INTERNATIONAL ASSOCIATION FOR THE STUDY OF TRADITIONAL ENVIRONMENTS

W O R K I N G   P A P E R   S E R I E S

HOUSES AND COURTYARDS

Gizem Kahraman

Falah AlKubaisy

Mohammed Mashary Alnaim

Erna Nuralia Zharani, Gehan Selim

HOUSES AND COURTYARDS

THE VERNACULAR PRODUCTION OF DOHA COURTYARD HOUSES:
FROM QATARI FAMILIES TO MIGRANT WORKERS

Gizem Kahraman

THE VERNACULAR PRODUCTION OF DOHA COURTYARD HOUSES:
FROM QATARI FAMILIES TO MIGRANT WORKERS

◆ ◆ ◆

This paper explores the ongoing vernacular production of courtyard houses in Doha, Qatar, throughout their modern history—by Qatari families in the past and by migrant inhabitants today. By analyzing these houses' material culture, built environment and through ethnography, the study elaborates on changes and continuities in the domestic spatialization of these two different population groups and the neighborhoods in which they are located in. The paper focuses on commonalities and differences of 'vernacular' production of these houses by extended Qatari families in the past and their contemporary 'spontaneous' reproduction by the migrant community in Qatar. The study demonstrates that methods of socio-spatialization of these two population groups have largely persisted notwithstanding their divergent lifestyles, socio-economic conditions as well as the immensely transformed socio-economic setting of Qatar.

With its focus on ethnographic data along with documentation of architecture and material culture, this research concentrates on the social processes of urban and architectural production, rather than the final product. Through the Qatari example, it narrates a story of change in worldwide urban and architectural production through modernization and capital accumulation, and the relevance of people's ongoing architectural practices within this dynamic context. It also documents the accumulated multi-ethnic architectural heritage in Doha's courtyard houses, including the understudied homemaking practices of the migrants.

1. INTRODUCTION: RESEARCH BACKGROUND, METHODOLOGY AND SIGNIFICANCE

This research takes place in some of the few remaining and continuously inhabited neighborhoods in central Doha that originally belong to pre- and early years of oil production in the state of Qatar. One of the significances of these neighborhoods and houses is their continuous socio-spatial production by their residents for over 70-years, notwithstanding the shift in predominant modes of spatial production in Qatar from vernacular to modern. By examining this continuous socio-spatial production in Doha's courtyard houses, the paper demonstrates the practical parallels between 'vernacular' and 'spontaneous' domestic spatialization.

The term spontaneous architecture and its synonyms (i.e., informal) are used to describe a mode of architectural production that "transgress the formal codes of the state in terms of land tenure, urban planning, design and construction"[1]. These formal codes were largely non-existent in the pre-modern world, in which residents themselves predominantly produced their own dwellings. In this regard, one of the hypotheses of this research is that underneath the stylistic, materialistic, and temporal differences between 'spontaneous' and 'vernacular' architecture, their socio-spatial production is based on the same practical principles. Several architects and scholars[2] emphasize the practical parallels between vernacular and informal architecture. Among them, architect, and academician Amos Rapoport[3] suggests 'spontaneous settlements' to be the closest contemporary equivalent of vernacular design. Both vernacular and informal architecture are

produced by the participation of the users themselves who design and adapt them incrementally based on their needs, values, and ways of life. They both represent the economic fundamentals of construction in a specific region and are responsive to their environmental context[4]. I seek to test this hypothesis through a social analysis of 'vernacular' production of Doha's courtyard houses by the Qatari families in the past and their 'informal' reproduction by migrants today. In doing so, I demonstrate practical continuities and changes in what are considered as 'vernacular' and 'informal' production of these houses.

Assessing the 'vernacular' and 'spontaneous' continuities and differences of people's production of courtyard houses of Doha calls for an understanding of the significant socio-economic changes Qatar went through since the initial production of these houses by Qatari families 70 years ago. In the past seven decades, Qatar went through a rapid modernization and urbanization process accompanied by a drastic shift in the dominant modes of socio-spatial production. While this shift is elaborated in more detail in the following section, broadly speaking, communal decision-making and production of the built environment was replaced by the government bodies and specialized contracting firms respectively. The shift in the broader contextual and temporal parameters of architectural production is crucial in understanding of the concepts of vernacular and spontaneous architectural production.

At the same time, to assess the continuities and changes people's production of Doha's courtyard houses, a thorough understanding of the population groups that produce them in the past and today is necessary. To understand the domestic socio-spatial production in the courtyard houses of Doha by Qataris and migrants, I refer to Rapoport's approach[5] in studying the 'activity systems' among particular 'lifestyle groups' in understanding the changing relationship between the use of space and built environment in these houses. His approach departs from his objective of understanding the relationship between the built environment and culture. However, since culture is a theoretical construct that is too global and too abstract[6] that is neither visible nor observable, Rapoport[7] seeks for more concrete and potentially observable social expressions of culture—such as family and kinship structures, social networks, status hierarchies, religious institutions, gender roles, groups, networks, relationships, and behaviors. These manifestations of culture often have settings associated with them or reflect in the built environment. Secondly, Rapoport seeks increasing specificity: going from culture through world views and values to lifestyles and activities. The concept of activity systems—which includes the combination of several activities—is also used by other scholars to understand the relationship between culture and the built environment[8]. Chapin & Hightower[9] analyze activity systems in categories such as religious, socializing, or educational activities. In terms of lifestyles groups, despite the ethnic diversity of the migrant population living in the courtyard houses of Doha, this population share a uniform lifestyle shaped by their similar income levels, occupations, and migrant statuses

in the host country. Similarly, my ethnographic data suggests that lifestyle groups and activity patterns of the Qatari families in the pre- and early oil periods living in my research houses can be elaborated uniformly.

This research draws on three types of data: published sources, on-site observation and documentation, and ethnographic data. Published sources include existing literature, historical records and maps, and historical aerial photography. The greatest dataset of the research is comprised of on-site observation and photographic documentation of the material culture, built environment, domestic and public life in my research neighborhoods and houses between 2015 and 2019. Ethnographic data gathered and used in this thesis includes oral history interviews with ten Qatari citizens who lived in the courtyard houses during the early-oil period. The interviews include drawing together the citizens' old house plans and their transformations, as well as questions with images regarding the locations of their old homes and architectural features inside them. One interview included a session in the form of a neighborhood and house tour with a former Qatari resident who previously resided in one of my research neighborhoods. I visited and documented 85 houses located within my four research neighborhoods and conducted interviews with 135 of their contemporary, male migrant inhabitants, primarily from South Asia and North Africa. A significant majority of this migrant community work in the construction and service sectors and their income levels can be categorized as low in the host country.

With its focus on ethnographic data along with documentation of architecture and material culture, this research concentrates on the social processes of urban and architectural production, rather than the final product. Through the example of Qatar, this study narrates a story of change in worldwide urban and architectural production through modernization and capital accumulation, and the relevance of people's ongoing architectural practices within this dynamic context. It is also critical for recording, analyzing, and presenting a historical narrative of a 70-years-long architectural production that is on the verge of disappearance as a result of ongoing regeneration projects in Doha. In fact, some of the courtyard houses studied in this research have already been evacuated or demolished. While there are sources on vernacular architecture of Qatar[10], the concentration of this research on its social production process is distinctive[11]. Furthermore, while several sources allude to migrants' inhabitation in the Gulf [12], limited sources cover their domestic lives, architectural production, and homemaking practices[13]. In this regard, this research is distinctive for the documentation and study of the accumulated multi-ethnic architectural heritage in Doha's courtyard houses, including the understudied domestic lives and homemaking practices of the migrants in Qatar and the wider Gulf region.

2. CHANGING MODES OF ARCHITECTURAL PRODUCTION IN QATAR: FROM VERNACULAR TO MODERN MODES OF SPATIALIZATION

The development of my research neighborhoods largely dates to the 1950s, when the onset of Qatar's exploitation of hydrocarbons brought along extensive changes to the peninsula at various levels—including the built environment. Doha—once a small fishing and pearl-diving village—promotes itself today as an emerging international transportation and service hub, using themes including sports, education, and cultural tourism for the international branding of the city[14]. Although Doha's decisive transformation started with the first shipment of crude oil from its shores in 1949[15], its pace was relatively slow in the beginning. In the 1950s, the housing typology largely remained yard-oriented, one-or-two-story structures responsive to the climate and cultural norms of the people, despite the introduction of new building materials and increased buying power of the population.

The first signs of urban planning appeared during this period in the form of a grid street layout, which was implemented in two of the neighborhoods this study concentrates on: Al Hitmi and Old Al Ghanim. However, historical aerial photographs indicate that the other two neighborhoods this research focuses on— Al Najada and Al Asmakh—continued to grow organically in the same decade based on individual and communal acts of the extended families (Fig.1). Regardless of their urban layout, each house in these four neighborhoods demonstrates a unique layout and design, proving them to be the products of their users based on their needs, economies, and preferences. Furthermore, the interviews I conducted with Qatari nationals and local heritage-experts suggest that the houses' inhabitants and their neighbors continued to participate in the decision-making, design, and a significant portion of their construction.

Fig. 1: Maps of Qatar, Doha, and central Doha indicating the fieldwork neighborhoods in relation to socio-politically significant places, 2021. (Google Earth image, edited by © Gizem Kahraman)

The participatory process of the residents in the design and construction of their houses changed drastically in the following decades. This change was mainly the result of introduction of new government bodies for urban planning and Western building types for housing. Following Qatar's declaration of independence in 1971, the newly formed Ministry of Municipal Affairs (1972) became responsible for Qatar's spatial and infrastructural development[16]. Under the supervision of foreign consultants, the ministry started preparing master plans for Doha's development and introducing standards and regulations for its built environment, along with new construction materials and techniques to the building sector. The design and implementation of these new materials and building standards, which were originally designed for Western building types, required expertise foreign to the region and its inhabitants. As a result, the state started replacing the inhabitants—as the agency of decision-making—with specialized contracting firms and foreign labor replacing the inhabitants—as the designers and implementers—in the production of the built environment.

During this period, many Qatari families moved out from their courtyard houses in central Doha to Western style villas in the newly formed outlying suburbs. The translocation was the result of state acquisition of privately owned land in Doha's historical core for redesign and development as well as the land and housing grants provided by the Qatari state to its citizens—a practice still in operation[17]. As a result, a significant portion of the pre and early oil neighborhoods were demolished for redevelopment while the remaining older courtyard houses were rented to the migrant workers by their Qatari owners. Some owners divided their houses into smaller units, renting them out primarily as shared accommodation. Over time, increased migration into Doha and rising rents led to more crowded houses. Both the house owners and their new migrant residents adapted them through further divisions and constructed new architectural units and extensions.

3. AN ONGOING TRANSFORMATION: QATARIS' CONTINUOUS VERNACULAR PRODUCTION OF DOHA'S COURTYARD HOUSES

Throughout the changing context of urban and architectural production in Qatar in the past 70-years, the courtyard houses of Doha also went through constant transformation. While the alteration of Qatari families with migrants can be regarded as a bigger shift in terms of changing lifestyles and activity systems[18] of the inhabitants of these houses, it is also important to note that the Qatari families also constantly reproduced these courtyard houses throughout their occupancy. Although most of these houses are known to be constructed and inhabited by Qatari families—which is also a historically heterogeneous group—my ethnographic fieldwork demonstrates that some of the houses in my research neighborhoods were inhabited by families of other Arab and Iranian origins as early as 1960s[19]. This is not surprising as Doha witnessed

migration from other Arab populations alongside Pakistanis, Indians, and a smaller number of Europeans throughout the 1950s and 60s[20]. By 1959, the number of foreign nationals was already greater than the number of Qataris[21]. Even before the start of the oil industry, Doha was home to demographically heterogeneous groups, and this social diversity was reflected in the compartmentalization of the town's layout according to the tribal roots and geographical origins of the people[22]. Nevertheless, the districts became demographically more heterogeneous over time[23].

Similar to vernacular buildings elsewhere in the world, courtyard houses are well-suited to incremental growth in people's pursuit of an economical path[24]. In the pre-oil period, an average Qatari courtyard house would be composed of a rectangular walled yard, accommodating at least one single-story, multifunctional building volume abutting perimeter walls. Wealthier households would also accommodate a *liwan*—a shaded, colonnaded veranda in front of the rooms where the family would spend time and a *majlis*—an area of reception and entertainment for the male house visitors. Small additional and often temporary structures located elsewhere in the yard served as kitchens, washrooms, and animal pens. However, an enclosed kitchen as well as an individual bathroom or toilet were among the dispensable features of an ordinary pre-oil house and mainly wealthier houses would incorporate them[25]. Each multifunctional building volume inside the courtyard—consisting of only a room—housed a nuclear family. As the children grew up, married, and had children of their own, families added new rooms on four sides around the central yard and the houses grew incrementally while keeping their uniformity[26].
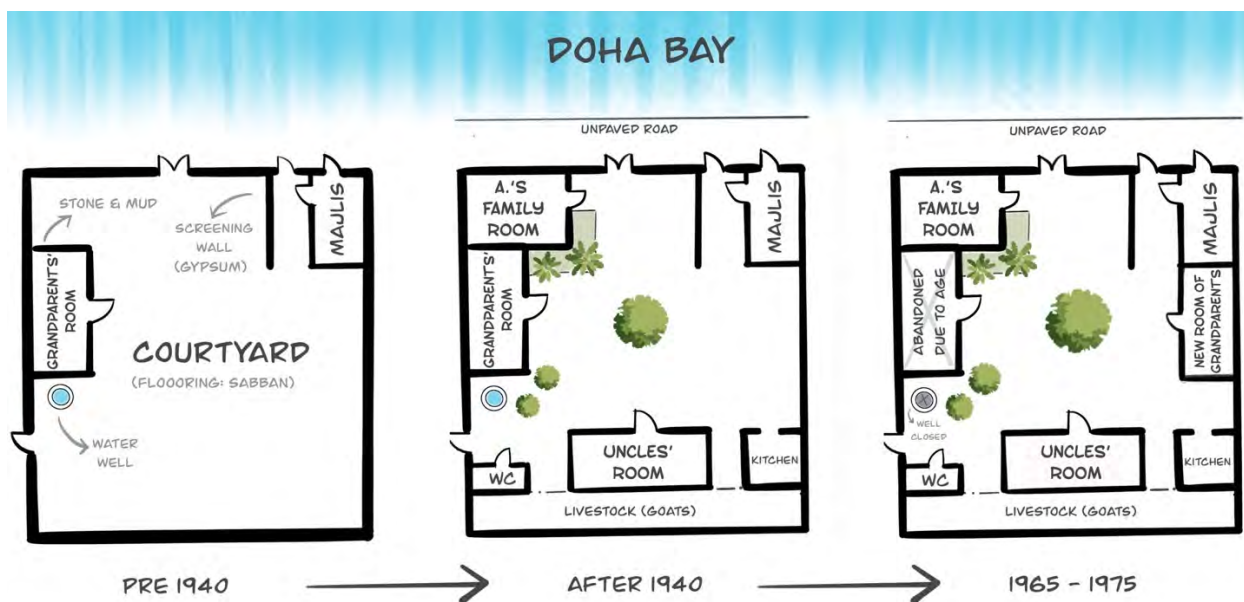

Fig. 2: Transformation of Fatima al-Hitmi's house. (Drawing by © Gizem Kahraman)

My oral history interview with Amna al-Hitmi and her mother Fatima al-Hitmi[27] sheds light to the gradual transformation of Doha's courtyard houses during the pre- and early oil periods. Fatima is originally from Bahrain and belonged to Al Bin Ali tribe who are also present in Qatar. She got married with another Al Bin Ali tribe member in Qatar in the 1940s and moved to Doha. Her husband belonged to the family of al-Hitmi, which is a leading family name of the Al bin Ali tribe, and they lived in the neighborhood which shares the same name with their family. According to Fatima and her daughter Amna, the Old Al Hitmi neighborhood which they lived in was not designated for their occupation by the ruler or anyone else. The family chose the location, settled, and their "village" grew year by year—adding new houses as families grew larger and new members moved in. All of their family members in Doha lived in the same district named after their family: 'Al Hitmi'. Besides the members of the al-Hitmi family, it is possible that their retainers and allies lived in the same district[28].

A continuous wall on four sides—divided by four gates—surrounded their house. The two oldest structures in her house were the room inhabited by Amna's grandparents—abutting the western wall—and the *majlis*—abutting the north-eastern wall (Fig. 2). They had an ornamented screening wall made of gypsum which prevented the visual access of *majlis* guests to the courtyard, while at the same time welcoming them with decorative geometric patterns specific to the region. When Amna's mother Fatima arrived in this house from Bahrain upon her marriage, they added a new family room in the north-western corner of the yard, while Amna's uncle's family room—who also got married and had a nuclear family of his own—was added in the south of the yard. When Fatima first arrived in the house, they did not have an enclosed kitchen or a toilet[29]. In the years following, they built up a semi-enclosed kitchen space, a toilet and fenced an area to place their livestock. They also decided to build a new room for Amna's grandparents because their old stone room had deteriorated. They did not demolish this old structure but built a new one abutting the eastern wall—next to the *majlis*—out of newly introduced cement blocks during the early oil period. Amna was born in 1965 and spent the early years of her childhood in this house until their translocation in the 1970s.

Comparable to vernacular architecture worldwide, the construction of courtyard houses was a participatory process based on inherent knowledge and participation[30]. Both the literature and my Qatari interviewees suggest that, in the past, extended family members, relatives and friends would assist with the addition of a new room to the house[31]. Mohammed Ali Abdullah Abel—the architect behind many rehabilitation projects in Qatar, including Souq Waqif—suggests that building was a collective activity that happened via shared cultural memory[32]. A Qatari interlocutor, Khalifa (interview, 31 March 2016), recalls using cement blocks throughout the 1970s to build new rooms onto his house. He remembers the construction as a joyful event when the whole family and their neighbors gathered to help. Khalifa's family built a kitchen, a room for his uncle when he got married, and a separate room for the children when they were old enough. They continued

adding rooms to their house as their family grew, stopping only when there was no free space left[33]. According to my Qatari interlocutors, Iranians and *Arab Faris*[34] are the two exclusive population groups who practiced expert construction work during the pre-oil and—increasingly—in the early oil periods, thanks to the rising purchasing power of the population[35]. Accordingly, when a family required expertise in construction, they headed to the section of the market known as Iranian market *(souq Irani)* to find a builder (*bannai*) or a master builder (*ustadh*). Nevertheless, the presence of an *ustadh* did not mean disengagement of a household in the design and construction process, and hence the abandonment of vernacular practices. The client would help the design, the builder would understand the client's needs, and both would work as a laborer in the construction as Professor of Folklore Henry Glassie[36] suggests being the case for vernacular architectural production in general.

Being prudent about the use of materials and time, seeking the most pragmatic building for the least effort and cost, vernacular buildings present the economic fundamentals of construction for a specific region[37]. When Nasser al-Othman depicts the town of 1949, he states "Most of the population lived in simple buildings made of stones and mud which mushroomed in tight little clusters, both because of the tight family structure of the society, and because building a new room onto existing buildings saved the cost of one wall" [38]. Besides demonstrating the impact of the social structures during pre-oil urbanization, his statement demonstrates the limited economic capacity people of Doha had before the oil industry. While there were significant gradual changes in public services and the built environment, the population's economic power changed rather slowly during the first two decades of oil industry as well. One of my Qatari interlocutors, Abdulla, describes the economic situation in the 1960s and '70s as follows:

> "Our life at that time was not very comfortable. In the morning we would eat bread with tea, no cheese or anything. Maybe milk if your neighbor has a cow, they will send you a little, or from the goat. Very simple. And I remember that if our lunch is with chicken, oh, it is a big celebration!"[39]

Nevertheless, and although the process was slow, the rising purchasing power of the population started showing its impact in domestic architecture during the early oil period. The simple buildings built out of stone and mud comprised majority of the ordinary houses of the pre-oil period, while the wealthier houses stood out with their size, accommodation of a second story and decorative architectural elements[40]. In the early-oil period, the number of courtyard houses with building volumes enclosing the courtyard on four sides and the incorporation of a second story increased. Ordinary houses started affording a *liwan,* a *majlis*[41] as well as decorative architectural elements previously restricted to wealthier sector of the population[42]. I suggest that another reason for the spread of such decorative elements was the use of industrial building materials which did not require as much craftsmanship. Imports, tools, and technologies initially introduced for commercial

and state projects were incorporated into domestic architecture by the mid-1950s[43]. Elements such as shell-tempered concrete blocks, square machine-cut timber—later followed by cement blocks and reinforced concrete—started being used in courtyard housing[44].

One of the characterizations of vernacular architecture is its utilization of "locally available building materials" [45]. Nevertheless, for the case of pre-oil Qatari vernacular architecture, available resources were rather scarce. Doha's residents depended on the outside world for almost everything they needed for daily life—including basic foodstuffs, clothes, along with some construction materials in exchange of pearls[46]. The livelihood of the townspeople depended upon the sea which was reflected on the formation Doha stretching along the shoreline. While some fundamental elements of Qatari architecture—including stone and clay-rich mud—were locally available, Qatar relied on its trade links for wood, which was used in the form of beams, doors, and windows. In the 1960s and '70s, shell-tempered cement blocks—locally produced with a type of sand rich in small gastropods—was among the 'locally available materials' in Doha[47]. During the first few decades of oil exploitation, beaten-out oil cans which was a by-product of the industry were also used by the inhabitants for informal housing in Doha[48].

4. "SPONTANEOUS" REPRODUCTION OF DOHA'S COURTYARD HOUSES BY THE MIGRANT COMMUNITY

Following the adoption of Doha's courtyard houses by the migrant population, spatial organization, and use of space in the courtyard houses changed as a result of altered lifestyle groups' and their 'activity systems'[49] and significantly increased house populations. The expatriate community living in these houses are primarily male, migrant workers with a low-income economic status in Qatar. The nationalities I encountered in my research houses, in the order from highest to the lowest frequency were Pakistanis, Bangladeshis, Indians, Nepalis, Iranians, Sri Lankans, Egyptians and Afghans, Sudanese, a few Ethiopians and finally one Chadian. Although there are also smaller number of families living in these neighborhoods, I have only encountered three family units in the courtyard houses, I had access to only one of them but could not encounter any female interlocutors throughout my visits[50]. Hence, the entirety of my 135 interlocutors in 85 houses I visited were male and they used the courtyard houses as shared accommodations through renting a bedspace inside them.

Their economic condition is one of the most important determinants behind the male migrant community's spatial and material production in these houses. Migrant inhabitants commonly increase per room bed space and seek ways of reducing their expenses as per their intentions of saving most of their salaries to send in the form of remittances to their countries of origin[51]. Their economic condition and temporariness in these

houses and the host country also reflect on their material production. Notion of temporariness[52] leads the migrant community to apply short-term architectural solutions while their limited income is the main determinant behind the material choices used in these solutions. They resort to low-cost—if not free— materials at their disposal or within easy reach. Furthermore, migrant community utilize and bring together their personal and occupational skills in the adaptation of their shared houses as majority of them are occupied in jobs related to various branches of construction—including plumbing, painting, masonry, electricity, plastering and carpentry. This also eases their free access to building materials and tools they use to adapt and maintain their homes. Moreover, they collect materials from second-hand markets, through their social networks, and from around their neighborhoods where the construction projects are always ongoing, and construction sites become a source of discarded materials that migrants make use of[53].

The rising population of the houses has resulted in changes to their spatial organization and the designation of new functions to both the existing and newly produced spaces. The owners or the expatriate residents make spatial adaptations to increase bed capacity within the houses, either by adapting and assigning new functions to existing spaces or by constructing new units in the available spaces. It is common to encounter an old, enclosed kitchen or a *majlis* transformed into a bedroom. Additional bedroom units are constructed either in available open spaces inside courtyards or on the first floors and rooftops of houses. As the bedrooms occupy most of the fully enclosed and previously open, non-built areas, they usually squeeze other domestic functions into the remaining spaces. The inhabitants either build additional units to be used as kitchens, bathrooms and toilets or construct them within the existing architectural elements. An example of this is the semi-open kitchen spaces built under the *liwan*. To demonstrate the above-mentioned transformations in the spatial organization of the courtyard houses, I present a medium-sized, high-density case study house. Based on historical aerial photography and my architectural investigations inside the house, I draw a hypothetical reconstruction of the house's historical layout and transformation of its built area throughout the years (Fig. 3).

While the entire neighborhood of Al Hitmi[54] seems to have been non-existent in the aerial photography of 1953, the 1959 aerial photograph[55] reveals that the H3 house had already been built by 1959 (Fig.3). Based on aerial photography from the years 1959, 1966 and 1977[56], three individual units were present in the house until 1977. From my on-site observations of architectural features, I suggest that two multifunctional family rooms and a *liwan* extending to the north of these rooms composed the volume located on the south-west corner of the boundary walls. This unit seems to have remained structurally unchanged to a large extent, based on aerial photography and the visible architectural features remaining from the pre- and early oil eras. During a visit to the house with my Qatari interlocutor Said[57], he suggested that the old house owner had

been a wealthy person due to the size of the house— which is roughly 24m by 19m—the presence of the *liwan* as well as the decorative elements. Inside the architectural unit located on the south-east corner of the house, the presence of two windows facing the street proves it to be the *majlis*[58]. While the north-eastern building volume seems to be composed of two different units in pre-1993 aerial photography, they seemed to have unified at the roof level between 1977 and 1993. The larger unit could have been a room and the most probable scenario for the smaller section in the north-eastern corner would be a kitchen or a bathroom due to its size and location on the north-east[59].
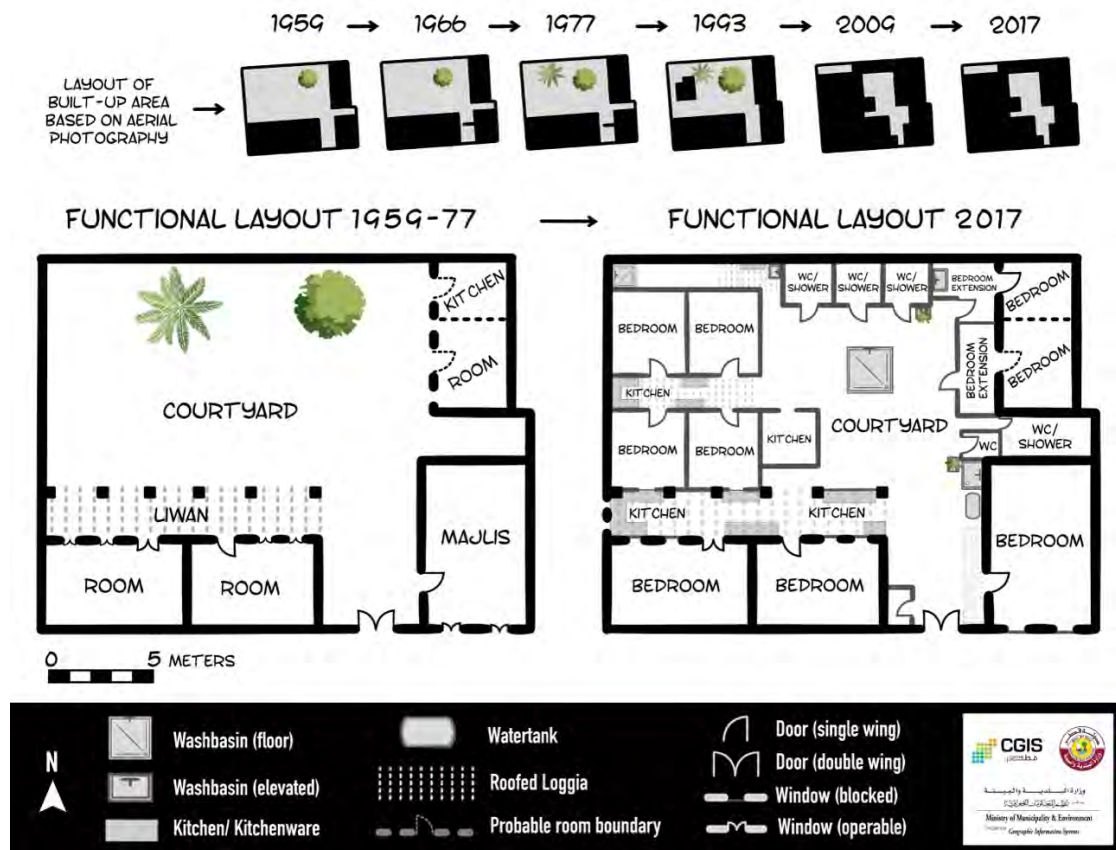

Fig. 3: Transformation of house H3 through historical aerial photography and sketch layouts. Aerial imagery courtesy of the CGIS of the MME (Sketches by © Gizem Kahraman)

I visited the house five times between November 2015 and February 2019 and did not see a remarkable change in the built environment between my visits. According to aerial photography, the house appears to have attained its 2015-2019 state by 2009, in terms of the built-up area. Based on the interviews I conducted in November 2017, Bangladeshis, Indians (Keralites) and one Nepali resident who shared a room with his Bangladeshi colleagues inhabited the house. There was a total of nine bedrooms and around 40 inhabitants, based on the accounts of my interlocutors and my observations. The increase in the number of occupants

from a maximum of three nuclear families—of a single extended family—to around 40 migrant workers resulted in some significant changes in the spatial layout of the house. The accommodation of the latter population necessitated an increase in bed-space capacity—which was satisfied with the addition of four-bedroom units in the north-western part of the courtyard and the conversion of the existing *majlis* and what hypothetically used to be a kitchen space into a bedroom (Fig. 4). The rooms accommodated four to five people. Besides beds for sleeping, they accommodated the resident's clothes, baggage, kitchenware, dry food and other personal items. Due to the lack of space inside the bedrooms, migrants' personal belongings often extended out into the courtyard, the *liwan*, and into the additional enclosed units attached to the bedrooms that serve as bedroom extensions (Fig. 4). They also stored clothes and shoes outside bedroom entrances. In all my visits, what remained of the common courtyard area accommodated the resident's drying laundry, making it difficult to use the courtyard for circulation, let alone any other purposes. Escalation in the number of residents also resulted in the need for increased space for cooking, storing, showering and more toilets. Five shared toilets and four integrated showers were added in the form of additional units on the northern boundary wall and in a small gap between two architectural units on the eastern wall. An enclosed kitchen unit was also added in the middle of the courtyard, next to the four additional bedroom units. However, the inability of one kitchen to fulfil the needs of 40 residents resulted in the migrants' construction of additional cooking spaces underneath the old *liwan* and the new roofed space between the new additional rooms. Some stored their kitchenware around the cooking areas; some preferred storing their own items inside their rooms: under their beds or on shelves.

Bedrooms are used for a wide range of functions throughout the day by the migrant population, just like they did during their occupation by the Qatari families. In the past, each nuclear family had a separate multifunctional room used for eating, sleeping, studying, playing, storage including dry food, and other daily activities[60]. The presence of only lightweight, portable furniture eased the shift of activities throughout the day. However, migrants' houses and rooms are mainly composed of bulky furniture that is difficult to dislocate. Nevertheless, the spaces, which at first glance seem to be functionally fixed, accommodate a variety of functions in migrants' domestic lives. A constant motion and entanglement of activities are apparent inside the houses, especially on Fridays. Migrants use the bedrooms for preparing food, eating, socializing, and hosting guests besides being used for sleeping and storing food, personal belongings, and domestic items. Some rooms accommodate table and chairs, a fridge, along with an attached bathroom for the exclusive use of that bedroom's inhabitants.
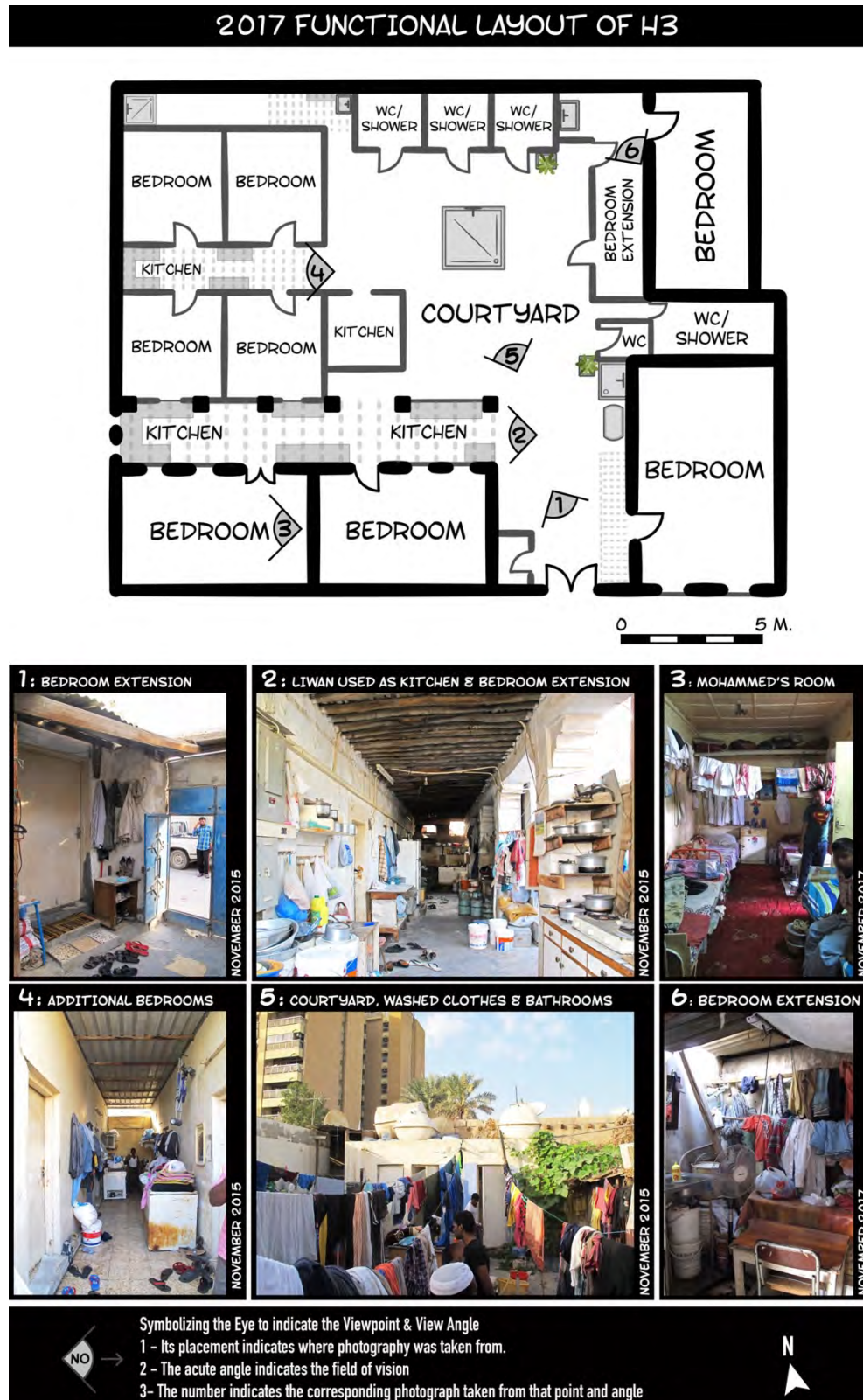
Fig. 4: Functional Layout of H3 and photographic documentation of the house (Photos and sketch: by © Gizem Kahraman)

5. CONCLUSION: TRANSFORMATION THROUGH VERNACULAR AND SPONTANEOUS

One of the most prevalent qualities when we seek to visualize vernacular architecture worldwide would most likely be a material and architectural uniformity that is peculiar to a region. For pre-oil Qatar and the wider Gulf region, the image of vernacular architecture is commonly mud-washed buildings placed organically in tight clusters and separated by narrow shaded winding alleyways. Local architects and scholars describe the reason behind this specific architectural and material formation mainly through environmental, economic and resource restrictions besides its reflection of people's ways of life and participation in architectural production[61]. Scholars of vernacular architecture use the same characteristics in defining vernacular architecture worldwide[62].

Studying the past 70-years of Doha's courtyard houses reveals numerous practical continuations in their spatial production, despite the change of their inhabitants and the drastic contextual change around where these houses are located. Population, economy, urbanism, and dominant modes of architectural population in Qatar changed immensely. Nevertheless, people's participatory production of the courtyard houses continued. One of the reasons of this was the continuation of communal living by the migrant community in these houses similar to the communal living in the neighborhoods of extended Qatari families in the past. Although, some of my migrant interlocutors expressed the difficulties of living in crowded houses, they also emphasized the importance of collaboration and sharing in their everyday domestic lives. The collaboration also takes place when the migrant community bring their individual skills, knowledge, and their available material resources in the reproduction and maintenance of their houses in Doha. Although my 135 migrant interlocutors belonged to eleven different nationalities and even more diverse ethnicities, there was a consistent and repetitive architectural and material language in their spatial production. However, as opposed to the pre-oil vernacular architecture, this architectural and material consistency is much more difficult to detect, due to the material clutter which obstructs the pattern behind this architectural language at first glance.

One of the most significant reasons behind the repetitive and pre-constrained expressions behind vernacular architecture in general[63] and the continuing informal production of these courtyard houses is the economic and material scarcity. Pre-oil architecture utilized the limited locally available materials of the time, along with some imported materials via trade links, therefore demonstrated a uniform style specific to the region. Throughout the centuries prior to industrialization, urbanization and the formation of further global connections, this style reflected a variation of the folk architecture of the Gulf region—with variations in each locality. Local communities utilized the locally available building materials or the easiest resources they can import via trade links which dictated the architectural qualities of their homes. For instance, mangrove beams (*danjal*) imported from East Africa were laid in the short-span direction of rooms, dictating the room width.

The length of these beams ranged between 2.5-3 meters; hence a typical room would be 3 by 4 meters[64]. For the case of migrants' reproduction of these houses, one of the formal determinants is the pre-existing boundaries of the courtyard houses acting as a pre-constraint. Migrants construct additional units or adapt within the allowance of external boundaries of and the available free spaces within these houses. The courtyard houses continue to grow incrementally, as they did in the past. This has led to repetitive spatial solutions which have led me to label as "*liwan* kitchens"—which are the kitchen units migrants construct under the *liwans* (Fig. 5), "cabinet kitchens"—which are semi-open kitchen units often constructed from timber boards (Fig. 6), or "DIY bed-spaces"—which migrants construct in available spaces on the rooftop as a place for relaxation and individual privacy (Fig. 7).

Fig. 5: A collage of kitchens built under the *liwan* by the migrant community (Photos by © Gizem Kahraman, 2015-

2019)

Fig. 6: A collage of "cabinet kitchens" built by the migrant community (Photos by © Gizem Kahraman, 2015-2019)

Fig. 7: A collage of "DIY Bedspaces" built by the migrant community (Photos by © Gizem Kahraman, 2015-2019)

Another pre-constraint of migrants' architectural reproduction of these houses is their limited economic means and materials at their disposal even though they utilize whatever material they can gather for free or purchase cheaply. Cement blocks and lightweight construction materials that are easy to find and install—such as timber boards (i.e. plywood, MDF), plasterboards and corrugated metal sheets—are among the commonly used materials in migrants' production of additional units and divisions. The ones that work in the construction sector bring them for free from their workplaces, also utilizing the second-hand materials. Some migrants suggest they gather materials from around their neighborhoods as there are numerous construction sites and dumped second-hand materials at some sites. Besides such construction materials, second-hand or broken grocery store items become repeating elements inside the houses for various domestic functions, such

as Pepsi refrigerators, which are used for kitchenware storage; one I saw was even used as a laundry basket (Fig. 8).

Fig. 8: Pepsi refrigerators and signs used for various domestic purposes (Photos by © Gizem Kahraman, 2015-2019)

The concept of "locally available building material" that is emphasized in the production of vernacular architecture has changed significantly with industrialization and globalization—which Qatar has partaken. A discarded cabinet from their workplace or a broken Pepsi drinks cooler from the nearby grocery are among the most economically viable materials for the migrant population. Corrugated metal sheets, plywood or a piece of tarpaulin became the most easy-to-find and feasible material in the local market or as a by-product—not only in Doha but throughout the world. For this reason, on one hand, high-density informal architecture in urbanized cities looks alike. On the other, the above-mentioned materials are particularly suitable and sufficient for the hot climate of Qatar since the spaces do not require insulation from the cold. Similarly, the climate of Qatar and its low yearly rainfall allow the common use of open and semi-open spaces for a variety of domestic activities. All of these local factors, along with migrants' limited resources, impact their formation of a consistent architectural language in the production of informal architecture in the courtyard houses of Doha.

While the courtyard houses offer more available space for adaptation when compared to other housing types, migrant community also adapt other housing types including apartment buildings and labor camp accommodations[65]. Their adaptation of older houses is also present in many cities in the Gulf region including Bahrain[66], the UAE [67] and Kuwait. Not only was pre-oil vernacular architecture almost identical across the region, so too is the contemporary vernacular spatialization of the migrant population living in these houses today. During my visits to several houses in Kuwait City in 2017, I noticed that migrants' spatial re-organization and use of materials were strikingly similar to those in Doha. As a result of migrants' similar economic conditions and the availability of identical construction materials in their host country, migrants have also utilized identical materials including corrugated metal sheets, timber boards, and cement blocks.

House interiors also reveal a similar collective life to that found in Doha's courtyard houses. Additional units, enclosure of existing spaces and their functional repurposing are among the solutions migrants employ to fit into these houses. This research has shown the presence of a consistent "migrant vernacular architecture" in the courtyard houses of Doha. Further research in the region has the potential to demonstrate a "migrant vernacular architecture in the Gulf" that goes beyond Qatar and a specific housing or accommodation type. Studying migrants' spatial production has a lot to teach decision-makers, architects, and designers on how to create better living environments for the migrant population in the Gulf and beyond. Their architectural solutions demonstrate the most sustainable and economically viable solutions for the specific region and circumstances they live in. In this regard, the study of migrant vernacular architecture in the Gulf links to a larger literature about informal architecture worldwide. It also contributes to a collective process of learning from people's architectural production, which in turn can help the creation of user-responsive solutions—not only for the migrant population but for everyone.

NOTES AND REFERENCES

[1] Kim Dovey, "Informalising Architecture: The Challenge of Informal Settlements," *Architectural Design* 83, no. 6 (November 2013): pp. 82-89.

[2] Rapoport, Amos, "Spontaneous Settlements as Vernacular Design" in *Spontaneous Shelter: International Perspectives and Prospects* (Philadelphia: Temple University Press, 1988), pp. 51-77. de Maat, Sytse. *The Perfect Slum: On the Symbiosis of People and Building* (Saarbrücken: Lambert Academic Publishing, 2016). Kellett, Peter, "Contemporary Vernaculars: Informal housing processes and vernacular theory," in *Journal of the International Society for the Study of Vernacular Settlements* 2, no. 1 (2011): pp. 2-12. Tang, Min, "Spontaneous as Contemporary Vernacular? An Analysis of Spatial Norms in Istanbul's "Gecekondu" Settlements" in *International Association for the Study of Traditional Environments, Kuala Lumpur,* 2014, pp. 75-76.

[3] Rapoport, Amos, "Spontaneous Settlements as Vernacular Design" in *Spontaneous Shelter: International Perspectives and Prospects*, Temple University Press: Philadelphia, 1988, pp. 53,63.

[4] Oliver, Paul. *Encyclopedia of Vernacular Architecture of the World.* Cambridge University Press: Cambridge and New York, 1997: p. piii. Brand, Stewart. *How Buildings Learn: What Happens After They're Built.* Phoenix Illustrated: London, 1994, pp. 134-136.

[5] Rapoport, Amos, "Systems of Activities and Systems of Settings" in *Domestic Architecture and the Use of Space: An Interdisciplinary Cross-Cultural Study,* Cambridge University Press: Cambridge, New York, and Melbourne, 1990, p. 10.

[6] Kent, Susan, "Activity Areas and Architecture: An Interdisciplinary View of the Relationship between Use of Space and Domestic Built Environments" in *Domestic Architecture and the Use of Space: An Interdisciplinary Cross-Cultural Study,* Cambridge University Press: Cambridge, New York, and Melbourne, 1990, p. 2.

[7] Rapoport, Amos, "Systems of Activities and Systems of Settings" in *Domestic Architecture and the Use of Space: An Interdisciplinary Cross-Cultural Study,* Cambridge University Press: Cambridge, New York, and Melbourne, 1990, p. 10.

[8] Chapin, F. S. J, "Activity Systems and Urban Structure: A Working Schema," *Journal of the American Institute of Planners* 34, no.1 (1968): pp. 11-18.

[9] Chapin, F. S. J, H. C. Hightower, "Household Activity Patterns and Land Use," *Journal of the American Institute of Planners* 31, no. 3 (1965): pp. 222-231.

[10] Al-Kholaifi, M. J. *Traditional architecture in Qatar.* National Council for Culture, Arts and Heritage, Museums & Antiquities Department: Doha, 2006. Jaidah, Ibrahim, Malika Bourennane, *The History of Qatari Architecture: From 1800 to 1950.* Skira Editore: Milan, 2009. Mahgoub, Yasser et al., *An Illustrated Glossary of Traditional Qatari Architecture,* Qatar University: Doha, 2014.

[11] Along with the work of; Eddisford, Daniel, "The vernacular architecture of Doha, Qatar," *Post-Medieval Archaeology* 51, no. 1 (2017): 81-107. Nagy, Sharon, "Social diversity and changes in the form and appearance of the Qatari house," *Visual Anthropology* 10, no. 2-4 (1998): pp. 281-304. Kahraman, Gizem, "In Pursuit of a Modern Home: Shared Vernacular Temporalities and Modern Aspirations of the Nationals and Transnationals in Qatar," in *Houses Transformed: Anthropological Perspectives on Changing Practices of Dwelling and Building,* Berghahn: New York and Oxford, 2024 (forthcoming).

[12] Elsheshtawy, Yasser, "Transitory Sites: Mapping Dubai's 'Forgotten' Urban Spaces," *International Journal of Urban and Regional Research* 32, no. 4 (2008): pp. 968- 988. Elsheshtawy, Yasser, "Navigating the Spectacle: Landscapes of Consumption in Dubai," *Architectural Theory Review* 13, no. 2 (2008): pp. 164-187. Elsheshtawy, Yasser. *Dubai: Behind an Urban Spectacle.* Routledge: Oxfordshire and New York, 2010. Elsheshtawy, Yasser, "Little Space, Big Space: Everyday Urbanism in Dubai," *Brown Journal of World Affairs* 17, no. 1 (2010): pp. 53-71. Elsheshtawy, Yasser, "The Prophecy of Code 46: afuera in dubai, or our Urban Future," *TDSR* 22, no. 2, (2011): pp. 19-31. Elsheshtawy, Yasser, "Informal Encounters: Mapping Abu Dhabi's Urban Public Spaces," *Built Environment* 37, no. 1 (2011): 92-113. Elsheshtawy, Yasser, "Where the sidewalk ends: Informal street corner encounters in Dubai," *Cities* 31 (2013): pp. 382–393. Elsheshtawy, Yasser. *Temporary Cities: Resisting Transience in Arabia.* Routledge: London, 2019.

[13] Bruslé, Tristan, "Living in and Out of the Host Society. Aspects of Nepalese Migrants' Experience of Division in Qatar," *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research* 11, no.2 (2010). Bruslé, Tristan, "What Kind of Place is this? Daily Life, Privacy and the Inmate Metaphor in a Nepalese Workers' Labour Camp (Qatar)," *South Asia Multidisciplinary Academic Journal* (2012)*,* [Online] Available at: <https://journals.openedition.org/samaj/3446> [Accessed 23 April 2018]. Bruslé, Tristan, "Habiter un camp de travailleurs. Appropriation, usages et valeurs du dortoir en milieu contraint," *Annales de géographie* 702-703, no. 2-3 [Online] Available at: <https://www.cairn.info/revue-annales-de-geographie-2015-2-page-248.htm> [Accessed 23 June 2021], (2015): pp. 248- 274. Mehta, Sandhya Rao, James Onley, "The Hindu Community in Muscat: Creating Homes in the Diaspora," *Journal of Arabian Studies* 5, no.2 (2015): p. 156–183. Mohammad, Robina, James D. Sidaway, "Shards and Stages: Migrant Lives, Power, and Space Viewed from Doha, Qatar", *Annals of the American Association of Geographers* 106, no. 6 (2016): pp. 1397-1417. Kahraman, Gizem, Robert Carter, "Adaptation of heritage architecture in Al Asmakh, Doha: Insights into an urban environment of the Gulf," *Post-Medieval Archaeology* 53, no. 1 (2019): pp. 38-65. Kahraman, Gizem, "In Pursuit of a Modern Home: Shared Vernacular Temporalities and Modern Aspirations of the Nationals and Transnationals in Qatar," in *Houses Transformed: Anthropological Perspectives on Changing Practices of Dwelling and Building,* Berghahn: New York and Oxford, 2024 (forthcoming).

[14] Wiedmann, Florian, Ashraf M. Salama, Alain Thierstein, "Urban Evolution of The City of Doha: An Investigation into the Impact of Economic Transformations on Urban Structures," *METU Journal of the Faculty of Architecture* 29, no. 2 (2012): pp. 46-48.

[15] Hay, Rupert. *The Persian Gulf States.* Washington, D.C.: The Middle East Institute: Washington, D.C., 1959: pp. 108-109.

[16] Zahlan, Rosemary. *The Creation of Qatar.* Croom Helm: London, 1979: p. 112.
[17] Nagy, Sharon, "Social and Spatial Process: An Ethnographic Study of Housing in Qatar," PhD diss., University of Pennsylvania, 1997: p. 111. Nagy, Sharon, "Social diversity and changes in the form and appearance of the Qatari house," *Visual Anthropology* 10, no. 2-4 (1998): pp. 295.

[18] Rapoport, Amos, "Systems of Activities and Systems of Settings" in *Domestic Architecture and the Use of Space: An Interdisciplinary Cross-Cultural Study,* Cambridge University Press: Cambridge, New York, and Melbourne, 1990, p. 10.

[19] Said, in discussion with the author. 20 October 2019.

[20] Fletcher, Richard, Robert Carter, "Mapping the Growth of an Arabian Gulf Town: The Case of Doha, Qatar," *Journal of the Economic and Social History of the Orient* 60 (2017): p. 435.

[21] Hay, Rupert. *The Persian Gulf States.* Washington, D.C.: The Middle East Institute: Washington, D.C., 1959: pp. 108-109.

[22] Nagy, Sharon, "Making Room for Migrants, Making Sense of Difference: Spatial and Ideological Expressions of Social Diversity in Urban Qatar," Urban Studies 43, no. 1 (January 2006): p. 134.

[23] Fletcher, Richard, Robert Carter, "Mapping the Growth of an Arabian Gulf Town: The Case of Doha, Qatar," *Journal of the Economic and Social History of the Orient* 60 (2017): pp. 425-429.

[24] Brand, Stewart. *How Buildings Learn: What Happens After They're Built.* Phoenix Illustrated: London, 1994: p. 136.

[25] Nagy, Sharon, "Social diversity and changes in the form and appearance of the Qatari house," *Visual Anthropology* 10, no. 2-4 (1998): p. 284.

[26] Eddisford, Daniel, "The vernacular architecture of Doha, Qatar," *Post-Medieval Archaeology* 51, no. 1 (2017): 84.

[27] The interlocutor names of the Qatari and migrant population used in this paper are pseudonyms. Amna al-Hitmi and Fatima al-Hitmi, in discussion with the author. 29 May 2018.

[28] Fletcher, Richard, Robert Carter, "Mapping the Growth of an Arabian Gulf Town: The Case of Doha, Qatar," *Journal of the Economic and Social History of the Orient* 60 (2017): p. 454.

[29] Thanks to the proximity of the house to the sea, they would use the sea to defecate which was a common practice in the pre-oil period along with the use of empty plots covered with small sand dunes (Said, interview, 9 February 2019).

[30] Glassie, Henry, "Architects, Vernacular Traditions and Society," Traditional Dwellings and Settlements Review 1, no. 2 (1990): p. 12.

[31] Reisz, Todd, "Making Souk Waqif: Doha, Qatar - Mohammad Ali Abdullah," *Al Manakh: Gulf Continued* Volume #23 (2010): p. 427. Ahmad, in discussion with the author, 31 March 2016. Khalid, in discussion with the author, 12 December 2017.

[32] Reisz, Todd, "Making Souk Waqif: Doha, Qatar - Mohammad Ali Abdullah," *Al Manakh: Gulf Continued* Volume #23 (2010): p. 427.

[33] Kahraman, Gizem, Robert Carter, "Adaptation of heritage architecture in Al Asmakh, Doha: Insights into an urban environment of the Gulf," *Post-Medieval Archaeology* 53, no. 1 (2019): p. 50.

[34] Arab Faris or Arab bar Faris: meaning the Arabs from Fars—Iran. A population group originally of Arab descent, who migrated back to the Arabian side of the Gulf following their centuries-long residence on the Persian coast and islands (al-Dailami, 2014, pp. 301-302, 304). They are also commonly referred to as *Huwala, Hawala* (al-Dailami, 2014), *Huwla* (Fletcher & Carter, 2017) or *Hawla* (Nagy, 2006).

[35] Said, in discussion with the author, 9 February 2019; Faris, in discussion with the author, 4 June 2018; Amna al- Hitmi, in discussion with the author, 29 May 2018; Khalid, in discussion with the author, 12 December 2017.

[36] Glassie, Henry, "Architects, Vernacular Traditions and Society," Traditional Dwellings and Settlements Review 1, no. 2 (1990): p. 12.

[37] Brand, Stewart. *How Buildings Learn: What Happens After They're Built*. Phoenix Illustrated: London, 1994: p. 134. Oliver, Paul. *Encyclopedia of Vernacular Architecture of the World*. Cambridge University Press: Cambridge and New York, 1997: p. piii.

[38] Al-Othman, Nasser. *With their Bare Hands: The Story of the Oil Industry in Qatar*. Longman: London, 1984: p.3.

[39] Abdullah, in discussion with the author, 3 March 2019.

[40] Al-Othman, Nasser. *With their Bare Hands: The Story of the Oil Industry in Qatar*. Longman: London, 1984: pp. 2-3. Eddisford, Daniel, Robert Carter, "The vernacular architecture of Doha, Qatar," *Post-Medieval Archaeology*, 51, no. 1 (2017): p. 100.

[41] Nagy, Sharon, "Social diversity and changes in the form and appearance of the Qatari house," *Visual Anthropology* 10, no. 2-4 (1998): p. 291.

[42] Eddisford, Daniel, Robert Carter, "The vernacular architecture of Doha, Qatar," *Post-Medieval Archaeology*, 51, no. 1 (2017): p. 100.

[43] Nagy, Sharon, "Social and Spatial Process: An Ethnographic Study of Housing in Qatar," PhD diss., University of Pennsylvania, 1997: pp. 89-91.

[44] Eddisford, Daniel, Robert Carter, "The vernacular architecture of Doha, Qatar," *Post-Medieval Archaeology*, 51, no. 1 (2017): p. 86.

[45] Oliver, Paul. *Encyclopedia of Vernacular Architecture of the World*. Cambridge University Press: Cambridge and New York, 1997: p. pii.

[46] Onley, James, "Indian Communities in the Persian Gulf, c. 1500–1947" in *The Persian Gulf in Modern Times: People, Ports, and History*, Palgrave Macmillan: New York, 2014, pp. 231-236. Carter, Robert. *Sea of Pearls: Seven Thousand Years of the Industry that Shaped the Gulf*. Arabian Publishing: London, 2012.

[47] Eddisford, Daniel, Robert Carter, "The vernacular architecture of Doha, Qatar," *Post-Medieval Archaeology*, 51, no. 1 (2017): p. 86. Aïtzegagh, in discussion with the author, 23 April 2018.

[48] Lockerbie, John, personal communication, 2 March 2018. Lockerbie, John. *Gulf Architecture 03*, 2005 [Online] Available at: <http://www.catnaps.org/islamic/gulfarch3.html> [Accessed 20 April 2018].

[49] Rapoport, Amos, "Systems of Activities and Systems of Settings" in *Domestic Architecture and the Use of Space: An Interdisciplinary Cross-Cultural Study,* Cambridge University Press: Cambridge, New York, and Melbourne, 1990, p. 10.

[50] I had the opportunity of talking to just two husbands and one housemate in a total of three family houses. However, I could not access any female interlocutors, due to the absence of the female member at the time of my visit; not being invited into the house or not being given access to talk to the female member of the house. Hence, all my interlocutors were male.

[51] Kahraman, Gizem, "In Pursuit of a Modern Home: Shared Vernacular Temporalities and Modern Aspirations of the Nationals and Transnationals in Qatar," in *Houses Transformed: Anthropological Perspectives on Changing Practices of Dwelling and Building,* Berghahn: New York and Oxford, 2024 (forthcoming).

[52] Migrants' status in Qatar is temporary. Majority of my interlocutors had families in their countries of origin where they sent back their remittances. However, their stay in the country can be for prolonged periods in practice. Based on my interviews with 135 inhabitants, their average number of years in Qatar was 19.8 years and in their houses 15.5 years—at the time of my fieldwork conducted in late 2017.

[53] Tariq Khan, in discussion with the author, 19 November 2017; Batoor Shah, in discussion with the author, 14 November 2017.

[54] The current Al Hitmi neighborhood is different than the previously mentioned one in this paper. Based on my interview with a past resident of the current Al Hitmi neighborhood, the place used to be referred as "Omani neighborhood" in the past while the original Al Hitmi neighborhood was located next to it. In Doha, since the early 20th century, we can see similar transformation in neighborhood names.

[55] The Centre for Geographic Information Systems (CGIS) of the Ministry of Municipality and Environment (MME) of the State of Qatar has shared and granted permission to the author to use the historical aerial photographs for academic purposes.

[56] Ibid.

[57] Said, in discussion with the author, 9 February 2019.

[58] Majlis was the only room with windows located on the eye-level in the vernacular courtyard houses of Doha as it was only used by men and was not subject to privacy concerns. In contrast, it was expected to be welcoming and inviting for the visitors.

[59] Robert Carter, in discussion with the author, 25 May 2020; Richard Fletcher, in discussion with the author, 25 May 2020; Khalid, in discussion with the author, 26 May 2020.

[60] Said, in discussion with the author, 5 February 2019; Ahmad, in discussion with the author, 31 March 2016.

[61] Jaidah, Ibrahim, Malika Bourennane, *The History of Qatari Architecture: From 1800 to 1950*. Skira Editore: Milan, 2009: p. 25. Al-Othman, Nasser. *With their Bare Hands: The Story of the Oil Industry in Qatar*. Longman: London, 1984: pp. 2-3. Khalid, in discussion with the author, 12 December 2017.

[62] Oliver, Paul. *Encyclopedia of Vernacular Architecture of the World.* Cambridge University Press: Cambridge and New York, 1997: p. piii. Glassie, Henry, "Architects, Vernacular Traditions and Society," Traditional Dwellings and Settlements Review 1, no. 2 (1990): p. 12.

[63] Rapoport, Amos. *House Form and Culture.* Prentice-Hall, Inc.: Englewood Cliffs (1969): p.5. Hubka, Thomas, "Just Folks Designing: Vernacular Designers and the Generation of Form," *Journal of Architectural Education* 32, no. 3 (1979): p. 28.

[64] Al-Kholaifi, M. J. *Traditional architecture in Qatar.* National Council for Culture, Arts and Heritage, Museums & Antiquities Department: Doha, 2006: p. 135.

[65] Reisz, Todd, "Workers City," Al Manakh. Dubai: Stichting Archis (2007): p. 307. Elsheshtawy, Yasser, "Little Space, Big Space: Everyday Urbanism in Dubai," *Brown Journal of World Affairs* 17, no. 1 (2010): p. 63. Bruslé, Tristan, "What Kind of Place is this? Daily Life, Privacy and the Inmate Metaphor in a Nepalese Workers' Labour Camp (Qatar)," *South Asia Multidisciplinary Academic Journal* (2012), [Online] Available at: <https://journals.openedition.org/samaj/3446> [Accessed 23 April 2018].

[66] Gardner, Andrew. *City of Strangers: Gulf Migration and the Indian Community in Bahrain.* Cornell University Press: Ithaca and London (2010): p. 141.

[67] Elsheshtawy, Yasser, "Cities of Sand and Fog: Abu Dhabi's Global Ambitions" in *The Evolving Arab City: Tradition, Modernity and Urban Development*, Routledge: Oxfordshire and New York, 2008, pp. 978, 982-983. Alawadi, Khaled, "Urban Redevelopment Trauma: The Story of a Dubai Neighbourhood," *Built Environment* 40, no. 3 (2014): p. 356.

DESIGN ELEMENTS OF BUILDING COMFORT IN THE ARID ZONE CLIMATE OF ARABIAN COUNTRIES: THE SIGNIFICANT ROLE OF ORIENTATION AND COURTYARD LAYOUT

Falah AlKubaisy

DESIGN ELEMENTS OF BUILDING COMFORT IN THE ARID ZONE CLIMATE OF ARABIAN COUNTRIES: THE SIGNIFICANT ROLE OF ORIENTATION AND COURTYARD LAYOUT

◆   ◆   ◆

Most traditional houses in Arabian countries are built by using traditional construction materials with an orientation towards the South, aiming towards sunshine availability during Winter while reducing the confrontation of dust storms during the daytime, as well as the cold wind at night from the North or the West. Buildings use a courtyard layout design, where a passive solar design for the hot desert climate is dominating the arid zone climate.

These trends of vernacular architecture styles are used for thousands of years, which are still standing and familiarizing the harsh desert climate while maintaining indoor thermal comfort for its occupants. Individuals living in this area adapted to the harsh climate without having electrical power for centuries till the introduction of oil and electricity in the middle of the Twentieth Centuries. Achieving thermal comfort is a complex issue. However, through good design, construction, and maintenance, it is possible to maximize the number of occupants that are comfortable. It has been repeatedly shown through scientific study that making everyone comfortable is virtually impossible, but there is a possibility to take measures to ensure that most families are satisfied.

This paper endeavors to show how the passive solar design can be achieved by utilizing the best house orientations and courtyard layouts of houses in the Middle East region. However, the Arab World needs more champions of science and technology from a policy-making aspect to reinforce the positive change that the region aspires. The necessity to place spaces design in the correct directions considering the movement of the sun and wind, and not to use exotic shapes, materials, and glass extensively over deaf walls with glazed ceilings to obtain bright shapes that cannot respond to the sustainable environment and increase the heat load as well as energy consumption.

There are at least 10 aspects of elements which are required to be provided for the design or rehabilitation of neighborhoods which will affect the individual buildings in the context of building comfort, these aspects can be considered carefully to achieve new building designs. A conclusion can be drawn that such a significant role can achieve thermal comfort through good design and construction, maintaining the use of the same design principles adapted or inspirited for the contemporary domestic concept.

Keywords: Traditional house materials and design layouts, Arid Zone   Climate, Thermal comfort, Passive Design along with Eco-friendly houses

1. INTRODUCTION

Human thermal in building comfort is defined as a condition of mind that expresses satisfaction with the surrounding environment. High temperatures and humidity provide discomfort sensations and sometimes heat stress (i.e., reducing the body's ability to cool itself). There are many factors and design elements that affect human comfort in the internal built environment.

> "Human comfort is always affected by thermal, physical, and personal factors. Another factor that can affect human comfort is the surrounding environment noise. Human comfort can also be affected by the visual of the space and the light intensity."
>
> Factors Affecting Human Comfort in Buildings[1]

The issues of thermal comfort have become a global point of interest to many researchers around the world. This fact is attributed to the realization that people are spending most of their time (more than 90%) in an indoor environment. Passive methods of achieving thermal comfort in buildings in several countries have been commonly investigated. These passive methods are the solution to provide the comfort of the indoor environment, healthy lifestyle, and energy efficiency.

> "Building comfort is considered an essential and necessary aspect in the urban sector especially in desert climates where the outdoor temperature reaches 50o C in the summer season and freezing point during winter."

> Noor Aziah Mohd Ariffin, Amira Behaz, Zuraini Denan[2]

The pre-occupation with privacy exerted another fundamental control. The roof was used for sleeping, during approximately six months of the year and the privacy of a family was fundamental, as such, roofs of houses should never allow to look down upon on its neighbor nor could one look into the court of another. This proscription effectively limited most houses to two stories above ground. Such self-imposed social restraint was more than mere good neighborliness. Buildings, particularly dwelling units, were therefore a culmination experience of influences from the tradition, the climate, and the social conventions. The vernacular solutions emerged through an evolutionary phase over several centuries before they became the norm. It, therefore, becomes even more important which deserves attention to the traditional form of the built environment, always, for projects aimed at revitalizing or modernizing the Arabian traditional towns and particularly their historic background. Since the 1950s, human thermal comfort under indoor and outdoor conditions have been discussed exhaustively in many reports and studies. These studies concerned the thermal comfort and/or heat stress for worldwide regions other than arid regions.

> "Different scales for thermal comfort and heat stress have been produced, in the form of numerical relations or graphs. Survey of building comfort studies revealed that most of these studies focused on the environmental conditions for human occupancy either indoor or outdoor to evaluate the human thermal comfort and heat stress potential in different areas worldwide."

> Abdel-Ghany. A.M. and other[3]

However, the comfort conditions under arid climate in the Arabian Peninsula has never been evaluated deeply. Accordingly, evaluation of heat stress and human thermal comfort in an urban setting under arid environment - such as in the Arabian Peninsula - is urgently needed.

2. BUILDING COMFORT ON HOUSES IN HOT ARID CLIMATES OF ARABIAN COUNTRIES

Traditional designs of houses in Arabian countries allowed a comfortable environment for occupants in high-heat desert conditions, modern examples are far from this. Design elements of courtyards and the perfect orientation for the dwelling rooms are found to have adapted to desert environments, whereas the modern equivalent is by large ignoring this heritage.

> "The designs of buildings with traditional construction and materials played a significant role in moderating the indoor environment when the outdoor climate of the Arabian Desert was unbearable. Unintentionally, energy for cooling was saved creating a significant impact not only on the economy both at the national and global level, but on the environmental scale as well."
>
> Jamal Akbar [4]

> "A social law called the *Urf*, beside the faith beliefs required the organization of a house such as to provide maximum privacy and protect the residents from outsiders' sight."
>
> Salih Al-Hathoul [5]

Added to this the required segregation between males and females in Islamic life, lead the layout of the traditional house to be developed on a "double circulation system", or the division of the house into two parts.

> "Larger houses were planned with two courtyards, one for the men *Diwan-khana*, and other for women *Haram*. In smaller houses with a single court, the *Diwan-khana* was raised to the first floor with a separate staircase from the entrance, as in the many examples found in traditional town of Arabian countries like Najaf- Iraq.*"
>
> Falah AlKubaisy [6]

One of the main characteristics of a traditional house is the bent entrance leading to the courtyard which for many centuries remained the dominant element in the plan of Arabic houses. For many centuries, the residences have evolved indigenous systems to sustain the harsh climate's discomforts. Most attempted to create domestic micro-climates of which courtyard houses were the most common. Houses were laid-out in appropriate orientation and the fine stations of rooms opened into the courtyard facing the direction of cool breeze. Environmental, the courtyard has gone a long way to mitigate the hot and dry climate of Arabian countries. In most regions there is a high percentage of sunshine and a high summer diurnal range (i.e., the difference between day and night temperatures) accompanied by low relative humidity.

The traditional houses had an underground level, either cellars or semi-basements. The cellars were known as *Sirdabs* (Darkness) and the semi-basements as *Neems* (Sleeping).

> "Both types in Iraq were built by brick-vaulted rooms, and both gained light as well as ventilation mostly from the courtyard, the *Sirdabs* having a central oculus and the Neems clerestories; this is below and identical in plan dimensions to the family room upstairs, it is also here that the residents take their summer afternoon rest."

> John Warren, and Ihsan Fathi [7]

Because it is below ground level and naturally ventilated by cold air, the basement remains cool most of the day. The heat lost during night to the clear sky by radiation allows the courtyard to remain cool most of the day. The covered terraces, usually on two or three (occasionally four) sides of the courtyard, and the identical first floor covered gallery immediately above, help to reduce the quantity of heat gain during the day by obstructing the direct solar radiation (see Figure 1).
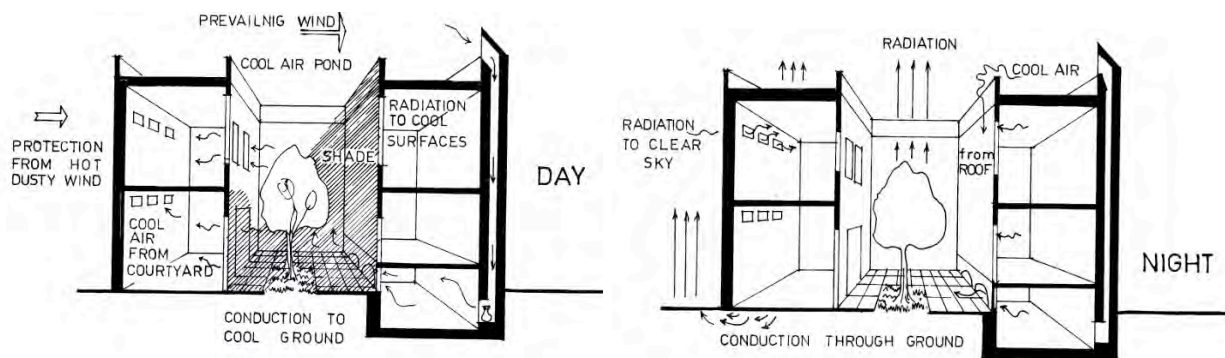

Fig. 1: Diagram of the thermal system of a courtyard building. Source: Drawing by the author (also in Najaf). The Architectural and Urban Heritage of Iraq's Holiest City (Source: page 34. KDP. Amazon. 2008.)

2.1. Courtyards, Wind Tower, and Shading Devices Created a Sustainable Microenvironment

Courtyards: The height of the courtyard being greater than any of its planned dimensions, the area exposed to this radiation is reduced to a minimum, leaving adequate space in the shade, even at mid-day when the summer sun is near the zenith.

> "By means of a fountain, plants, or both, the very low relative, humidity of the air is raised to a comfortable level. In addition, the courtyard is usually washed at least once a day and showered a few times daily. All this is aimed at raising the relative humidity."

> Lina Zuaiter [8]

Due to its position within the house, the courtyard is much quieter than the alleyways. The enclosing rooms which were built with thick walls also act as an effective buffer against noise. The social convention of providing privacy to each family was another major design consideration which gave traditional houses an inward orientation. The openings were constructed in such a way as to prevent anyone intruding unseen into the intimacy of his neighbor's life.

Wind Towers: In many towns of the Arabian Gulf which possess a humid climate particularly in Summer and other days of the year. Thick walls contain mid-wall wind catchers like wind towers called *Badgirs* or *Barajils*. These towns used to have many wind towers when they were located close to the sea (see Figure 2). They were designed to catch the faster flowing upper air stream and channel it down to ventilate and cool the rooms below for their occupants. *Badgirs* ventilated traditional basements to remove adores from heavily used areas with a few windows, providing refreshed air cooler than the rooms below.

> "The convective techniques worked best when the air temperature was around 35°C. Additionally, they would act as labyrinth cooling mechanisms, capturing the cool and saving it for the day."
>
> Lina Zuaiter [9]

Additionally, they would act as labyrinth cooling mechanisms, capturing the cool and saving it for the day. Often the *Badgirs* were kept above water features to allow the cool air to pass over the water and provide refreshing moist air. Vernacular architecture was described as an expression to call traditional buildings that matched the local climate, culture and economy.

Fig. 2: In Abu Dhabi during 1940s, several or *Barajils* have demolished with the modernization era of the twentieth centuries.

There are several lessons which can be obtained from vernacular architecture. The knowledge of creating passive low energy buildings and architecture has shown the way to achieve an acceptable indoor environment for occupants with the least amount of energy consumption and materials.

> *"The usage of renewable energy sources in traditional architecture created a sustainable micro-environment."*
>
> Jomehzadeh et al. [10]

Replacing unrenewable sources of energy with renewable natural sources is one of the most vital lessons. The usage of building physics helps to understand the best choice of materials that can provide better

environmental properties. Another type of popular shading device is the claustrum. The claustra are small vents that are made of plaster. These help to create a uniform distribution of air entering the room. In addition to security and privacy, it provides an aesthetic value. They are usually positioned on the upper section of the wall to allow the scape of hot air, as seen in Figure (1).

Shading devices: Another feature of traditional architecture in Arabian countries dwellings is the excessive use of shading devices. These shading devices are used as privacy screens that have a climatic advantage, since they regulate the climate in the inner spaces. One of the well-known shading devices is the *Mashrabiya* which is a widely used wooden screen (as shown in Figure 3). The *Mashrabiya* had various functions which include controlling the light passage; the air flow which help to reduce temperature and play an important role for creating privacy. A Mashrabiya, also called either *Shanshūl* or *Rūshān,* is an architectural element with a characteristic of traditional architecture in the Islamic World. It is a type of projecting oriel window enclosed with carved wooden latticework located on the upper floors of a building, sometimes enhanced in stained glass.
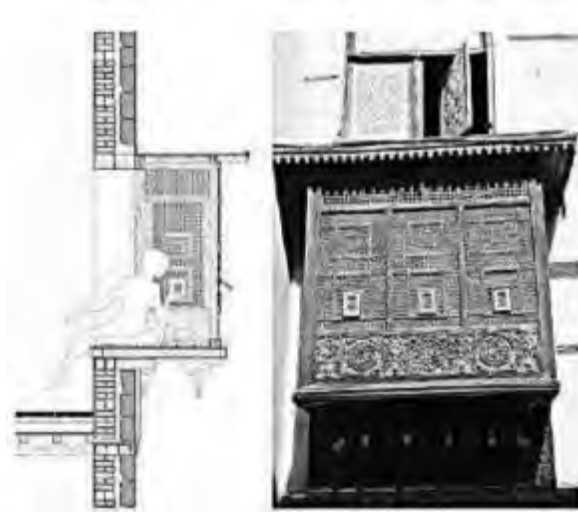
Fig. 3: The ladies behind the *Mashrabiya*
(Source: Ficarelli, 2008).

Fig. 4: Houses in the middle of the
twenty-century built in Iraq by local
materials of thick brick walls, with
Art Nouveau style.

3. RE-INVENTING TRADITIONAL ELEMENTS FOR BUILDING COMFORT

There are two main lessons which can be derived from vernacular architecture; the first one is that traditional architecture provides many buildings which can be studied to understand the passive techniques and the environmental designs. The second reason behind considering this architecture is the best available lesson for us today that it never ceases to appeal only for architects or students of architecture. The main lesson driven from traditional architecture is harmonizing the various conflict requirements that help to achieve the pure sense of community and timelessness.

3.1. International Trends and Identity Charters

The Arabian Gulf countries, however, were not alone in the Arab World with such attempts to establish national identity through architecture. Pursuant to the oil boom and in the context of increasing Westernization that came along with the oil-based developments, there was in fact a larger soul-searching movement that swept through the entire Arabian Gulf region. Many similar nations also wanted to establish cultural uniqueness; distinct differences from others whilst re-affirming their associations with European cultures. From the 50s of the last centuries, two interrelated trends emerged in the region: one was the use of European Classicism, subtly modified to create a national character to arise through an international form (see Figure 4). The other was to look to one's own cultural heritage to find a truly national style in

architecture. Fuccaro points-out that they can be broadly organized around two main themes: the city as a recipient of modernity, and the city as the focal point for the reclaiming of an Arab-Islamic identity.[11]

The latter (the city as the focal point for the reclaiming of an Arab-Islamic identity) in Bahrain and Iraq, led to the discovery of a vernacular-influenced architecture with beliefs stemming from the ancient past that prevailed predominantly in the Bahrain and traditional towns of Iraq (see Figures 5 and 6).

Fig. 5: Different traditional windcatchers in Arabian countries. Windcatchers function during daytime and nighttime. Left: decorative *Barjeel* in Qatar; Middle: *Barjeel* in the Bastakiya Quarter of Dubai-UAE; Right: an example of Windcatcher in Bahrain.
(Source: Jomehzadeh et al. Renewable and Sustainable Energy Reviews Part 1: Indoor air quality and thermal comfort assessment of Energy Reviews journal).

"Of parallel significance are the practices that have evolved in the domestic architectural scene of Bahrain which have been driven by individual fascinations, market forces and popular perceptions."

Ranjet Dayaratne.[12]

Many of the villas and residential buildings imitated Palladian architectural forms and symbolism in preference to the vernacular. In fact, symmetry in form, elaborate domes, pediments, and porticos reminiscent of the Italian Renaissance were legitimate forms that could establish the newly acquired status as a wealthy nation.

3.2. New Era of Architecture Toward Sustainable Environment

Fig. 7: A traditional house with a wind tower converted to a restaurant in the middle of Manama in Bahrain (Source: Author collection).

Fig. 6: Traditional courtyard house in Baghdad where the family realm with full privacy and comfort (Source: Author collection).

The Bahraini wind tower is an architectural element that has now become a marker of its national identity which has gained popular currency. A rising tower with openings orientated towards the good winds act as a funnel, catching the breeze and drawing it down into the cavities below where the living spaces are located, while releasing the hot air like a chimney; the wind tower is one of the early forms of "air conditioning" by natural means. It is a built element that provides for iconic imagery, expresses local ingenuity in responding to the harsh climate and therefore can be hailed as a unique symbol of Arab-Islamic-Bahraini identity for all times (see Figure 7).

> "Equally reproduced are the unique, wooden-poled palm-mat ceilings that had helped construct a flat mud roof for Bahraini traditional houses to combat the scorching sun."
>
> Kansara. T. [13].

Most present-day new built "wind towers" are purely decorative identity advertisements that make a mockery of the past rather than celebrate it. Thus, the production of this form, devoid of functionality, raises serious questions about the engagement of elements of traditional urbanism to recall identity from the past. Siyadi House, built by the pearl merchant Ahmed Bin Qassem Siyadi about hundred years ago, are fine examples of vernacular architecture that represent a balance between sensitivities to climate and needs of privacy with fine, exquisite ornamentation to counter the barren desert; traits that Bahrainis would cherish and celebrate as uniquely theirs. This house does not have a window on the ground floor toward the streets, all spaces are open towards the courtyard, as well Khalaf House in Manama. (See Figure 8).

The building comfort on traditional buildings exists in areas that traditionally were
used to open spaces inside the building for better ventilation. Creating environments
conducive to comfort and respite from the blazing sun.

Kansara. T. [14]

Present-day architect may take vernacular form to combine ideas of local material use and dimensions for the
design of places between the indoors and outdoors. The examples used in traditional ecology will stand as a
basis for future standards for building comfort design. (Seen in Figure 6). Further research is needed to
identify how vernacular use of design can reduce discomfort before entering the design concept of a building.
Masdar in UAE provides a good example of this and can therefore shed light on modern construction. Other
means of green building concept that can help to draw a decent courtyard and find the finest orientation to
get the best building comfort and reduce the cost of energy in buildings.

"The use of vegetation in micro-climates can provide a good basis for further investigation
to reduce the Urban Heat Island (UHI) effect and improve thermal comfort for people
entering the buildings; thus, reducing the cooling load."

Urban Heat Island (UHI) [15]

Fig. 8: Right: Siyadi House in the heart of Muharraq old town, one
of the best examples of building comfort, all these magnificent
screens are from Gypsum and wooden windows. Left: Courtyard
inside Khalaf House in Manama (Source: Author collection).

3.3. Retrogressive Western Influence on the Concept of Building Comfort

Urbanization has long been a familiar social phenomenon in the Near East: Islam itself is largely urban in
concept and is closely associated with urban-based culture. What is new and alien, however, is the strong
tendency to link urbanization and modernization with Westernization. The incessant and indiscriminate
importation of Western culture and its technology has unfortunately, but inevitably, resulted in the rejection
of the tradition. Thus, the old and indigenous aspects have now become inappropriate words falsely
associated with reaction and conservatism.

"In physical terms, this blind rejection was quickly expressed in the neglect or outright destruction of historic areas and much of what was valuable has now been lost forever."

Falah AlKubaisy[16]

Fig. 9: The first law court building in Bahrain in 1937. The designer succeeded to adapt the courtyards in public building. It is a style transition between the tradition and modern (Source: Author collection).

Modernization does not have to be based on the Western model and the supreme irony today is that while the Western society is going through a process of self-reappraisal and discovering some values and wisdom in its past; 'follower' societies are busy trying to emulate and eventually catch-up with the West. However, it could also be argued that this race is not wholly self-imposed and that other deeper forces such as economic and technological colonialism are at work. While this is partly true, it should also be recognized that a cultural time gap and climate conditions between different societies and places will perhaps always exist and, therefore, the end of this race is fundamentally illusory. International culture, technological cooperation and borrowing are necessary but must be selective and adaptive. Indeed, Arabian countries can take advantage of the Western experience and avoid their costly mistakes by this one good way (see Figure 9).

Urbanism in Arabian countries is a product of the West - encouraging professionals, planners, architects and the like that the Arab-Muslim city will evolve into this model of city development. There is no alternative. The fully-recognized method of *Taqlid* – imitation architecture, abounds. Despite four decades of building development, the architectural style has been persistently reduced to a process of mimicking external designs, most large projects have been conducted by foreign consultants who are mostly not giving much attention to the climate nor social-economic issues that their design product is dominated by the idea to make something

different from the surrounding, assuming that modernization is building façades of glass and aluminium. The return on investment of these high risers is approximately 10 years. Once the investments are paid off, the owner of the land may decide to renovate and build something higher and more commercially viable.

> "With zero-interest on loans and a very easy method for gaining commercial mortgages, the government provides ample opportunity for owners to demolish and re-build. Embodied energy becomes a real issue if these buildings are replaced so frequently"

> Kansara. T. [17]

However, during this process, if particular interest could be paid to building comfort and green building concept for long-term costs of energy-efficient buildings to be minimized. There is a lesson we can take from traditional ecology and lifestyles to incorporate in modern construction. Higher UHI effect will only increase the use of AC consumption of power, exacerbate problems of the impact's fossil fuel energy costs on economy and environment as well as AC-related health issues. The increase in UHI will reduce the discomfort received by occupants as they enter the building; therefore, giving freedom to building owners to increase the temperature inside the in-between area of buildings and reduce energy bills, subsequently.

4. BUILDING COMFORT IN CONTEMPORARY ARCHITECTURE IN THE ARABIAN COUNTRIES

4.1. Imitating Traditional Forms of Building Comfort

The existing challenge is the absence of a conceptualization source to generate new patterns and design forms. Imitating old forms once fitted traditional houses but this is no longer the case. The introduction of air conditioning and new manufacturing makes it possible for many products to be upgraded if thoughtful design consideration is articulated during the design and manufacturing phase. A true understanding of architectural element construction details, like the Mashrabiya, should be documented, understood, and tested with new materials and manufacturing before being used in modern interiors.

> "The *Mashrabiya* responds passively and positively to its surrounding environment which proved the influence of the screen depth and perforation on decreasing the heating, cooling, and lighting energy loads in its environmental surroundings"

> Almerbati. N [18]

The wooden or gypsum screens were also found to reduce the penetrating level of light causing glare. Historian studies have shown the Mashrabiya and Roshan to cool water jars in Islamic cities, some have classified these products as having more of a climatic character than a privacy role. The importance of the design that the old Mashrabiya allowed the inhabitants of the house to view the street from the upper floor

but not to be subject to being viewed from outsiders, (see Figures 10 and 11). The great Arabian architect Hassan Fathy states that the *Mashrabiya* is the best solution for thermal comfort issues in the region. The screens also allow a good passage of air and breeze, its design delays the flow of heat into a building. At the same time, it has a positive consequence in enhancing a cooling effect.
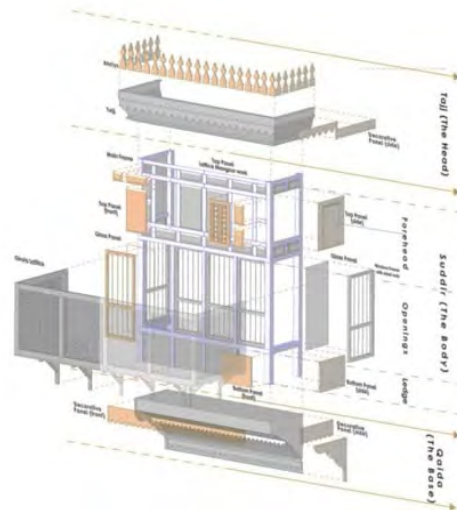

Fig. 10: Mashrabiya and Roshan
construction (Source: Mortada (2014)
and Almerbati. N).

Scholars investigated air movement in various areas of a traditional house in Jeddah City, Saudi Arabia - indicating an increased air velocity of about 0.3 to 1.3 m/s. Airflow simulation and shadowing evaluation gave the ability to determine the relation between the cooling effect and the geometric aspect of Mashrabiya concerning natural ventilation and solar control. However, regarding the illuminance values of the screens proved the visual comfort level gained from *Mashrabiyas*, (see Figure 11). Passive cooling can be argued as being inadequate for Bahraini new houses. The consequence of climate changes the high level of humidity and the introduction of air conditioning systems in modern houses because the availability of cheap power has placed an emphasis on the aesthetic function of Mashrabiya rather than environmental ones (see Figure 12).

Respectable design for large projects in the Arabian Gulf countries adapt to a traditional building element in contemporary design either for the identity reason or building comfort purposes. In terms of the environmental aspect, the traditional *Mashrabiya* plays a role in cooling and humidifying houses. The *Mashrabiya's* wood absorbs, retains, and releases water when faced with an air current. Once the wood fibers get heated by sunlight, they release their retained humidity. Wood is an expensive material to use needs to be maintained continuously.
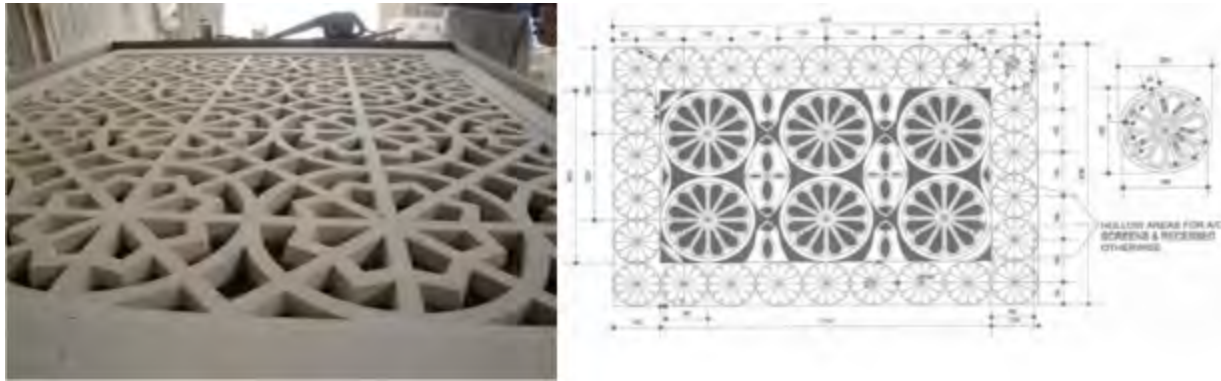
Fig. 11: A typical gypsum screen pattern
(Source: Bahrain Ministry of Housing, also Almerbati.N. page 66).

Fig. 12: Decent *Mashrabiya* used for decoration and
privacy elements covered the ladies' prayer room in
Bahrain's City Center
(Source: Author collection).

The modern smart adaptive skin of AlBahar Tower project wins the contest due to its intelligent *Mashrabiya* design and environmental context interaction. It uses parametric design and simulation as well as specialized programming methods and thermal actuators that open the *Mashrabiya* facade like an origami fold,19 (see Figure 14).

Fig. 13: Al Ghurair Center in the middle of old Dubai, UAE; combining multi-use buildings to rewards the high price of land by using the concept of low-rise high density. Imitating traditional forms like the wind tower to be used as building lifts and landmark as a vertical element. Residential blocks on the left side consist of a large courtyard on third floor where all the amenity activities take place.

An innovative honeycomb structure was designed following the analysis of high-efficient load paths. The towers also accommodate sky-gardens at the top to reduce solar heat gain on the most exposed elevation of the roof. The designer described their project as a design generated from a mathematically pre-rationalized form that derives from Islamic design principles. A key feature of the design is the application of a diaphanous screen that envelopes the most exposed aspect of the building in the form of a dynamic '*Mashrabiya*', opening and closing in response to the sun's path, significantly reducing the solar heat gain and providing a more comfortable internal environment. The two honeycomb structures developed in the city are a decent example of the traditional *Mashrabiya*. These are intelligent facades that block the sun from heating the building, but still allow for daylight penetration. The Abu Dhabi Investment Council's headquarters will be an example of energy-reduction by design.

Fig. 14: Abu Dhabi Investment Council Headquarters
Towers designed by
Aedas – Arup, 2010
(Source: https://www.evolo.us/abu-dhabi-
investment-council-headquarters-towers-aedas-arup/)

Within interior design, the Mashrabiya screen was used in houses, offices, and embassies to reflect cultural Arabic Islamic identity. It was also utilized to reflect the complexity of Islamic architectural patterns and its aesthetic endorsement of interior space quality. It was used as a window screen and sometimes as a room partition. Material and weather conditions regulated the use of *Mashrabiya* in an interior space. In Almerbati's thesis, she has classified the contemporary of Mashrabiya in the context of modern architectural projects that have been used in three categories which include Adaptive skin, Structural pattern, and Cultural value.[20] (see Figure 15).

4.2. Applicability of Green Building to Achieve the Building Comfort

Building Comfort and Green Building Concept can be performed in an initial stage of architectural design development. It can involve all new buildings, additions, expansions, and restorations of buildings particularly in town center areas. The next diagram can show that the design process has been introduced to develop the building concept which must include building comfort criteria as well as matching the green building concept, (see Figure 16).

Design Process: Any new design building should have the following:

> A. Design Aspects: which include site analysis and conceptual design,
>
> B. Design Process: following a logical methodology,
>
> C. Economic Aspects: where the initial cost is high to save energy.

The design process was created a long time ago by Chicago Architecture Center called Discover Design to help designers formulate a design concept accepted by community and suiting the micro-climate condition of that area. The Design Process is an approach for breaking down a large project into manageable chunks.
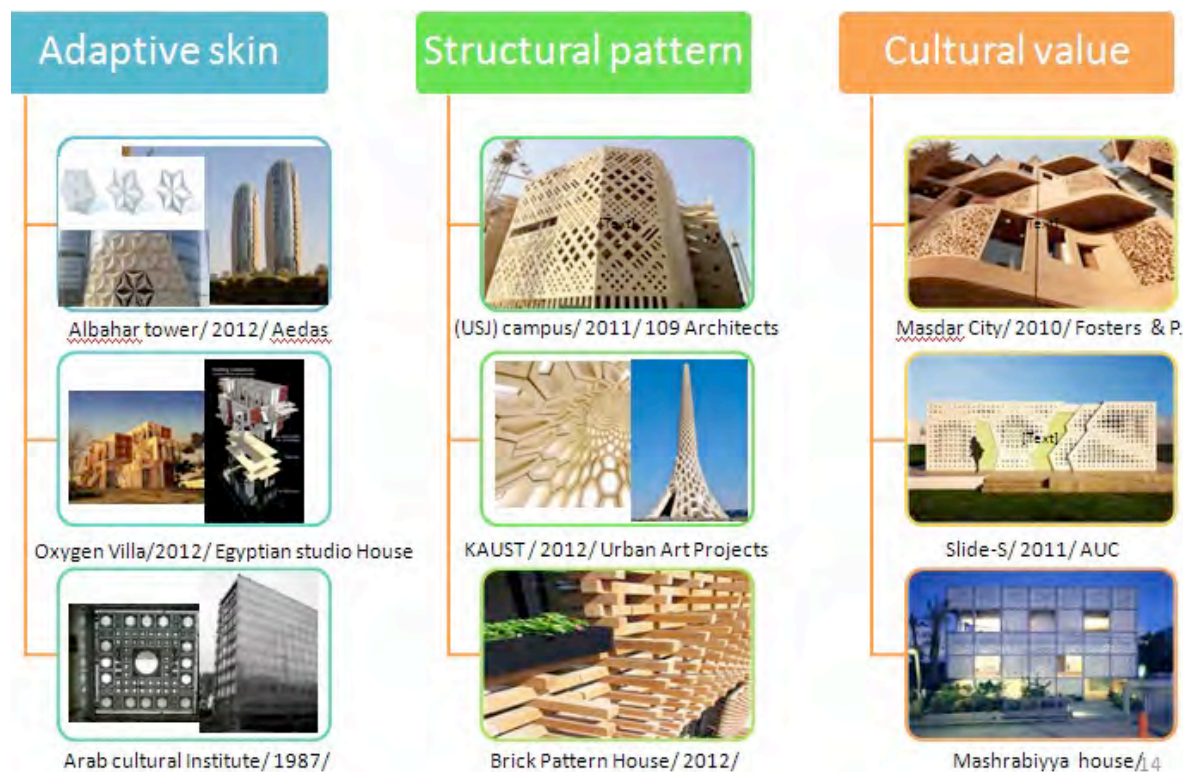

Fig. 15: Mashrabiya in the context of modern architectural projects
(Source: Almerbati et al. (2014) (page 72), and Pages 68-69).

Architects, engineers, scientists, and other thinkers use the design process to solve a variety of problems. Use this process to define the steps needed to tackle each project and hold all ideas as well as sketches throughout the process.

UK Essayes [21]

The design process consists of six steps, they are:

1. Define the Problem: A solution cannot be found until having a clear idea of the issue.

2. Collect Information: Collect sketches, take photographs, and gather data to start giving you inspiration.

3. Brainstorm and Analyse Ideas: Begin to sketch, make, and study what can be started to understand how all the collected data and information may impact your design.

4. Develop Solutions: Taking the preliminary ideas and form multiple small-scale design solutions.

5. Gather Feedback: Present an idea to as many people as possible: friends, teachers, professionals, and any other trusted persons to offer insightful comments.

6. Improve: Reflect on all the feedback and decide if or to what extent it should be incorporated. It is often helpful to take solutions back through the Design Process to refine and clarify them.

Design Quality Features in Building Comfort:

These are some design quality features which can be adapted to accomplish a building comfort in Arabian countries:

1. The spatial, temporal environment and privacy factors are clear and important in traditional designs.

2. Continuity in the development of architectural designs and inspirations of urban heritage according to the region or the city.

3. Continuous adjustments and development towards the quality of the design product according to the environmental, social, and spatial conditions in the city.

4. The response of architectural designs to the climatic environment, saving energy consumption and providing design rigor in placing buildings in healthy climatic directions.

5. Integrated and thoughtful architectural designs are put in place for all government businesses by architecture makers that seek reputation and workmanship and are far from business.

Fig. 16: The Design Process Diagram.
(Source: Chicago Architecture Center (2012-2019)
https://discoverdesign.org/handbook)

4.3. Building Comfort Requirements in the Arab Town Neighbourhoods

There are at least ten aspects of elements which are required to be provided for the design or rehabilitation of neighbourhoods which will affect the individual buildings in the context of building comfort, these aspects can be considered carefully to achieve new building designs. They are summarized as below:

1-The obligation to maintain a group of buildings which have advantages and characteristics of urban heritage of the old city, they are the best example of building comfort and saving energy (see Figure 17).

2-Renovation and Rehabilitation process is required for buildings which have damaged parts of the urban building fabric and contain heritage values.

3-Urban infill process to fill the empty and distorted spaces of urban scenes integrated with the urban fabric. This process will enhance the adjacent building and increase the building comfort in all buildings (see Figure 18).

Fig. 17: Restoration of Historical Khan Margan as a restaurant in Baghdad is the best example of saving energy and building comfort.

Fig. 18: Solidere Downtown of Beirut- Lebanon shows real examples of creating a building comfort by the process of urbanism to fill the gap between street buildings.

4-Developing urban designs inspired by the urban heritage of the city and determining the type of morphology of the Arab and Islamic city as well as not utilizing plans for modern prefabricated residential neighbourhoods used in the outskirts of the city that do not fit with the compact urban fabric of the traditional city and not accomplish a building comfort.

5-Stressing on the principle of separation between vehicles and pedestrians in designing streets or alleys and making them shaded with evergreen and fruitful trees which can plant in arid zone or having a landscape of desert nature with water fountains (see Figure 21).

6-Emphasizing the diversity in land subdivision schemes and layout alleys moving away from stereotypes in the designs of modern neighbourhoods within the urban fabric of the traditional towns. Setting regulations not encouraging the construction of tower buildings in the centers of historical towns that proliferate in the

tribal way while not being environmentally sustainable, like Towers Area Zone in Doha- Qatar in some area in Dubai.

7-Setting a flexible urban requirement to improve the urban environment and building comfort while preserving the heritage values and architectural features of the urban fabric of the Arabian towns. Detailed planning and urban controls of reinforcing regulations that are compatible with the distinctive urban composition of the town. A clear written document should be available, binding and becoming the basis of any proposed development process toward building comfort (see Figure 19).

Fig. 19: Muharraq Municipality building in Bahrain (when shaded, a shadow inner courtyard is the key to provide a successful sustainable urban environment).
(Source: Yousif Dawood AlSayagh Office, Bahrain 2007).

8-Working to develop an urban design concept in developing new areas that are available in large plot areas and have been invested by joint-stock companies from the public and private sectors. Land subdivision of small plots should be halted. Small plots of land with the setbacks regulation for each building from four sides are difficult to organize and may only make small gardens, resulted in having at least three sides exposed to the sun and heat generation is increased inside the building: other issues include construction

wastage materials and spaces. A large plot of land subdivision easily creates successful design concept by having appropriate spaces for gardens, shaded walkways, liveable amenity, and the best building orientation which can be achieved and would be suitable for the building comfort.

9-The necessity to place building designs in the accurate directions consider the movement of the sun and wind and not use exotic shapes, materials, and glass extensively over blind walls with glazed ceilings to obtain bright shapes that cannot respond to the sustainable environment and increase the heat load as well as energy consumption (see Figure 20).

Fig. 20: Development of the new Souq in the traditional town of Manama-Bahrain; using extensive skylight of steel glazed ceiling. Increase the heat load and energy consumption with no care of sustainable environment building comfort (2006).
This should be not acceptable with the increase of power consumption.

10-Encouraging to provide the concept of high density with low rise buildings in the center of the Arabian towns, using the local materials with insulation and reducing the opening sizes towards the bad orientation of buildings. Essentially, providing the principle of privacy in all residential neighbourhoods and separating the movement of vehicles from the dwellings. Low-rise housing developments for reasons of money, efficiency, simplicity and conceptuality, repetition seems difficult to avoid. When one unit or a group of units are designed, identical copies are stacked next to each other until a neighbourhood is created, often with monotonous results (see Figure 21).
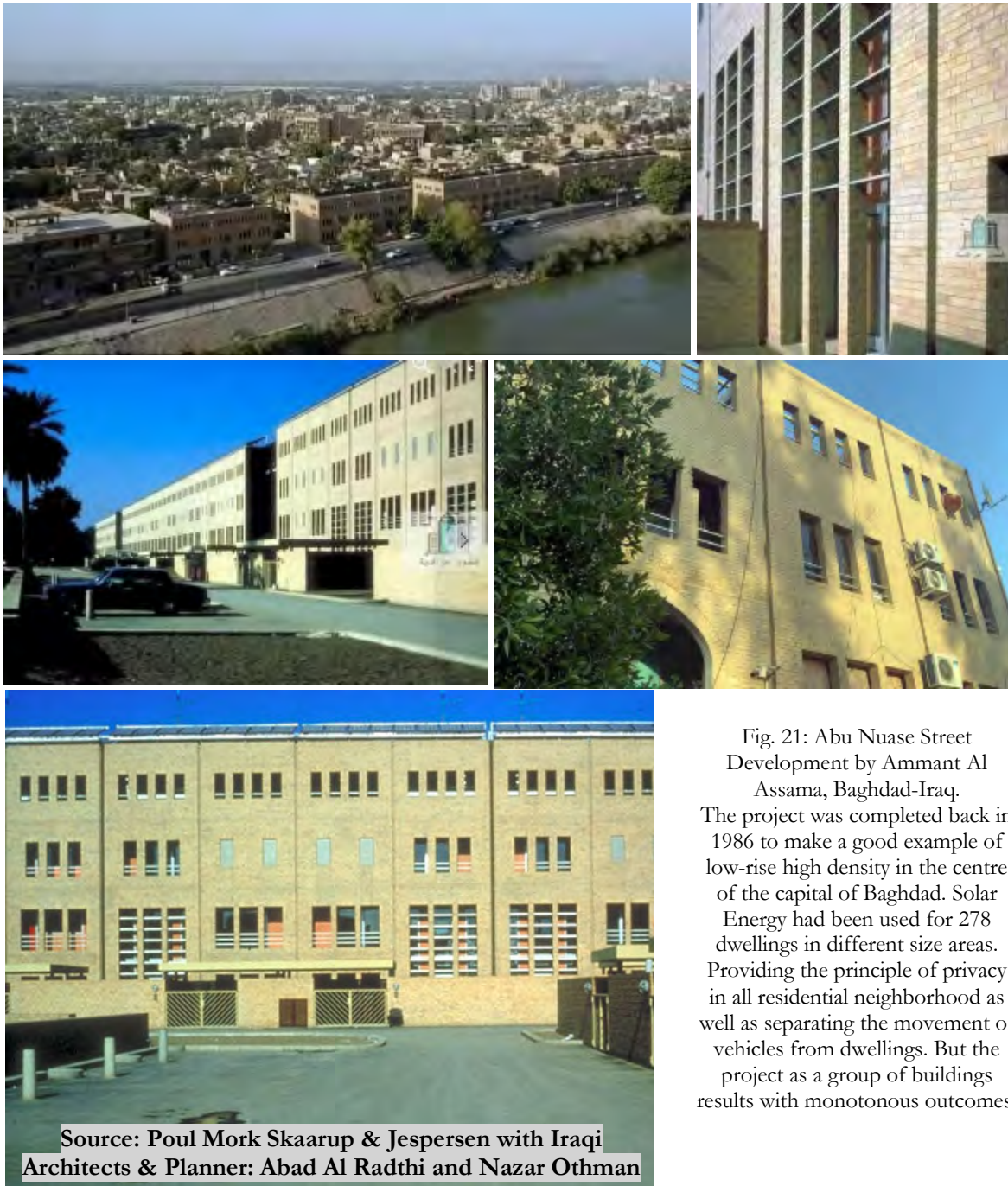
Fig. 21: Abu Nuase Street Development by Ammant Al Assama, Baghdad-Iraq.
The project was completed back in 1986 to make a good example of low-rise high density in the centre of the capital of Baghdad. Solar Energy had been used for 278 dwellings in different size areas. Providing the principle of privacy in all residential neighborhood as well as separating the movement of vehicles from dwellings. But the project as a group of buildings results with monotonous outcomes.

Source: Poul Mork Skaarup & Jespersen with Iraqi Architects & Planner: Abad Al Radthi and Nazar Othman

5. CONCLUSION

Evaluation and discussion of building comfort and heat stress under arid climatic conditions was presented. The main conclusions from this article could be summarized that Arid Zone Climate of Arabian Countries can be responded in building comfort from the initial stage of planning and designing such as:

1. Land-subdivision planning of a neighbourhood should have as much of the lands in rectangular shapes orientated towards North-Southern direction as the prevailing wind is North-Western; such a direction can be easily designed in the concept of having the best orientation to the South for the sunlight and North for the light and the breeze. In addition, it can utilize the design plot to have a garden at the front or the back of the house. It is recommended to avoid the West–East directions for plots as much as possible; the East direction creates intensive heat during mornings, while the West direction has long hours of exposed time direct of sunlight at high temperatures from afternoons until the evenings.

2. This design layout depends heavily on the size of the land plot from the land subdivision, where a building can be designed with a courtyard layout or as a U-shape where all major required spaces of the building have the best orientation toward the courtyard; meanwhile, if the plot is medium-sized, it can make an L- shape design of the building and every two adjacent buildings can make a large courtyard (semi-detached style). It is often that land-subdivision planning departments struggle to subdivide small plot of lands to increase the population density or planning for low - income groups. North-South orientation is still significant for this type of layout planning. However, regulations should be tolerated or abandoned by not providing a set back from two neighbouring side of the buildings which will look like a row of house style. Good planning layout of a group of small plots can be created to generate a nice group of buildings with a common open space such as a large courtyard with vegetation of trees and arid zone landscape.

3. Using sold walls with small window openings toward the bad orientation will help building comfort, save energy as well as enrich the privacy.

4. One of the most harmful factors to building comfort is building a sky dome made of glazed materials which will increase the HVAC system in the building as well as face difficulty in maintenance. Such practice in buildings, shopping centres or any function have a sky dome as a design element is harming the sustainable environment and is considered as a failure in architecture design which should be prohibited in regulations within the Arab countries.

5. Using strange shapes of buildings, shielded with glass and aluminium in arid zone within the Arab

countries, it is a matter of thoughtless ideas to the sustainable environment approach in architecture design and building comfort. This product will be classified in assumption of commercialism and does not follow the sense of place and the urban context. This kind of approach should be rejected and can be corrected in educating stakeholders within the field of architecture and construction.

NOTES AND REFERENCES

[1] UK Essays. (November 2018). Factors Affecting Human Comfort in Buildings. Retrieved from https://www.hse.gov.uk/aboutus/timeline/index.htm.

[2] Noor Aziah Mohd Ariffin, Amira Behaz, Zuraini Denan: Dept. of Architecture, International Islamic University Malaysia: Thermal Comfort Studies on Houses in Hot Arid Climates, Conference Series: Materials Science and Engineering, Published in Ser.: Mater. Sci. Eng. 401 012028 IOP, 2018.

[3] Abdel-Ghany. A.M. and other "Human Thermal Comfort and Heat Stress in an Outdoor Urban Arid Environment: A Case Study". Academic Editor: Harry D. Kambezidis; Volume 2013 |Article ID 693541 | https://doi.org/10.1155/2013/693541

[4] Akbar J.A:" Court Houses: a case study from Riyadh-Saudi Arabia" in the Arab City: Its Character and Islamic Cultural Heritage; Edited by Seragelden, Ismail 1981. p.164). Also, in AlKubaisy. F. "Najaf: The Architectural and Urban Heritage of Iraq's Holiest City", BookSurge. www.KDP.Amazon.com. 2008 page 33.

[5] The *Urf* -"action or belief in which persons persist with the concurrence of the reasoning powers and which their natural dispositions agree to accept as right". Al-Hathoul," Tradition, Continuity and Change in the Physical Environment". The Arab Muslim City" Ph.D. Thesis (Boston 1981 p.139).

[6] AlKubaisy. F. "Najaf: The Architectural and Urban Heritage of Iraq's Holiest City", BookSurge. www.KDP.Amazon.com. 2008 page 35

[7] Warren, J and Fathi, I. Edited "Conservation of Traditional Houses" Amanat Al-Assima- Baghdad-Iraq; 1984; p.10. see also Fathi. I." Urban Conservation in Iraq with special references to Baghdad" Ph.D. thesis submitted to University of Sheffield (England 1977) p.159.

[8] Zuaiter Lina: Vernacular Passive Cooling Strategies in Hot- Dry Regions of Middle East and North Africa. Sustainable Residential Buildings in U.A.E. 2015.

[9] Zuaiter.L. op.cit. page 18

[10] Jomehzadeh et al. Renewable and Sustainable Energy Reviews A review on windcatcher for passive cooling and natural ventilation in buildings, Part 1: Indoor air quality and thermal comfort assessment Energy Reviews journal.P.3

[11] Fuccaro.N." The Cities of the Gulf: a Challenge to Modernity?" in Arab Crossroads Studies, pp.64-70

[12] Dayaratne. R. "Landscapes of nation: Constructing national identity in the deserts of Bahrain" National Identities, 2012, 1-19, I First article. Page 6 and 9.

[14] Kansara. T. page 601.Transitional Zone design in the desert environment of Abu Dhabi: Vernacular vs. Modern.

[15] The urban heat island (UHI) effect is a common environmental problem occurring in　metropolitan areas in which the air temperature is significantly higher than in suburban areas. The UHI effect also leads to a smoggy climate.

[16] AlKubaisy. Falah edited "URBAN RENEWAL IN ARAB WORLD" KDP Amazom.com page 24.

[17] Kansara. T. page 7.

[18] Almerbati. N." Hybrid Heritage: An Investigation into the Viability of 3D-printed Mashrabiya Window Screens for Bahraini Dwellings. Ph.D. thesis published by De Montfort University, Leicester- UK. 2016.page 64. And Pages 68-69.

[19] Kansara. T. page 71.

[20] Almerbati.N." Hybrid Heritage: An Investigation into the Viability of 3D-printed Mashrabiya Window Screens for Bahraini Dwellings. Ph.D. thesis published by De Montfort University, Leicester- UK. 2016.page 64.

[21] UK Essayes.

THE TYPOLOGY OF COURTYARD SPACE IN NAJDI ARCHITECTURE, SAUDI ARABIA: A RESPONSE TO HUMAN NEEDS, CULTURE, AND THE ENVIRONMENT

Mohammed Mashary Alnaim

THE TYPOLOGY OF COURTYARD SPACE IN NAJDI ARCHITECTURE, SAUDI ARABIA: A RESPONSE TO HUMAN NEEDS, CULTURE, AND THE ENVIRONMENT

◆ ◆ ◆

This study seeks to identify the significant characteristics of the traditional Najdi courtyard in Saudi Arabia in order to comprehend the typology and applicability of courtyard patterns in Najdi dense urban neighborhoods. The study includes a literature review that investigates the socio-cultural influences on courtyard typology and the typological implications of courtyard residences at both the building and urban scales. The study also includes a case study of six Najdi courtyard residences in three settlements in the central region that analyzes the patterns, characteristics, and spatial qualities of these courtyards. The ethnographic approach is used to observe and document a culture, society, or other phenomenon related to the study objectives through participant observation and interviews, as well as making use of the Space Syntax "justified access graphs" method to understand and examine the organization and spatial order of the traditional dwelling. The study indicates that the courtyard acts as a holistic space and place within the home; however, the features of individual courtyards may vary based on geographical and environmental setting. The conclusion of the research is that courtyard typologies have the capacity to satisfy the enduring cultural, social, and climatic demands of residents and hence might be implemented in contemporary urban contexts. The findings of this research suggest that courtyard typology has the potential to create an environment of comfort, privacy, and special efficiency for modern urban households.

1. INTRODUCTION

The term "courtyard," derived from the Latin word "cohors" meaning "enclosure," refers to an open space within a building or a group of buildings[1]. In regions characterized by hot and arid climates, such as the Middle East, North Africa, and Southern Europe, courtyards hold a central role in vernacular architecture[2]. Typically enclosed by walls or structures on all sides, courtyards create a microclimate that can be carefully managed to meet the environmental and social needs of their users[3]. Given their versatility, which includes passive cooling, natural ventilation, daylighting, and fostering social interaction, courtyards have become popular features in both residential and public buildings[4].

Courtyard spaces have been an integral part of traditional dwellings for centuries. They offer families a place to gather, where they can enjoy the privacy of their own home while remaining connected to the outdoors. The layout of these spaces is meticulously designed to provide a sense of security and comfort to their inhabitants. Consequently, courtyard spaces are often perceived as an extension of the family's indoor living area, offering a space for relaxation and quality time together. Furthermore, courtyards play a crucial role in the overall architectural layout of a dwelling by facilitating ventilation and introducing natural light while preserving visual privacy.

As an architectural element, courtyards often serve as transitional spaces between the public and private domains. They serve as tangible reflections of the cultural traditions of their inhabitants, embodying their

values in physical form. However, defining these traditions can be a contentious task since cultural traditions are fluid and ever evolving, influencing our daily decisions. The concept of cultural traditions is subject to interpretation, with each discipline approaching it from a different perspective. Nevertheless, UNESCO defines 'intangible cultural heritage' as traditions typically conveyed and expressed through physical forms, representing the collective creations of a cultural community that reflect its cultural and social identity[5]. This perspective underscores the importance of recognizing the dynamic and diverse nature of traditions, which continually evolve and merge with other societal traditions, giving rise to hybrid and newly introduced customs. Thus, traditions are not static but dynamic, and comprehending this dynamism is crucial for evaluating and developing the architecture of a given society.

In addition to its architectural advantages, the courtyard offers an array of social and psychological benefits that significantly enhance the quality of life for its inhabitants. These advantages encompass elements like privacy, social interaction, outdoor living, a connection to nature, and a bolstering of cultural identity. For instance, as noted by Bekleyen and Dalkiliç (2011)[6], courtyards in Turkey provided a strong sense of enclosure for their residents, effectively demarcating the private domain of the home from the public street realm. This spatial arrangement fostered feelings of security and comfort for those within the courtyard, particularly in densely populated urban areas. Consequently, courtyards often transformed into communal spaces where residents gathered, socialized, and engaged in various activities, thereby nurturing a sense of community and social cohesion among neighbors and enhancing their overall sense of belonging and well-being[7].

Understanding the role and significance of the courtyard space in traditional dwellings requires an exploration of both its tangible and intangible dimensions, illuminating the intricate process of shaping the built environment. This exploration involves scrutinizing the multiple layers of construction processes that have evolved to create the current state of built environments. To truly appreciate the final form of a built environment, one must consider not only the architectural traditions of its inhabitants but also the people themselves. Despite the advent of modern building techniques, until the year 1960, the central region relied heavily on locally available materials in constructing traditional environments. Economic constraints necessitated this reliance, leading to the development of solid, compact walls in most floors and roofs, not only preserving privacy but also embodying essential social and religious beliefs of the region. The courtyard, therefore, became the central hub connecting the sturdy structure of the dwelling with the surrounding environment and its inhabitants.

However, the trajectory of courtyard houses in the central region took a significant turn following a 1968 contract with an international consulting firm to formulate a master plan for Riyadh City. Four years later,

this plan, covering a vast area of 304 square kilometers, was implemented, instigating a radical transformation of the city's nature. This transformation heralded the emergence of a new, modern Riyadh deliberately eschewing the development of courtyard dwellings, among other aspects of the plan. The master plan advocated for segregating the city into distinct land use zones, overhauling traditional family dwelling units into more 'modern' architectural forms, and promoting a more efficient and metropolitan way of life. While parts of old Riyadh initially remained intact, with traditional architectural styles inspired by the traditional Nadji settlements persevering into the 1960s, the implementation of the new master plan inexorably altered the city's character, modernizing it and erasing much of its cultural and heritage architecture that had defined it for decades, if not centuries.

Understanding the composition of the traditional Saudi dwelling as a whole is a fundamental prerequisite for comprehending the role and significance of the courtyard space within its formation. This holistic understanding allows us to gain valuable insights into how the courtyard space contributes to the overall architectural design and spatial layout of traditional Saudi homes. Such insights hold particular relevance for contemporary Saudi architectural practices and urban design, ensuring that traditional elements like the courtyard are not lost but are instead seamlessly integrated into modern home designs that are both functional and culturally meaningful.

The placement of courtyards is far from arbitrary; it takes into account multiple considerations, including the dwelling's position within the surrounding built environment, its physical attributes, spatial organization, and, crucially, socio-cultural influences, as depicted in Figure 1. Thus, this study delves into the myriad factors that have influenced the traditional courtyard spaces in various settlements across the central region of Saudi Arabia, specifically within the traditional 'Najd' settlements. The primary objective here is to scrutinize both the tangible (physical) and intangible (cultural) significance of the courtyard space in Najdi traditional dwellings.
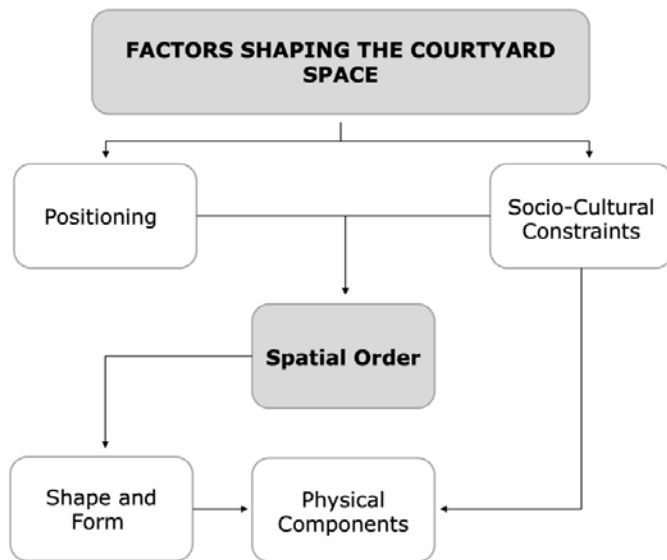
Fig. 1: Factors shaping the courtyard space. (Source: Author).

2. LITERATURE REVIEW

Traditional architecture encompasses all structures from the past that have endured to the present day, serving as tangible links to history[8]. These traditional structures hold historical significance and are often considered embodiments of heritage passed down through generations, typically crafted by everyday individuals without professional guidance[9]. Consequently, traditional architecture offers valuable insights into how past societies and cultures forged their identities and sense of belonging.

The term 'courtyard' conventionally refers to an area enclosed on its sides but open at the top, typically situated at the heart of a building or a cluster of buildings. Paul Oliver's book, "Dwellings: The House Across the World," underscores the deep historical roots of courtyard dwellings, with examples dating back thousands of years, such as those unearthed in Kahun, Egypt, tracing back as far as 2000 B.C.[10]. As one of the oldest architectural components, courtyards have garnered architects' appreciation for various reasons. They offer a practical spatial solution for inhabitants and simultaneously foster a sense of cultural continuity.

The courtyard space stands out due to its specific plan structure and the interplay of architectural masses. It holds a crucial role in a home's spatial layout, occupying positions on the side, at the front, or nestled centrally within the dwelling[11]. This arrangement of architectural elements is pivotal in shaping the courtyard's distinctive identity and character, influencing how individuals engage with the space. Depending on the context, the courtyard can transform into both a public and a private area, offering versatility[12]. Beyond its

physical attributes, the courtyard serves as an open environment, fostering interaction, relaxation, and an appreciation of the surroundings.

Rapoport provides a perspective on regional architecture characterized by an absence of hierarchical or aesthetic superiority, with a profound connection to the landscape and climate[13]. This regional architecture aligns with its surroundings, demonstrating respect for the broader environment and remaining adaptable within a defined framework[14]. It embodies a reverence for nature and local culture, encapsulated in Rapoport's concept of regional architecture, which emphasizes seamless integration with the landscape, suitability to the climate, and a harmonious relationship with existing structures. This architectural approach prioritizes context specificity, utilizing materials and building techniques sourced from the local environment. It also considers spatial usage and scale in alignment with various socio-cultural values[15].

Courtyards fall under the category of 'transitional spaces,' a distinct architectural classification that places them in an 'in-between' realm within the overall structure of a dwelling[16]. These transitional spaces can be broadly categorized based on the dwelling's position within the built environment. In this context, various types of 'in-between' spaces emerge to support the functionality of courtyards, assuming roles like arcades, patios, corridors, and more. These diverse roles enable courtyards to serve a range of functions, depending on the specific context in which they are situated[17] (Al-Hafith et al., 2017). Consequently, courtyards hold particular significance within dwellings as they seamlessly bridge the divide between indoor and outdoor spaces.

2.1 COURTYARD SPACE IN THE SAUDI CONTEXT

Within Islamic society, the dwelling courtyard emerges as a versatile space catering to numerous social and cultural needs of its residents (Alnaim, 2006). In Islamic culture, where the public and private spheres coalesce, the courtyard offers a delicate equilibrium between privacy and social interaction[18]. Consequently, it assumes a central role in family gatherings, acting as a nexus connecting the family with the larger community. It not only serves as an outdoor area but also facilitates interactions with private visitors. These vital functions establish the courtyard as an indispensable facet of Islamic family life and culture.

Traditional dwellings in Saudi Arabia's Nadji region typically form clusters of homes closely adjacent to one another, creating a sense of housing clusters, especially pertinent in the desert environment[19]. Cities in this region often comprise residential blocks, with each block containing multiple houses. The adjacency of these buildings fosters a sense of community through shared walls and their purposeful construction[20]. This close-knit arrangement underscores the significant role of social factors in shaping both the individual dwelling and the surrounding built environment. The tribal social structure, in particular, encourages the cohesion and

harmonious coexistence of these buildings. Notably, the layout of traditional dwellings predominantly focuses inward, with the courtyard serving as the primary private space within the dwelling[21].

In the context of traditional Saudi dwellings, a fundamental architectural division exists, encompassing three primary zones: the private, semi-private, and semi-public areas. This division aims to uphold the elevated levels of privacy expected within Saudi society while ensuring a harmonious coexistence of various functional components within the dwelling. Consequently, traditional Saudi homes typically comprise several key elements.

Firstly, there is the presence of an entrance corridor, often referred to as the threshold. This space serves as a pivotal link between the semi-private and semi-public realms of the dwelling, meticulously designed to maintain a certain degree of privacy, a cultural norm highly valued in Saudi society, as individuals enter the dwelling. Usually covered, this corridor connects various essential spaces within the dwelling, including the courtyard and the men's guest room.

The men's guest room, another integral architectural component, is strategically positioned within the dwelling. It is often closely connected to the corridor and placed near the entrance of the dwelling to facilitate proximity to the exterior surroundings. This arrangement serves to safeguard the privacy of the dwelling and its occupants during male-centric social activities. Consequently, the entrance, the corridor, and the men's guest room collectively constitute a semi-public zone within the traditional dwelling due to their stronger association with the public realm and the outer built environment.

Central to the configuration is the inner courtyard, the heart of the traditional dwelling, with most room openings oriented towards it. The inclusion of the corridor element serves a specific purpose: it extends the courtyard's reach into the interior spaces of the house by creating a visual buffer between the entrance and the courtyard. This is crucial because the courtyard's primary function is to offer privacy to the family while also providing shelter from dusty winds, shade, natural light, and ventilation. In this way, the other functional components of the dwelling complement and support the courtyard, enabling it to fulfill its central role within the house.

In traditional houses, the components are organized into three distinct sections: front, middle, and back[22]. The central hub of the dwelling is predominantly occupied by the courtyard, often referred to by Najdi locals as the 'tummy' or 'batn al-hawi' in Arabic. This area holds a special significance as it is reserved for personal and family use, earning it the moniker 'core space' due to its central location and primary function. The courtyard possesses a critical feature: its ability to naturally ventilate and cool the adjacent interior spaces while also providing ample natural light, all without the need for external openings like street-facing windows.

This feature is especially vital because the limited urban space constrains the external façade's length in the typical dwelling. Consequently, external windows are a rarity, and when they do exist, residents often orient them away from each other to minimize potential visual corridors[23]. Hence, the courtyard acts as a central regulating hub, catering to the social, cultural, and environmental requirements of the adjacent interior spaces.

Beyond its role in facilitating natural environmental functions, the courtyard serves as a significant space for various family and social activities. Given its dual usage for both public and private social events, privacy becomes a crucial consideration in the design of traditional buildings[24]. The courtyard acts as a unifying element, connecting multifunctional family rooms and controlling the flow of people throughout the house during both daytime and nighttime hours. By positioning the courtyard at the center and surrounding it with various interior spaces, residents could effectively devise optimal solutions for their family's activities without external interference. Courtyards, through their provision of semi-private areas for family gatherings, are thus seen as a focal point for family life and unity, nurturing close bonds among family members.

In such communal settings, where roads, fields, and *souq* (market) areas are shared, Al-Hussayen's observations shed light on the limited mobility of women, who are largely confined within the confines of their homes[25]. This confinement is primarily driven by cultural norms aimed at safeguarding privacy. As a result, women frequently gravitate toward two specific areas: the courtyard and the roof. The courtyard, in particular, plays a pivotal role in upholding the privacy standards within traditional dwellings. Although the courtyard and roof provide some degree of privacy, it's evident that women still face restrictions. Therefore, Al-Hussayen underscores the importance of residents comprehending how the house's positioning and layout can effectively address both family and societal privacy concerns within the context of neighboring dwellings.

Examining the internal threshold areas and their physical components within traditional settlement communities becomes essential to gaining a deeper understanding of the courtyard's role as an architectural element. This exploration reveals that inhabitants had already devised strategies to introduce a level of seclusion into their homes. The 'hidden meaning' of this space, which played a pivotal role in organizing the internal spatial order of traditional homes, effectively delineated the family's seclusion from the semi-private area, often referred to as the 'majlis'[26]. Residents perceived the courtyard as a space that could demarcate the semi-private regions from the more private sections of the house, typically housing multipurpose family rooms[27]. In reality, the courtyard acts as a 'threshold' for female guests and family members. As mentioned earlier, the family utilizes adaptable and flexible rooms for various activities during the day when they are open and at night when they become more confined spaces. Consequently, the courtyard plays a pivotal role in managing this dynamic usage while maintaining the functional effectiveness of the adjacent areas. Therefore, the courtyard effectively operates as a threshold, facilitating the transition between the semi-

private spaces of the house and the private family rooms, providing a unique bridge for family members and female guests.

3. MATERIALS AND METHODS

This study employs an ethnographic approach to gain deeper insights into the societal values of Najdi residents and the construction of their traditional dwellings. Ethnography is a social research method that involves the observation and documentation of a culture, society, or other phenomena through participant observation and interviews[28]. In the realm of architectural studies, the ethnographic approach delves into how individuals utilize and interact with buildings and spaces within their cultural and social contexts. Rooted in anthropology, this approach utilizes qualitative research methods such as participant observation, interviews, and focus groups to develop a comprehensive understanding of people's relationships with their built environments[29]. Additionally, the ethnographic method can delve into the social and cultural significance of buildings and spaces, exploring the symbolic meanings associated with them, as well as the embedded power dynamics and social relationships. Overall, the ethnographic approach serves as a valuable tool for architects and designers seeking to create designs that are not only thoughtful and responsive but also grounded in a profound understanding of the people and communities, they aim to serve[30].

In this study, the ethnographic approach is employed to inform the design process by offering insights into how architectural design can effectively accommodate and support people's needs and behaviours. By comprehending how individuals utilize and perceive buildings and spaces, architects can better craft designs that are not only functional but also deeply meaningful, tailored to the specific requirements of diverse communities. This approach serves as a vital resource for architects, guiding them in the creation of designs that truly align with the needs and preferences of the communities they serve.

3.1. Informal Interviews

Collecting data on the characteristics of the constructed courtyard environment in Najd and its historical utility for previous residents was of utmost importance for this study. To complement the ethnographic approach, the informal interview method was employed to gather information and insights from individuals in an unstructured, conversational manner[31]. Unlike other interview methods, the informal approach serves as a means to help researchers generate ideas and insights, supplementing methods like observational research and ethnography to provide a more comprehensive understanding of the subject matter[32].

Hence, during the fieldwork visits and observations, interviews were conducted with local residents, focusing on topics aligned with the study's objectives. Informal, open-ended questions were posed to participants to stimulate discussions about their experiences, opinions, and perspectives. These questions included:

- What are the benefits of having a courtyard space in the house, and how does it enhance the overall living experience?

- How is the courtyard space designed/placed to maximize its potential and to create a functional and breathing outdoor area, especially in a compacted and preserved environment such as Saudi Arabia?

- What impact can a courtyard space have on the environmental quality of the house, and how did it contribute to the eco-friendly living environment?

- What role does a courtyard space play in promoting social interactions and creating a sense of community within a household or neighbourhood?

- How did the courtyard space used for various activities such as gardening, relaxation, entertainment, and outdoor family social gathering, and how the space was contained to ensure comfort living experience?

- What are the cultural and historical significance of courtyard spaces, and how did it contribute to the overall typology of Najdi dwellings?

Given that the informal method involves unstructured conversations, it becomes crucial to distill the interviewees' opinions, thoughts, knowledge, experiences, and values related to the courtyard space. To achieve this, a word cloud graph based on interview responses was generated during the study's observations and site visits with local residents. Figure 2 illustrates the word cloud, highlighting various sub-areas of interest within the courtyard. The size of each word within the cloud corresponds to its frequency and repeatability in the responses.


Fig. 2: Keyword map of significant ideas related to Najdi courtyard. (Source: Author).

3.2. Observation

Observation serves as a valuable research method employed in academic studies to gather data pertaining to specific phenomena or behaviours[33]. This method involves systematic and detailed observation and recording of behaviours, events, or interactions occurring within a natural setting. As emphasized by Ciesielska et al. (2018)[34], fieldwork within this context encompasses active observation, memory enhancement, informal interviews, extensive field notetaking, and, notably, patience.

Therefore, during the period spanning 2021 to 2022, we conducted observational research within two traditional Najdi settlements: Diriyah, and Hail (Figure 3). Participant observation was the chosen method, allowing the researcher to become an integral part of the observed group, offering an insider's perspective on behaviours, events, or interactions. This approach enabled the study to delve into practices associated with courtyard usage and the construction of meaning related to the courtyard's role as a family gathering space within the built environment. Employing a diverse range of data collection methods, as is customary in this approach, we conducted observations (lasting three hours, once a week) for each case, diligently recorded field notes, engaged in informal interviews with elderly residents and local inhabitants, and gathered various documents, including archival data, images, and architectural plans and sections.

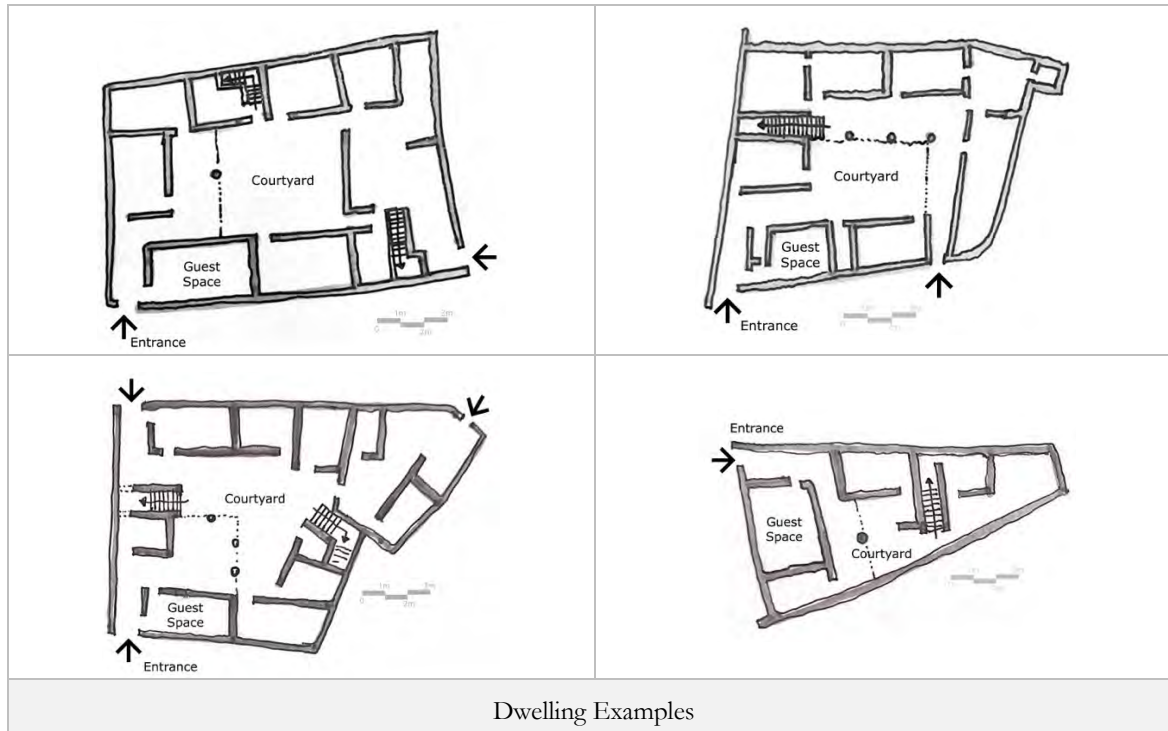| Settlement Locations within the Saudi Arabian Central Region	
Diriyah	Hail

Dwelling Examples
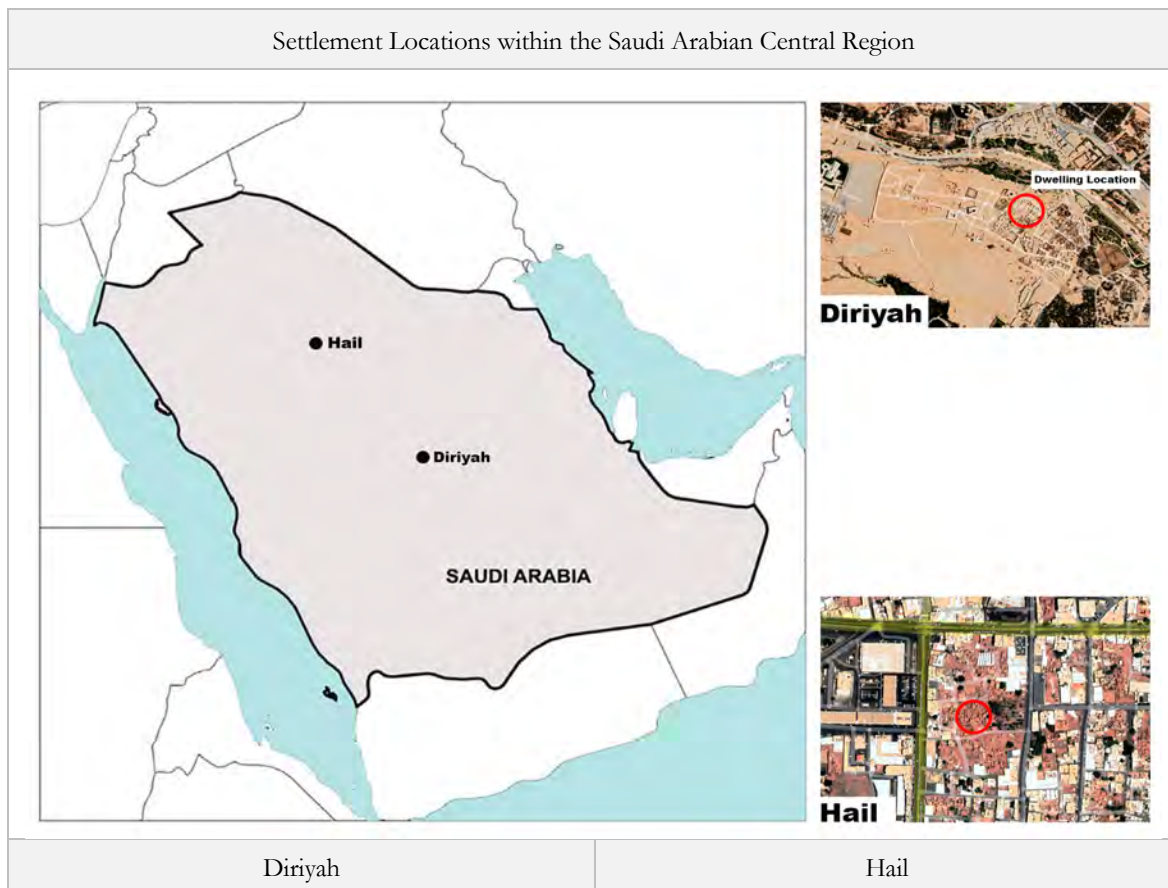
Fig. 3: Traditional dwelling case studies and their geographical location. (Source: Author).

3.3. The Justified Access Graph Technique (Space Syntax)

Hillier and Hanson developed a range of analytical tools designed to assess different architectural qualities (Hillier and Hanson, 1988). Space syntax methods are commonly employed to convert or abstract specific spatial arrangement features into syntactic characteristics and discrete models, facilitating the understanding of architectural space[35]. Within the realm of space syntax analysis, Hillier and his colleagues introduced various foundational concepts, one of which is particularly relevant to this study: the "justified access graph." This technique serves to unveil hidden topological patterns within a building's floor plan[36], represented as a depth diagram originating from a chosen point, such as the main building entrance or an interior room[37]. In essence, space syntax techniques have found widespread adoption in elucidating the relationship between spatial configuration and human behavior, encompassing aspects like pedestrian mobility and social interaction.

The initial step in constructing a justified access graph involves observing and comprehending the spatial relationships within the given spatial arrangement[38] (Ostwald, 2011). These spatial relationships are then translated into linkage graphs, elucidating the connections between spatial hierarchy, permeability, and integration/segregation. In this study, the justified access graph approach is harnessed to represent these syntactic linking graphs. Consequently, the utilization of justified access graph analysis equips researchers with an analytical comparative tool that not only identifies similarities and disparities in architectural features but

also unravels the social behaviors and underlying meanings embedded within diverse layouts and spatial linkages[39]. (See Mustafa et al., 2011; Elizondo, 2022).

Hence, in this study, justified access graph analysis is employed to generate one or more graphs for the analysis of specific spatial configurations. These graphs play a pivotal role in comprehending spatial hierarchy, permeability (the interconnections between various areas), depth, and integration/segregation. Variable depth graphs, a fundamental component of this technique, serve as illustrative tools to explore the depth and interconnectedness of distinct patterns across different houses. By applying this methodology, the spatial configuration offers a framework for comprehending how individuals engage with the built environment, scrutinizing the associations among different spaces through the lens of the justified access graph. This technique proves highly effective in abstractly capturing the topological representation of any spatial layout, prioritizing spatial links and accessibility over considerations of spatial shape, size, or form.

4. RESULTS: EXAMINING THE NAJDI COURTYARD SPACE

To comprehensively grasp the significance and functional role of the courtyard space in shaping the spatial arrangement of internal spaces and enhancing privacy in inherently private areas, this analysis is segmented into three interconnected stages. These stages are mutually dependent, aiming to delve into the dynamics, importance, and role of the courtyard within the dwelling and its immediate built environment, fostering the inhabitants' relationships.

The analysis begins with an examination of the courtyard's placement in various traditional homes and its interconnectedness with adjacent inner rooms. Additionally, building sections are utilized to scrutinize a selection of neighboring courtyards, shedding light on how each residence effectively maintained the seclusion of its courtyard concerning that of its neighboring dwellings. Through these three interrelated stages, a comprehensive understanding emerges regarding how the courtyard effectively meets the family's privacy requirements and underscores its pivotal role in determining the spatial organization of inner spaces within a traditional home. Essentially, it acts as a conduit connecting the semi-public regions of the home with its more secluded areas.

4.1. The Dynamism of Courtyard Space

The central courtyard within the dwelling establishes an inward-facing environment, safeguarded from external visual encounters, rendering it an ideal space for opening to the sky and hosting family gatherings. This arrangement effectively facilitated interaction between the family's domain and the guest area while also serving a pivotal role in the strategic management of entry into the house. This observation aligns with the

findings of Roderick Lawrence (1987)[40] and Mohammed Alnaim (2021)[41] when they investigated the hierarchical organization of internal spaces within traditional homes. Both scholars noted that in traditional households, the family courtyard acted as a physical barrier, demarcating guest spaces from the private family quarters. Consequently, the introverted nature of the courtyard bestowed upon it a unique role within traditional residences: on one hand, it provided a semi-public "threshold" for entertaining guests without intruding on the family's privacy, while on the other hand, it created a semi-private and intimate space for the family's own use.

The creation of a threshold space with its staggered layout effectively separates the entrance to the dwelling from immediate access to the courtyard, resulting in the establishment of a dynamic spatial transition zone. This threshold area's characteristics can vary in traditional homes depending on whether one approaches the courtyard from the urban or building side, offering an adaptable buffer zone that adds depth to the family's living space while serving as a boundary between their private domain and the semi-public guest area (Figure 4: 1). Notably, this threshold area may house the guest room (majlis) or even a small shop, playing a crucial role in maintaining the family's privacy by physically separating them from these public spaces throughout the day. Simultaneously, it allows the courtyard to function as an intermediary zone connecting their home to the outside world. Therefore, the courtyard's dynamic nature sets it apart from other architectural forms, utilizing the threshold space as a controlled interface between semi-public and semi-private zones (Figure 4: 2). This concept aligns with the observations made by Nibedita Das et al., (2006)[42] in North African courtyard homes, where a wide array of daily activities, including food preparation, sleeping, working, playing, hosting guests, and even animal care, traditionally unfolded within the courtyard.

Upon passing through the entry threshold and traversing the deeper private zones, a secondary spatial arrangement unfolds, requiring the individual to reach and traverse the courtyard space. Consequently, the courtyard takes on the role of a central gathering place for the family, connecting various private internal sections within the dwelling. Positioned amidst the semi-private and private areas, the courtyard space harmoniously accommodates a range of shared family activities, including family meetings, children's play, and cooking, among others, all while safeguarding the privacy of the surrounding inner spaces. Inhabitants ingeniously established a dynamic spatial order to facilitate the activities of both realms, public and private, within their homes. Consequently, the family's social and religious needs significantly influenced and contributed to the development of these two distinct spatial orders, accounting for various cultural considerations within the traditional dwelling. The desire to segregate men's activities from those of the family led to the incorporation of several supporting architectural elements. These elements ensured that the spatial layout was effectively organized to segregate the numerous activities taking place within the Najdi traditional house, enhancing its physical structure. This segregation was rooted in the distinction between the

public and private spheres, as well as the differentiation between masculine and feminine domains. Consequently, this dichotomy between the public and private realms constituted an integral aspect of traditional Najdi culture, enabling both genders to maintain their distinct roles within the household.
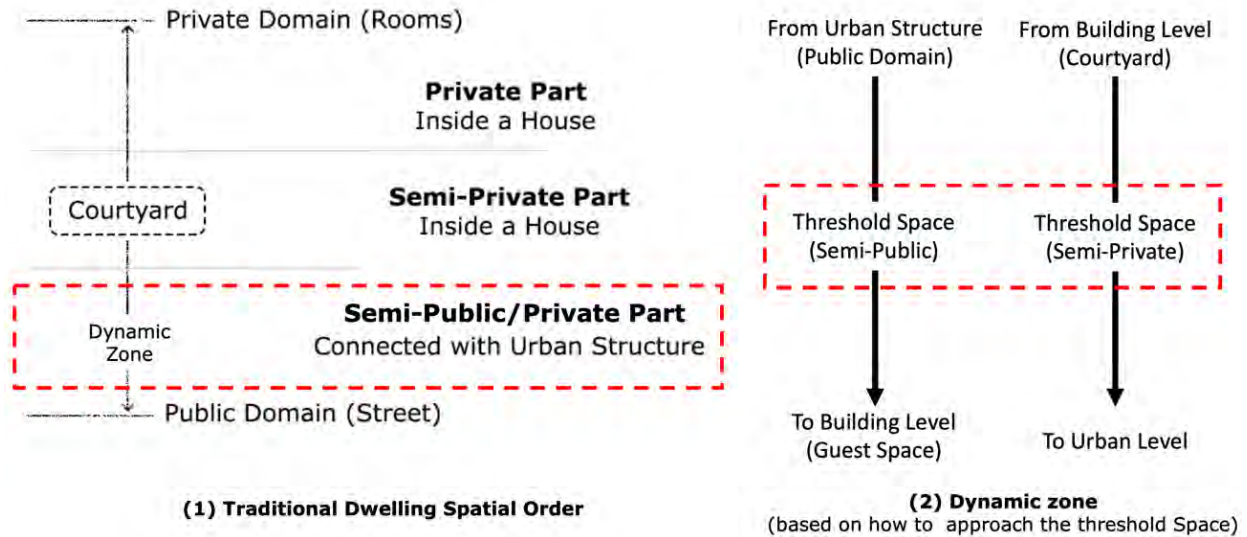

Fig. 4: The dynamic of courtyard space. (Source: Author).

Hence, this study sought a deeper understanding of the spatial arrangement within a typical Najdi dwelling to unveil the implicit role of the courtyard space. The examination of the courtyard's location revealed the presence of two concealed spatial mechanisms that seemed to reinforce the connection between spatial hierarchy and the physical arrangement of internal spaces within the house. In essence, the dwelling transcended being a standalone physical structure in the built environment; it functioned as an integral component that facilitated spatial integration, contributing to the formation of Najdi urban masses. The study illuminated how traditional house occupants ingeniously engaged with the public sphere while safeguarding the seclusion of their interior spaces, achieving this through a semi-public 'threshold' space situated between the entrance and the courtyard within the house.

By delving further into the role of physical form within the urban context, it becomes possible to draw conclusions regarding how traditional houses interact with their surroundings and shape the social dynamics within the built environment. Faced with socio-cultural norms and limited land space, Najdi residents were compelled to rely on the courtyard as the sole access point to the majority of the house's components. To shield the courtyard from the prying eyes of neighbors, it was enclosed with 'setback' private internal rooms. This architectural strategy engendered a multi-layered and dynamic space that served a multitude of functions for the occupants, functioning as a depth space for regulating and controlling the spatial order of the house.

To put this insightful observation to the test, the study's second stage focuses on unravelling the placement of various components designed to enhance the courtyard's seclusion.

4.2. Courtyard's Significance

In the context of understanding the courtyard's strategic placement, Mohammed Alnaim (2020a) argues that a typical feature in most traditional Saudi dwellings is the existence of a threshold space. This threshold space plays a pivotal role by providing the necessary separation between the courtyard and the dwelling's entrance, effectively concealing the courtyard from the public view. The courtyard, in this configuration, occupies the intermediary position between the threshold space and the inner, isolated zones of the house. This positioning is of utmost importance as it envelops the courtyard with its distinct private inner rooms (Figure 5: 1). Given that all rooms open up to the courtyard, the inner private spaces must serve as a protective barrier from all directions to meet the courtyard's essential need for seclusion (Figure 5: 2). This seclusion factor is indispensable for the comfort and well-being of the families residing in these dwellings, offering them a personal sanctuary within their homes to which they can retreat.
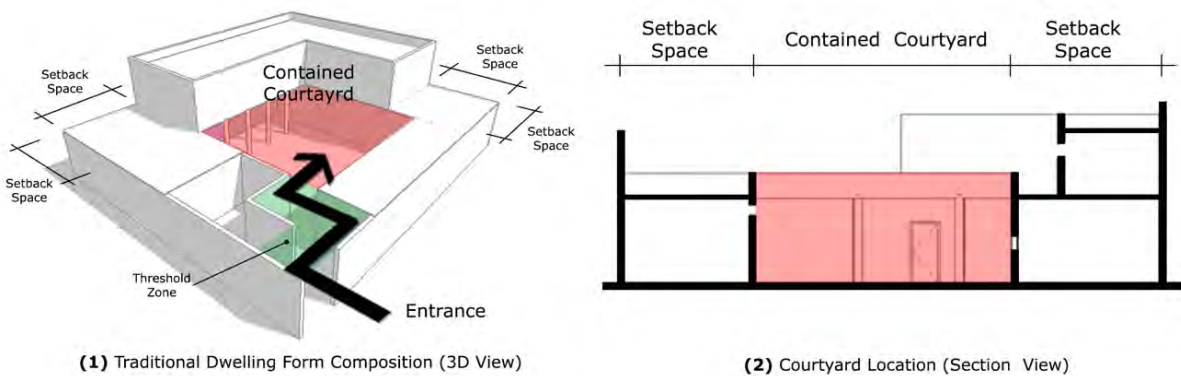

Fig. 5: Understanding the courtyard positioning within the traditional dwelling. (Source: Author).

The study conducted an analysis of courtyard locations within various dwellings across the three communities to further validate the premises of this research. Upon examining the floor plan (Figure 6: A), we were able to dissect the concealed mechanisms that were employed within the courtyard to regulate the central part of the dwelling. This examination revealed the existence of two distinct mechanisms. The first mechanism involves understanding three key aspects: (1) how the courtyard's placement creates an interplay between indoor and outdoor environments, (2) how it introduces depth into the spatial arrangement of internal rooms, and (3) how it governs access to different sections of the building. The second mechanism focuses on comprehending how the inner private areas of the house function as protective barriers, safeguarding and enhancing the courtyard's privacy in relation to its neighbouring courtyards. To investigate the spatial

organization of internal spaces, we employed the Space Syntax 'justified access graph' methodology. This analytical approach allows us to discern and appreciate the courtyard's position within the hierarchy of indoor spaces (Figure 6: B).
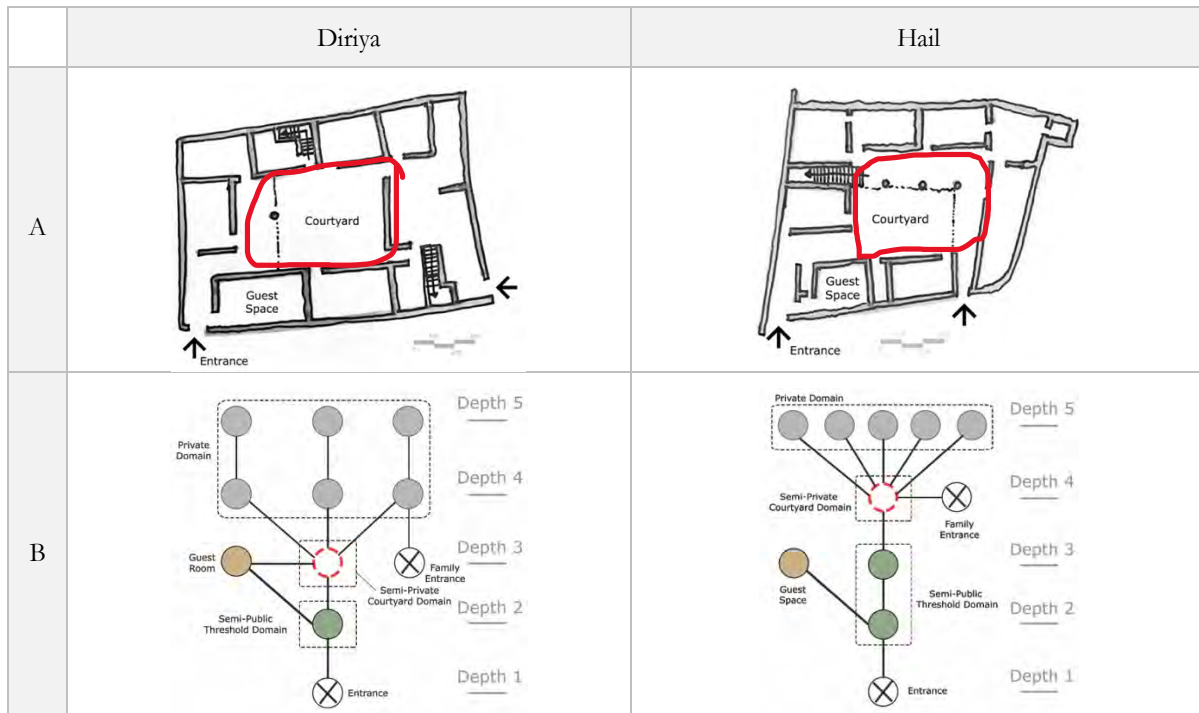

Fig. 6: The spatial behavior of the courtyard location. (Source: Author).

An understanding of the placement and intricate linkages of the courtyard space within traditional house designs, as well as the relationships between the courtyard and other interior spaces, can be obtained through a thorough analysis of house layouts using the justified access graph analysis method. The generated graphs effectively demonstrate that the courtyard is typically positioned between two significant areas, namely the house's threshold entrance and the inner private space (Figure 6: B). This configuration ensures that the courtyard is consistently enveloped by two layers of depth spaces, thereby preserving privacy from both external and internal perspectives. According to the graphs, the internal private areas are consistently accessible through the courtyard, and in some instances, an additional transitional space, the threshold, further enhances the depth. This spatial relationship between the courtyard and other indoor areas offers valuable insights into how it provides both a sense of seclusion from neighboring courtyards and accessibility.

Therefore, the justified access graph analysis method substantiates the earlier assertions that the courtyard is typically situated at the heart of the house, serving as a central hub that connects various rooms within it,

spanning from semi-public to private spaces (Figure 7). As previously emphasized, this location is of paramount importance and aligns with the socio-cultural imperative for household members to engage in their daily social activities without concerns about intrusions into their privacy. Achieving this necessitates physically enclosing the courtyard within the secure confines of the inner private spaces. Careful consideration is given to prevent any visibility or visual contact from neighboring roofs. To further enhance the courtyard's privacy, various architectural features and design elements were conceived and implemented to optimize its functionality and address various socio-cultural considerations, as will be explored in the subsequent sections.
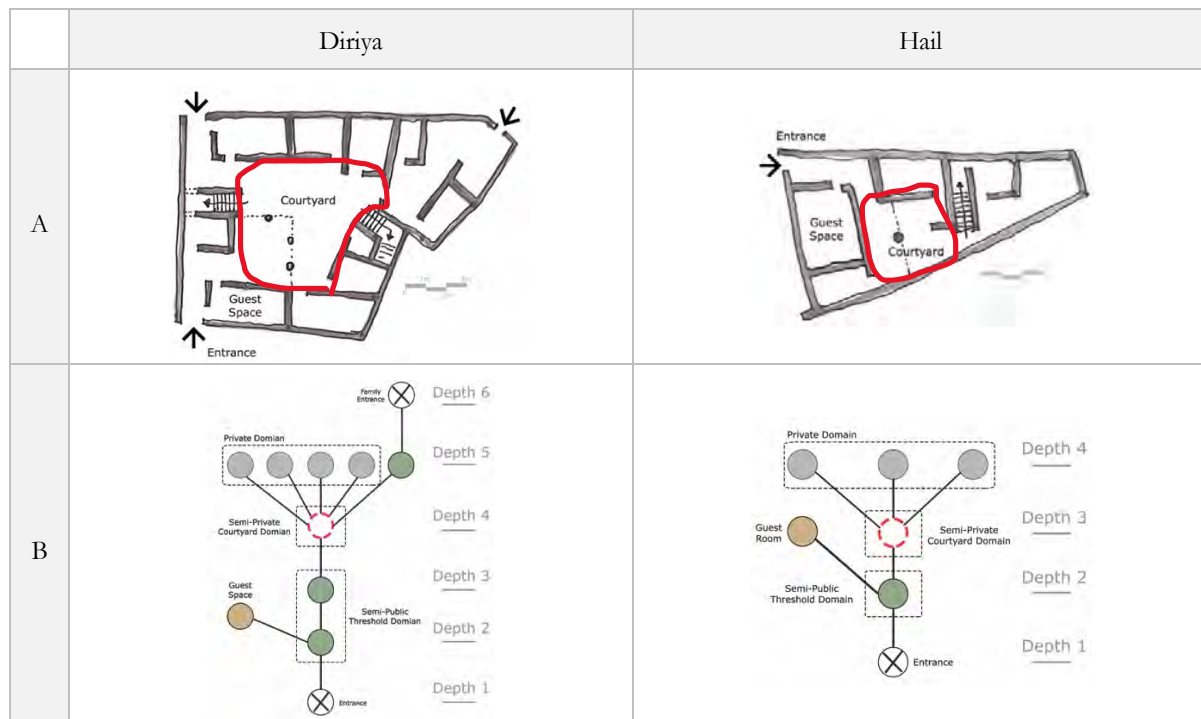

Fig. 7: The spatial behavior of the courtyard location. (Source: Author).

The study's findings were based on a series of non-continuous site visits conducted between 2021 and 2022, coupled with interviews involving residents of Diriya and Hail. Participants from Hail shared their experiences, shedding light on how the central location of the courtyard catered to their daily needs. The courtyard emerged as the most bustling area within the house due to its central position, allowing access to all private rooms from a single focal point. According to interview participants, this central positioning of the courtyard facilitated the accommodation of diverse activities within the internal spaces, both throughout the day and at night. It also explained the variation in sizes of traditional houses, as residents ingeniously adapted to maximize the utilization of their limited interior spaces.

Similarly, when questioning locals from Diriya with firsthand experience of the traditional built environment, they asserted that elements integrated with the courtyard were purposefully added to enhance its privacy. The study identified these elements primarily within courtyard walls and building roofs. According to participants, while these components were not strictly necessary, locals incorporated them to achieve a greater degree of privacy and address the spatial organization of various elements within the dwelling (Figure 8)[43]. Thus, the study illuminated how residents employed various architectural elements to enhance privacy, with walls increasing the courtyard's enclosure and building roofs creating an additional layer of separation from neighbors. This was particularly significant for female occupants, who could enjoy more open-air activities, including hosting social gatherings in the courtyard or spending time outdoors, thanks to the heightened privacy. Through observation, it was evident that these elements were strategically implemented after considering the spatial arrangement of the dwelling components, effectively enhancing security and privacy for both male and female residents.
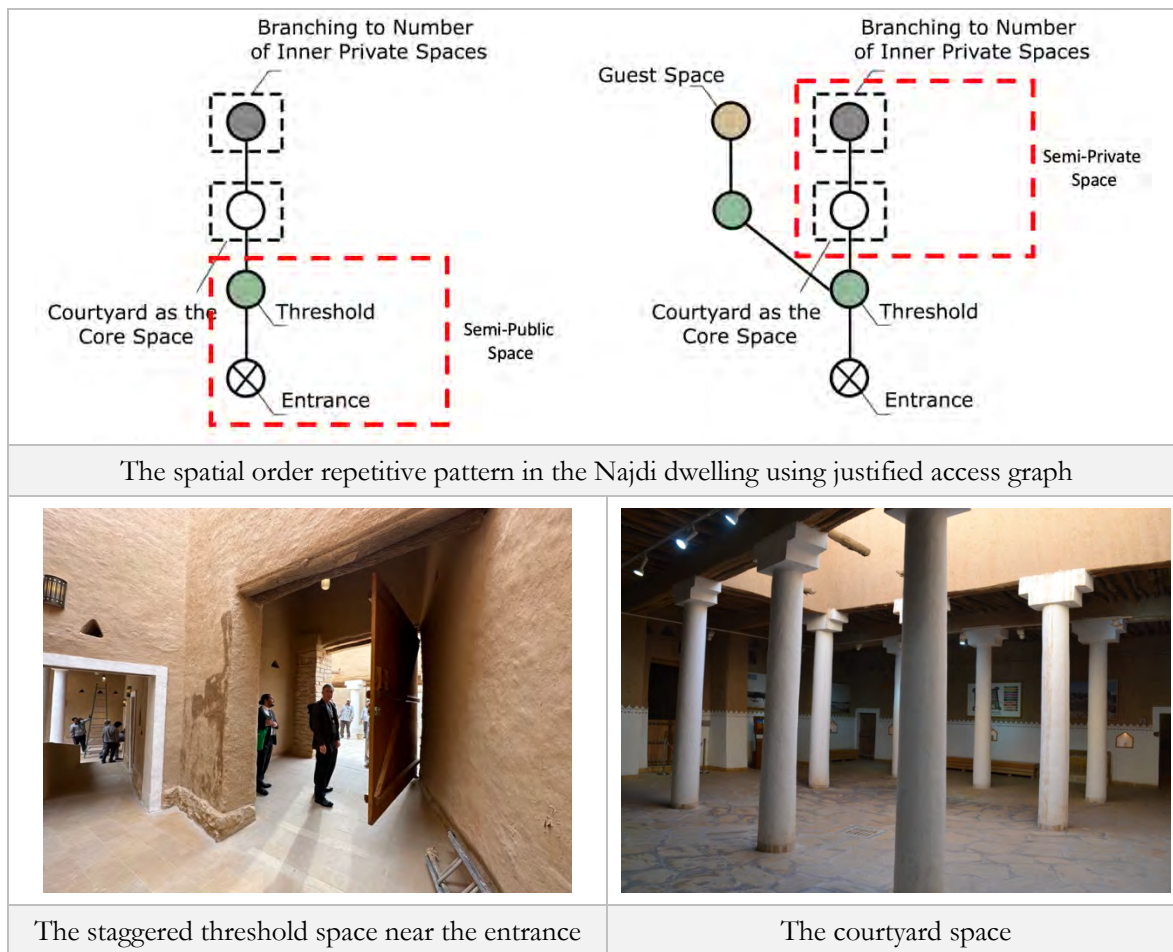

The spatial order repetitive pattern in the Najdi dwelling using justified access graph	
The staggered threshold space near the entrance	The courtyard space

Fig. 8: The internal spatial order of the Najdi traditional dwellings. (Source: Author).

Al-Mohannadi (2019)[44] conducted a study on courtyards in Qatar's traditional built environment, emphasizing their physical and social significance as the nucleus of the housing unit. The researcher observed that the spatial layout of Qatari houses is heavily influenced by the culture of hospitality, reflecting the social divisions among family members and their deeply ingrained way of life in Arab culture. Similarly, Bekleyen and Dalkil (2011)[45] noted the prevalence of traditional Turkish courtyards in hot and arid climates, highlighting their role in establishing territorial boundaries and providing private spaces for introspection. While both Al-Mohannadi and Bekleyen & Dalkil pointed to hospitality and territoriality as factors influencing the spatial design of Arab dwellings, it is also plausible that these courtyards signify increased social organization and status. This notion of hospitality and the creation of private spaces resonates in traditional Arab homes, with many considering the traditional courtyard as a testament to these cultural values. Therefore, the observations of Al-Mohannadi and Bekleyen & Dalkil align with the findings of this study, indicating common trends in the formation of traditional courtyards in regions like Qatar and Turkey.

In addition to its role in managing the spatial organization of inner areas, the courtyard adds a layer of depth that regulates accessibility, as previously discussed[46]. This aligns with the earlier description, where locals positioned the courtyard at the heart of the house to control access to other interior spaces. Consequently, women who frequently use the courtyard throughout the day have a clear view of all the other private areas within the home from this central location. While it cannot be definitively stated that this was the sole purpose of the courtyard, it can be argued that it was one of its primary objectives. By being able to monitor the comings and goings within the household, women could exercise a greater sense of autonomy, control, and privacy[47]. Thus, the courtyard struck an ideal balance between privacy and visibility, allowing women to safeguard their privacy while freely moving about the house.

4.3. The Courtyard's Relationships

To gain insights into how a specific courtyard interacts with other interior areas of the home, considering factors like connectivity and visual separation, it was essential to focus on individual courtyards. The proximity of Najdi towns influenced the development of certain architectural components aimed at ensuring specific requirements related to neighbourly privacy. Consequently, it was previously suggested that some courtyard features were purposefully designed by locals to meet particular needs. It's noteworthy that many of the components found in Najdi courtyards share similarities with courtyard designs in other parts of the world[48]. While these resemblances have been observed, it's plausible that the close proximity of these towns and their cultural affinities contributed to the development of similar courtyard features.

To examine the architectural elements and spaces associated with neighbouring courtyards and their role in maintaining privacy, the study employed architectural section views. The investigation involved scrutinizing

two or three contiguous houses to discern how the physical layout of each dwelling ensured the isolation of its courtyard from those of its neighbors. Additionally, the study explored the presence of various architectural components and their socio-cultural significance in safeguarding household privacy.

Three prominent elements emerged from the courtyard analysis conducted through section views: the roof walls (parapet), the towering walls, and the diverse architectural features connecting inner rooms surrounding the courtyard space (Figure 9). Each of these components within the house has a specific location and function aimed at preserving privacy. This observation aligns with Ali Bahamman's explanation of Saudi Arabian home architectural plans, emphasizing the role of courtyards as more than just climatic and cost-effective solutions, but also as architectural tools for creating seclusion and a pleasant semi-outdoor extension of the home[49]. The concept of using architectural design to manage privacy has been deeply ingrained in Saudi culture for generations.

For instance, the tall walls within the courtyard serve the purpose of obstructing views of rooms on the rooftops of the buildings, much like the roof parapets between two adjacent houses that serve a similar function. Roof parapets are used to demarcate the boundaries of a house's roof. These parapets can be tall, providing greater privacy, or short, allowing visibility across neighbouring rooftops, enabling women from adjacent houses to communicate and socialize. Roof parapets and towering walls function as complementary components, as both contribute to heightened physical enclosure of the courtyard. Conversely, private rooms and their exterior walls are employed to encircle the courtyard by extending the distance between adjacent house rooftops, incorporating architectural elements (e.g., a roof parapet, known as *shuraf*), or positioning them in ways that either restrict or enhance views (e.g., an arcade, known as *alrewaq*)[50]. All these elements have evolved to shape the social dynamics and physical environment where women engage with one another.
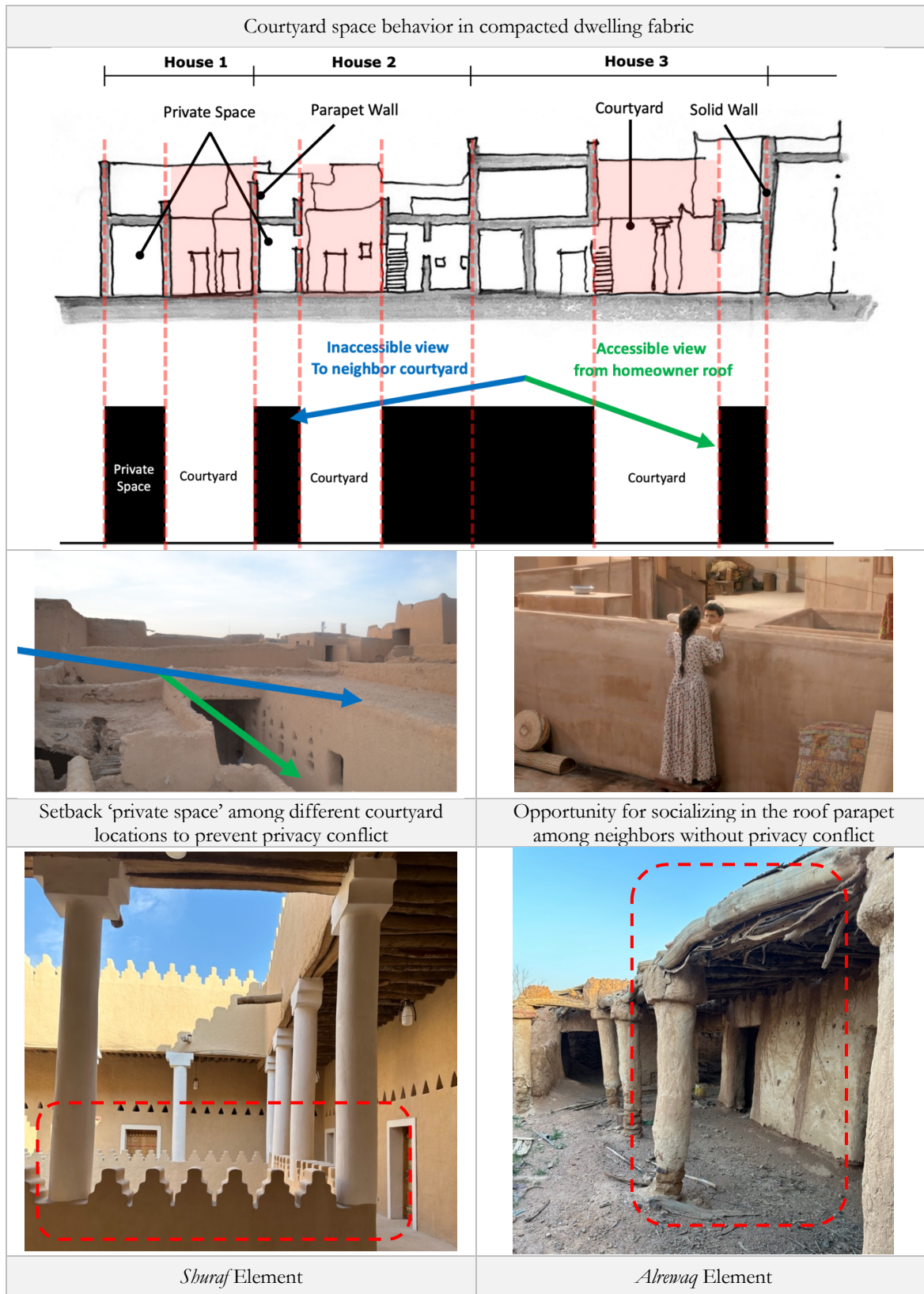
Fig. 9: Courtyard space behavior among compacted dwelling fabric. (Source: Author).

As previously discussed, the courtyard typically occupies a central position within the house. However, in cases where space constraints, such as the size of the plot, prevent courtyards from being situated between private spaces, alternative approaches are adopted. This situation is exemplified in houses in Hail, where the courtyard is unavoidably positioned at the center of the structure without the presence of private spaces, making it adjoined to a neighboring house. To maintain the privacy of the courtyard and the rooftop areas in these homes, the first house had to incorporate various architectural features, as previously described[51]. These components, while possessing aesthetic qualities, primarily serve to enhance the seclusion of each house and protect the courtyards of both neighbors, thereby affecting the privacy of attached homes. Consequently, inhabitants devised and implemented these features not only to benefit their own courtyards but also as architectural elements that establish an interaction with nearby buildings. This interplay with neighboring structures not only influenced the physical form of the house but also contributed to the overall configuration of surrounding homes.

As depicted in Figure 10, the compact nature of the Najdi built form reinforces the physical homogeneity of these structures. Even when viewing two or three closely situated houses in architectural section views, their property boundaries remain ambiguous, and they appear physically intertwined. This observation is crucial because it underscores that the three architectural components discussed earlier are not intended to demarcate separate houses but rather to safeguard the privacy of residents while enhancing the compactness and interconnectedness of various physical forms. Consequently, female inhabitants can engage with each other more closely and efficiently, even though the fundamental characteristics of the Najdi house are designed to provide them with highly private spaces.

This outcome is a direct result of the spatial organization devised by inhabitants, which has shaped the Najdi built environment into cohesive urban masses capable of accommodating both household segregation and connection based on religious principles. These principles include Islamic concepts such as 'neighbors' rights,' 'easement rights' (as discussed by Al-Hathloul, 2010)[52], and the Islamic principle of 'do no harm' (as examined by Alnaim, 2020)[53]. The significance of this developed spatial order lies in empowering female inhabitants to establish a robust sense of community and interaction. Therefore, any additional architectural components introduced by local's stem from this spatial order, which aims to preserve the uniformity of the built environment and meet socio-cultural demands effectively.
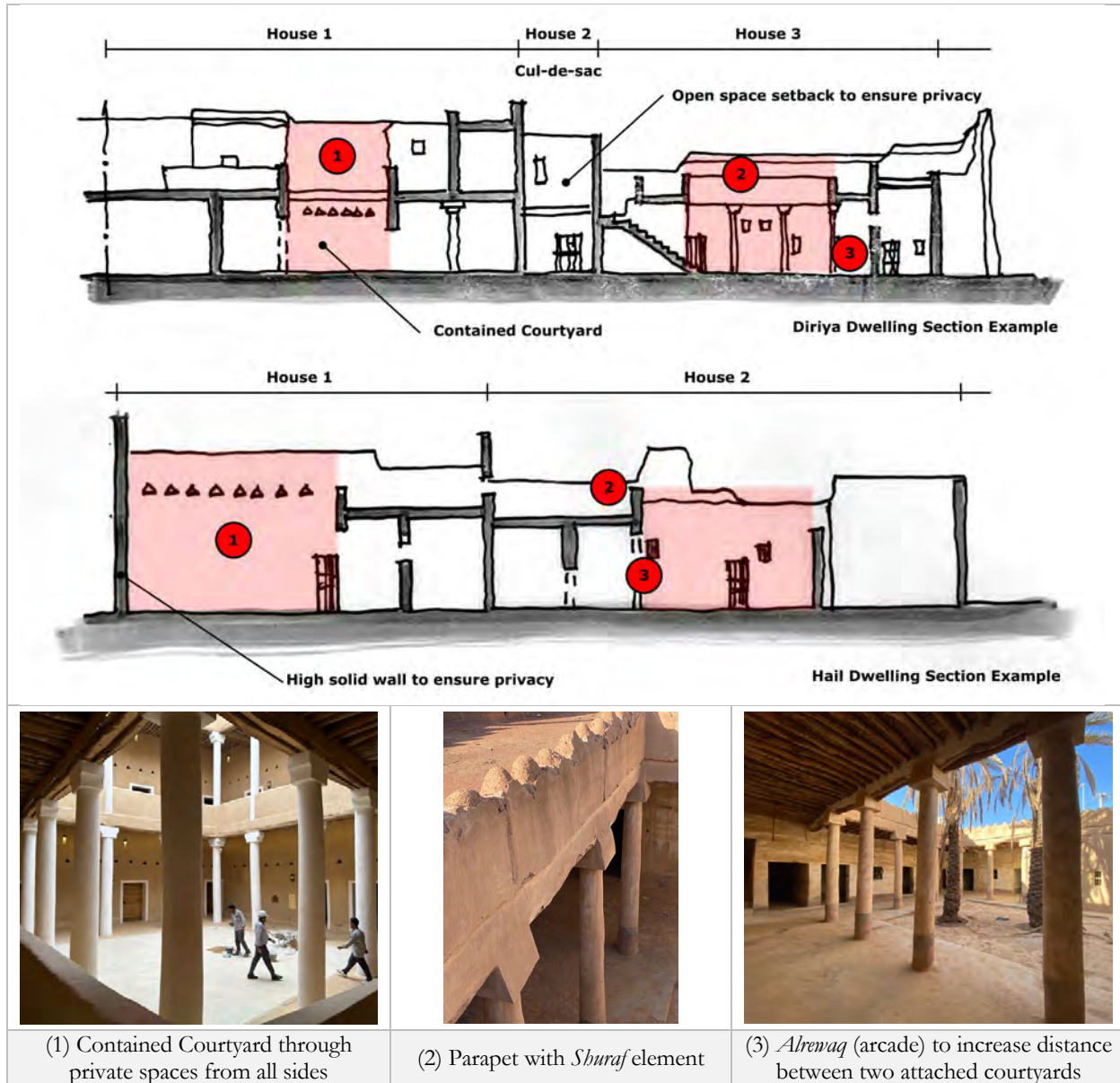
	House 1		House 2	House 3	

Cul-de-sac

Open space setback to ensure privacy

Contained Courtyard

Diriya Dwelling Section Example

House 1 — House 2

High solid wall to ensure privacy

Hail Dwelling Section Example

(1) Contained Courtyard through private spaces from all sides	(2) Parapet with *Shuraf* element	(3) *Alrewaq* (arcade) to increase distance between two attached courtyards

Fig. 10: Architectural section view for a variety of Najdi dwellings. (Source: Author).

5. DISCUSSION

Najdi architecture, a traditional style rooted in the Najd region of the Arabian Peninsula, has distinctive characteristics that set it apart. One of its defining features is the ingenious use of courtyard spaces, strategically employed to create comfortable and sheltered environments in the scorching desert climate. The traditional layout of the residential units, with two sides covered, naturally enhances privacy while also allowing for the seamless incorporation and adaptation of backyard spaces without significantly encroaching upon the neighbors' privacy. Courtyards, in particular, often have various openings and windows, primarily

facing the family section. These courtyards contribute significantly to improving the thermal efficiency of residential units, harnessing the benefits of natural cooling through shielding from direct sunlight. This protection from the harsh sun, a fundamental design principle, is made possible through the adoption of a compact layout and isolation techniques. Isolation is achieved by introducing an arcade element within the house, creating additional space and distance between two courtyard areas. This architectural approach facilitates the incorporation of ventilation openings that overlook the inner courtyard, a vital feature for providing natural ventilation and effective cooling to other parts of the dwelling without compromising privacy requirements.

As exemplified in our study, courtyard spaces serve as more than just functional elements within the architecture; they play a pivotal role in the social and cultural fabric of communities. These courtyards act as focal points for social interactions, community identity, and cultural expressions. They serve as communal spaces where residents come together, fostering bonds and a sense of belonging. These interactions take diverse forms, ranging from shared meals to informal gatherings and collaborative activities. In this way, the courtyard transcends its physical utility to become a central hub for social life, enriching the community experience and strengthening the ties among its inhabitants.

The utilization of courtyard spaces for communal purposes was a driving force behind fostering cooperation and collaboration within the community. This aspect is underscored by the collaborative design processes that encouraged the organization of various events and activities centered around the courtyard. These initiatives played a crucial role in influencing how courtyards were designed and situated within traditional dwellings. Consequently, courtyards evolved into platforms for community building and strengthening social bonds. Therefore, gaining an understanding of the profound social and cultural implications associated with these spaces offers valuable insights into the significance of preserving and reintegrating courtyard design into modern architectural practices.

Traditional courtyards are typically characterized by four fundamental criteria that prioritize user privacy and significantly impact the spatial layout of the home. Firstly, residents traditionally positioned the courtyard further inside the dwelling, accessed through a designated threshold area, which added depth and dimension to the home's entry. Second, to ensure seclusion from all sides and the envelopment of private interior spaces, courtyards were strategically situated either at the center of the house or along one of its sides. Third, the study consistently observed that in most single-story houses, outer partition walls were designed to rise above eye level, particularly on the roof, to prevent visual intrusion from neighboring residences. Fourth, it was a customary practice to avoid situating two courtyards from different houses adjacent to each other. Instead,

residents of traditional settlements introduced barriers between these courtyards, which could include courtyard components or private interior spaces.

These established guidelines not only preserved the cultural essence of traditional settlements but also regulated the utilization of courtyards within this context, shaping the agreed-upon spatial arrangement of inner spaces in dwellings. Consequently, by comprehending these courtyard design principles employed by inhabitants of traditional settlements, it is conceivable to create spaces in contemporary developments that not only safeguard privacy but also foster social interaction among neighbors. It is also crucial to consider the contextual nuances of a specific location when designing courtyards, as these factors significantly influence their functionality and cultural relevance.

Hence, (Table 1) outlines the typological and socio-cultural attributes of courtyard spaces within traditional Najdi architecture, taking into consideration various factors such as:

Typological Aspects	Socio-cultural Aspects
The courtyards are enclosed with thick walls constructed of local materials such as mud brick, stone, or gypsum block. These walls provide insulation from both heat and noise.	Provide a sense of community. The shared space of a courtyard can be a place for residents to gather and socialize. This helped to build a sense of community and belonging among residents.
The courtyard is often divided into two parts, an outer area (near the entrance) and an inner area (arcade, or *Alrewaq*) that is more private and sheltered from the guest space (*Majlis*).	Promote social interaction. The open and accessible nature of a courtyard encouraged family members to interact with each other. This is especially beneficial for women's who have limited social interaction outside of their home.
The courtyard in some cases contains a central well, surrounded by palms trees for shading and decoration.	Used for a variety of activities, such as gardening, dining, entertaining, and relaxing. This led the space to be point of focal life for its versatile and valuable addition to the dwelling.
The roof is typically flat or pitched, made from palm wood supported by columns or beams carved, in some cases, with intricate designs.	Used to reflect the cultural values of the residents through implementing several architectural features to respond and represent the socio-cultural values of its inhabitants.
Windows or openings are often placed high up on the walls to allow light into the courtyard while maintaining privacy.	Used to improve the quality of life for everyone who lives in a neighborhood as they provide a safe, healthy, and enjoyable space to mitigate the compacted nature of the urban form.
Doors are usually placed at each end of the courtyard to provide access to different parts of the dwelling as well as ventilation when needed.	Encourage security and control through the space ability to visually observe all other spaces inside the house.
Decorative features such as wooden latticework, decorative plaster, painted ceilings and a parapet (*Shuraf*) add to the beauty of these spaces while providing shade from direct sunlight in some cases.	Used to overcome the restricted openings in the exterior façade. This led the inner private structures to have the ability to open to the courtyard space to circulate airflow and provide daylight.

Table 1: Summary of the study typological and socio-cultural aspects of the Najdi courtyard.

To promote the evolution of Najdi courtyard homes in modern Saudi Arabian architecture, it is advisable to leverage new materials and technology while preserving the essence of traditional architectural forms. The influence of the Ministry of Municipal and Rural Affairs (MMRA) has been notable, particularly in terms of regulating home size and plot sizes, leading to changes in the architectural landscape and constraints on the incorporation of courtyard spaces due to setback policies between neighboring homes. Consequently, employing materials like concrete and steel can provide structural support for constructing new extensions and additions while retaining the original architectural character. Moreover, the integration of effective shading strategies should be a focal point, ensuring both environmental sustainability and cost-effectiveness in cooling the dwelling. This approach allows contemporary residences to meet contemporary standards for comfort and energy efficiency while still honoring their traditional aesthetics.

Incorporating fundamental principles and natural elements into the design process is key to realizing contemporary courtyard spaces in modern homes while staying true to traditional concepts. Opting for open-air courtyards instead of enclosed ones, for instance, not only facilitates natural ventilation but also establishes a sense of connection with the surrounding natural environment within living spaces. Furthermore, the use of materials such as wood, stone, and clay can be harnessed to evoke a classic ambiance. These materials can be complemented by the introduction of plants and foliage, thereby creating an atmosphere reminiscent of traditional courtyards. By striking a balance between aesthetics and functionality, homeowners can enjoy their courtyard spaces without sacrificing privacy.

6. CONCLUSION

Beyond its architectural significance, the traditional courtyard dwelling design offers an efficient means of blending indoor living spaces with outdoor accessibility while ensuring privacy and protection from external elements. It serves as a communal area where family members can gather or entertain guests, benefiting from natural ventilation and illumination that might be challenging to achieve in conventional building structures. This holds particular importance in cultures like Saudi Arabia, where family privacy is highly cherished. While this study has emphasized the prevalence of rectangular and square courtyard shapes, it's worth noting that occasional deviations, such as U or L-shaped layouts, may arise due to site constraints, building orientation, size considerations, or to accommodate specific functions within the dwelling. Nevertheless, it's evident that courtyards in the Najdi region adhere to a vernacular architectural style governed by a set of regulatory principles and socio-cultural norms, with minor variations influenced by local traditions or context. The study's findings illustrate that, regardless of the courtyard's placement, similar architectural elements were employed to maintain the demarcation between the interior and exterior realms. Irrespective of the

configuration, the overarching objective remained the preservation of family privacy, contributing to the distinctive characteristics of traditional Najdi dwellings.

Constructing new residences represents a visible aspect of contemporary modernization. It's a recent development in Saudi Arabia to question the extent of Westernization in these new homes and, more significantly, how modern architecture can preserve the subtle characteristics of the traditional mud houses of the past. The significance of courtyards in Saudi and global architecture offers valuable insights into how such spaces can serve as meaningful transitional zones between public and private areas in the modern context. Architects can leverage this cultural understanding to design modern courtyards that are not only visually appealing but also socially significant. Thus, we should ponder: can contemporary architectural endeavors incorporate traditional concepts? Does a direct application of these traditional ideas effectively convey originality and local identity in modern projects? A question for future research is how a deep comprehension of the underlying meanings of various traditional concepts can enhance the development of a distinct local architectural identity.

NOTES AND REFERENCES

[1] Nelson, R., "The courtyard inside and out: a brief history of an architectural ambiguity." *Enquiry The ARCC Journal for Architectural Research, 11(1),* (2014), p. 10-10.

[2] Hakim, B. S., "Arabic-Islamic cities: Building and Planning Principles." Kegan Paul International, London. Hatam, Gholamali (2000), Islamic architecture in saljugi period, Majed publication, Tehran, 1986.

[3] Memarian, G., & Brown, F. E., "Climate, culture, and religion: Aspects of the traditional courtyard house in Iran." *Journal of architectural and planning research,* (2003), p. 181-198.

[4] El-Shorbagy, A., "Traditional Islamic-Arab House: Vocabulary and Syntax." *International Journal of Civil & Environmental Engineering, IJENS, 10(4),* (2010), p. 15-20

[5] UNESCO, "Intangible Cultural Heritage – Working Definitions." International Round Table, Piedmont: Italy, 2001, Retrieved from: https://ich.unesco.org/doc/src/00075-EN.pdf on January 28, 2023

[6] Bekleyen, A., and Dalkil, N., "The Influence of Climate and Privacy on Indigenous Courtyard Houses in Diyarbakır, Turkey." *Scientific Research and Essays, 6(4),* (2011), p. 908-922.

[7] Lee, M. S., & Park, Y., "The Courtyard as a Microcosm of Everyday Life and Social Interaction." *Architectural research, 17(2),* (2015), p. 65-74.

[8] Oliver, P, "Dwellings settlements and tradition: Cross-cultural perspectives." Handed down architecture. In: Bourdier, J. P. and Alsayyad, N. (eds.), *University Press of America,* New York, (1989), p. 54–75.

[9] Noble, A. G., "Traditional Buildings: A Global Survey of Structural Forms and Cultural Functions." I. B. Tauris & Company, London: UK, (2007).

[10] Oliver, P., "Dwellings: The Vernacular House Worldwide." Phaidon Press, Incorporated, USA, (2007).

[11] Erarslan, A., "The Concept of Regionalism in Architecture as Interpreted in Contemporary Architecture: The Element of the "Courtyard" in the Architecture of Turgut Cansever and Cengiz Bektaş." Contemporary Studies in Sciences, *Cambridge Scholars Publishing,* UK, (2020), p. 196-222.

[12] Zhang, D., "Courtyard Houses around the World: A Cross-Cultural Analysis and Contemporary Relevance." New Approaches Contemp. Archit. Urban, *Cinius Yayinlari Publication,* (2020), p. 23–44.

[13] Rapoport, A., "House Form and Culture." Prentice Hall, Inc., Englewood Cliffs, London: UK, (1969).

[14] Rapaport, A., "The Nature of the Courtyard House: A Conceptual Analysis." *Traditional Dwellings and Settlements Review,* 18(2), (2007), p. 57-71.

[15] Sthapak, S., & Bandyopadhyay, A., "Courtyard houses: An overview." R*ecent Research in Science and Technology,* 6(1), (2014).

[16] Taleghani, M., and Tenpierik, M., "Environmental Impact of Courtyards — a Review and Comparison of Residential." *J. Green Build.,* 7(2), (1986), p. 113–136.

[17] Al-Hafith, B., Satish, K., Bradbury, S., and De Wilde, P., "The Impact of Courtyard Compact Urban Fabric on its Shading: Case Study of Mosul City, Iraq." *Energy Procedia,* 122, (2017), p. 889–894.

[18] Akbar, J., "Courtyard houses: A case study from Riyadh, Saudi Arabia'." *The Arab City: Its Character and Islamic Cultural Heritage, Proceedings of a Symposium,* KSA: Madina, (1982), p. 162-176.

[19] Akbar, J., "Crisis in the Built Environment: The Case of the Muslim City." Concept Media Pte Ltd, A Mimar Book, Netherlands, (1998).

[20] Husin, Z., "The Role of Domestic Courtyard in Islamic Teachings and Practices: Oman as a Case Study." Journal of Education and Social Sciences, 4, (2016), p. 225-234.

[21] Alnaim, M.M., Albaqawy, G., Bay, M., and Mesloub, A., "The Impact of Generative Principles on the Traditional Islamic Built Environment: The Context of the Saudi Arabian Built Environment." *Ain Shams Engineering Journal, 14,* (2023), 101914.

[22] Alnaim, M.M., "Dwelling Form and Culture in the Traditional Najdi Built Environment, Saudi Arabia." *Open House International, 46(4),* (2021), p. 595-614.

[23] Ragette, F., "Traditional Domestic Architecture of The Arab Region." *American University of Sharjah Press,* UAE, (2012).

[24] Within Najdi architecture, courtyards serve as versatile spaces, accommodating a range of activities such as Eid celebrations, weddings, family get-togethers, and even playground activities. These traditional courtyards hold their value in their ability to facilitate private social interactions and act as the central hub for family life and gatherings.

[25] Al-Hussayen, A., "Women and the Built Environment of Najd." *Unpublished PhD Thesis*, University of Edinburgh, United Kingdom, (1996).

[26] Mortada, H., "Sustainable Desert Traditional Architecture of the Central Region of Saudi Arabia." *Sustainable Development, 24(6),* (2016), p. 1-13.

[27] Rabbat, N., "The Courtyard House: From Cultural Reference to Universal Relevance." Routledge, London: UK, (2010).

[28] Nurani, L. M., "Critical review of ethnographic approach." *Journal socioecology, 7(14),* (2008), p. 441-447.

[29] Flynn, P., "Ethnographic approaches." Handbook of Translation Studies, 1, (2010), p.116-119.

[30] Curran, J., "Ethnography Design." Royal College of Art, London, (2012).

[31] Ahmadi, S., and Habibi, M., "Concept of dwelling in informal settlements located in metropolitan areas of Iran case study." *Morteza Gerd. GeoJournal, 88(2),* (2023), p. 2083-2100.

[32] Wimpenny, P., & Gass, J., "Interviewing in phenomenology and grounded theory: is there a difference?" *Journal of advanced nursing, 31(6),* (2000), p. 1485-1492.

[33] Urquhart, C., "Observation research techniques." *Journal of EAHIL, 11(3),* (2015), p. 29-31.

[34] Ciesielska, M., Boström, K. W., & Öhlander, M., "Observation methods." *Qualitative methodologies in organization studies,* Volume II: Methods and possibilities, (2018), p. 33-52.

[35] Bafna, S., "Space Syntax: A Brief Introduction to Its Logic and Analytical Techniques." *Environment & Behavior 35 (1),* (2003), p. 17–29.

[36] Hillier, B., A. Leaman, P. Stansall, and M. Bedford., "Space Syntax." *Environment & Planning. B, Planning & Design 3 (2),* (1976), p. 147–185.

[37] Turner, A., Doxa, M., O'Sullivan, D., & Penn, A., "From Isovists to Visibility Graphs: A Methodology for the Analysis of Architectural Space." *Environment and Planning B: Urban Analytics and City Science, 8(1),* (2001), p. 103-121

[38] Ostwald, M., "A Justified Plan Graph Analysis of the Early Houses (1975-1982) of Glenn Murcutt." *Nexus Network Journal, 13(3),* (2011), p. 737-762

[39] Elizondo, L., "A Justified Plan Graph Analysis of Social Housing in Mexico (1974–2019): Spatial Transformations and Social Implications." *Nexus Network Journal, 24(1),* (2022), p. 25-53.

[40] Lawrence, R. J., "Housing, Dwellings and Homes: Design Theory, Research and Practice." John Wiley & Sons Ltd, London: UK, (1987).

[41] Alnaim, M.M., "Dwelling Form and Culture in the Traditional Najdi Built Environment, Saudi Arabia." *Open House International, 46(4),* (2021), p. 595-614.

[42] Das, N., "Courtyards houses of Kolkata: Bioclimatic, typological and socio-cultural study." Doctoral dissertation, Kansas State University, (2006).

[43] Focus groups was held in Hail between 2021 and 2022.

[44] Al-Mohannadi, A., "Socio-Cultural Factors Shaping the Spatial Form of Traditional and Contemporary Housing in Qatar: A comparative analysis based on space syntax." Academia, *Proceedings of the 12th Space Syntax Symposium, 285,* (2019), p. 1-19.

[45] Bekleyen, A., and Dalkil, N., "The Influence of Climate and Privacy on Indigenous Courtyard Houses in Diyarbakır, Turkey." *Scientific Research and Essays, 6(4),* (2011), p. 908-922.

[46] Alnaim, M.M., "The Hierarchical Order of Spaces in Arab Traditional Towns: The Case of Najd, Saudi Arabia." *World Journal of Engineering and Technology, 8,* (2020), p. 347-366.

[47] Focus groups were held in Hail and Diriya between 2021 and 2022.

[48] Al-Hussayen, M., "Significant Characteristics and Design Considerations of the Courtyard House." *J. Archit. Plan. Res., 12(3),* (2015), p. 240–258.

Markus, B., "Review of Courtyard House in Nigeria: Definitions, History, Evolution, Typology, and Functions." *AFRREV STECH An Int. J. Sci. Technol., 5(2),* (2016), p. 103-117.

Gupta, R., and Joshi, M., "Courtyard: A Look at the Relevance of Courtyard Space in Contemporary Houses." *Civil Engineering and Architecture, 9(7),* (2021), p. 2261-2272.

[49] Bahammam, A., "Architectural Patterns of Privacy in Saudi Arabian Housing." *Unpublished PhD Thesis,* McGill University, Montreal: USA, (1987).

[50] An interview with Hail's elderly community between 2021 and 2022.

[51] Focus groups were held in Hail between 2021 and 2022.

[52] Al-Hathloul, S., "Arabic Islamic Cities: The Effect of Legislation in Shaping the Urban Environment." Umran, Riyadh: Saudi Arabia (Arabic), (2010).

[53] Alnaim, M.M., "The Concept of Access and the Mechanisms of the Threshold Space in Arab Traditional Built Environment: The Case of Najd, Saudi Arabia." *Global Journal of Science Frontier Research, 20(A9),* (2020), p. 1–18.

THE INFLUENCES OF ETHNICITY IN CONTEMPORARY ROW HOUSING: AN INVESTIGATION ON THE MEANING OF HOME IN THE MALAYSIAN SETTING

Erna Nuralia Zharani, Gehan Selim

THE INFLUENCES OF ETHNICITY IN CONTEMPORARY ROW HOUSING: AN INVESTIGATION ON THE MEANING OF HOME IN THE MALAYSIAN SETTING

◆ ◆ ◆

Home has many interpretations. The meanings can be derived based on multi-faceted scenarios and circumstances. This paper hypothesises that ethnicities have multiple realities or views on reconfiguring spaces to regulate their way of living within contemporary row housing and perceive the meaning of 'home'. This paper explores the multi-ethnic society of Malaysian households and how their diverse practices delineate the physical spaces between private and public from the modifications they make to their houses. This study employs qualitative methods and conducts in-person home interviews using mental map drawings and home tour observation to investigate the influences of ethnicity in contemporary row houses as they define the meaning of home. The outcome of this investigation responded to the hypothesis of this paper. This paper concludes that ethnicity has multiple views, which are categorised into four themes: safety and boundaries, religion and lifestyle, tradition and memories, and community living, which explains how each household reconfigured spaces to facilitate their way of living within contemporary row housing thus provide a greater understanding to their meaning of 'home'.

1. INTRODUCTION

The physical 'dwelling' and 'home' are more frequently linked to a place attachment than the word 'house'. 'Home' is a physical setting where people inhabit and interact with environments and gradually assign meaning to each place. It contains significance and memories related to the 'home' concept[1]. Although the conceptions of a house and a home are different, both phrases refer to the same physical structure of a habitation; the meaning contained inside this structure pushes the residence toward one of the spectrum or the other. It is crucial to recognise the physical structure's potential to serve as a record of experiences and a conducive setting in which meanings are created[2].

The experience of home is an interaction between people (individually or in groups), setting (physical space) and time (linear or cyclical)[3]. Gerontologists explained that the meaning of 'home' involves 'making or creating', which also refers to a 'process of belonging'[4]. The demarcation of the external space of a house belongs to the public, while internal spaces refer to private rooms that belong to the homeowners. This notion gives meaning to the 'delimit spaces', which refers to one's psychological ties to the region or vicinity around one's residence[5]. It is related to individual psychology and the environment, which produces a 'sense of familiarity' through a particular society or individual's behaviours, feelings and experiences[6]. Petridou (2001) refers to this notion as a "place of origin and retreat" and 'right to return''. In psychology, home is the geographical lens through which people see, experience and perceive the environment that orients them into a familiar space, time and culture. A bonding between the self, experiences and place refers to spatial identity[7] (Case, 1996, p. 14). From a sociological and environmental perspective, an empirical study by Depress classified the concept of home into four behavioural or theoretical perspectives[8].

The territorial model, which was adapted from studies of animal small group ecology to human behaviour in primary groups, is generally understood as a self or other boundary mechanism that involves personalisation or marking of a place or object as a medium of communication that it is 'owned by a person or a group[9]. The primary outcomes of territorial satisfaction are security and control, both external and internal. Dwellers in the home territory are authorised to exert control over the space and the behaviours that occur within it[10]. It was discovered that establishing the home area with physical markers or regular activities enhanced the inhabitants' sense of control to delineate their perceived public and private spaces according to their daily practices and way of living[11].

Psychological interpretation provides home fulfilment to dwellers in three manners: mind, heart and body fulfilment[12]. The desire to act upon and modify the home unit and to express one's ideas and values is interpreted as a subconscious expression of the self[13]. The characteristics of a physical home are equally significant since they reflect the identity, social group or individual's architectural style and preferences within the self or self-expression[14]. Home becomes an arena for everyday life activities, sensual experiences, and spiritual experiences. In other words, the home provides psychological comfort through its additional spatial quality in terms of quietness, light, cleanliness, thermal conditions, and eased movement[15]. In addition, the home is the centre of the family and the place to entertain friends and achieve the human psychological need for social interaction and connecting, as well as the companionship of pets in the home[16].

The phenomenology and development interpretation suggests that home is a process and can only be experienced for a long time and that people's particular life events influence their experience of home[17]. One of the most crucial events is migration. A home's definition varies by ethnicity and post-migration experience towards homemaking in a new environment[18]. It has been discovered that a person's history strongly influences their motivation, concepts, and images about home. This notion describes home as permanence and continuity, associated with a process that links an individual's past and future[19].

A home reflects culture, social convention, and values, manifested in people's habits, practices, and predispositions towards their homes, known as "habitus"[20]. The practice of home is a mediating variable that explains how and why ethnicity as a social actor can influence the physical home settings[21]. Consequently, past literature suggests that each household practises privacy and boundaries in line with their belief systems and that reconfiguring physical space is part of homemaking[22]. This paper hypothesises that ethnicities have multiple realities or views on reconfiguring spaces to facilitate their way of living within contemporary row housing as they define the meaning of 'home'. There is a need to uncover the knowledge to understand better the meaning of home from multi-ethnic perspectives within this context. Henceforth, this paper aims to understand the pattern of home renovations from each ethnic household and the spatial practice that causes

these space reconfigurations in contemporary row houses. To fill in the gap, two main questions need to be investigated. First, what are the changes in the physical configuration of space in Malaysian contemporary row houses and the cause of these transformations? And second, how do the physical spaces facilitate the home practices in each household as they define the meaning of home? This paper aims to examine each household's home experience and decisions to transform spaces according to their social and personal needs and to understand the pattern of home renovations from each household and the spatial practice that causes these reconfiguring spaces in contemporary multi-ethnic homes. The following discussion starts with an introduction to the meaning of home and describes the phenomenology of contemporary row houses in a Malaysian multi-ethnic context. In the following sections, we also explain the methodology process for this investigation and analysis, elaborate on the results from fieldwork and conclude with contributions and suggestions for future research.

2. METHODOLOGY

During post-war British Malaya, the socio-economic segregation causal the gaps between the multi-ethnic population, as the Malays or Bumiputera focused on agriculture and fishery in the rural area, and the Chinese community focused on tin mining, usually in the sub-urban, while the Indian community mainly based in the rubber estate. Following the introduction of the New Economic Policy (NEP) in 1970, housing policy and strategy aimed to fulfil two NEP objectives: eradicating poverty by expanding income and employment possibilities regardless of ethnicity and eliminating ethnic-based economic activity[23]. Kuala Lumpur's capital city, the nation's centre of business and commerce, experienced overpopulation with migration and a considerable influx of individuals from rural areas to the city to find work and improve their living[24]. The significant population boom resulted in the rapid development of contemporary row houses in 1970, extending throughout the Selangor state[25]. The identical and mirror-image built forms in contemporary row housing led to physical modifications by dwellers, describing issues concerning privacy tensions and social conflicts which are inefficient to their home practice and experience[26]. As time passed, the transformation of these contemporary houses started to take shape differently[27]

Fig 1: The phenomenology of urban transformation in Malaysian contemporary row houses.

The phenomenology of transforming contemporary row houses has become a significant trend among the Malaysian population[28]. Past literature found that human psychology, emotions and social behaviours are the main factors that influence the physical configuration of space in multiple regions as they define the meaning of home[29]. Hence, a subjectivist approach that focuses on the social agents is appropriate in this situation and this stance is adopted to explore the meaning of home in the Malaysian multi-ethnic context[30].

A qualitative method is the research methodology adopted to understand social and cultural phenomena that look at multi-ethnic households from the 'inside' perspective of Malaysian home practice. Observing within the context enables the researcher to pursue the questions of 'how and why' modifications of physical homes occurred, specifically in contemporary row houses. This investigation implemented an embedded case study by selecting contemporary row housing in Selangor state and recruiting interested participants as the unit of analysis to investigate the creation of a 'home'. The unit of analysis refers to selecting a population context within contemporary row housing as a case that focuses on multiple households from different ethnic background[31].

Malaysian Context

Selangor Contemporary Row Housing

| Unit of Analysis | Unit of Analysis | Unit of Analysis |
| Unit of Analysis | Unit of Analysis | Unit of Analysis |
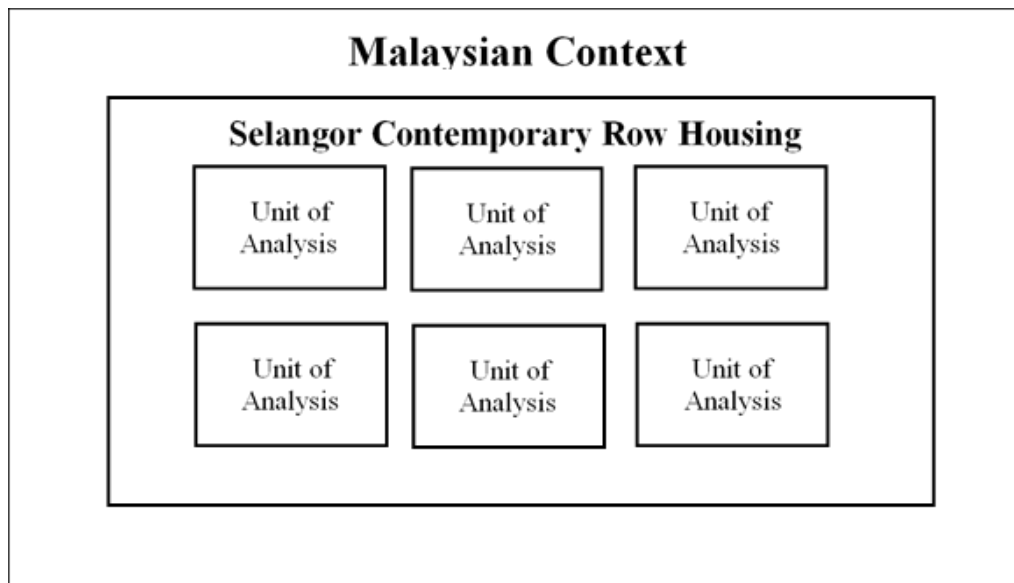
Fig 2: Embedded case study and research context (Source: authors)

Benner (1994) suggests that an adequate sample size is achieved when interpretations are visible and clear and new informants reveal no new findings. Creswell (2006) suggested that sample sizes should have a range of 3 to 6 and $\leq$ 10 interviews in the research[32].

At the early of this investigation, a recruiting survey determines interested and potential participants for this investigation. The survey was distributed online, and the questions were executed to reach out to interested and potential participants with specific criteria as described in Table 1 below.

Context	House Typology	Households	Participants Criteria
Selangor, Malaysia	Contemporary Row houses (Terrace houses or Semi-detached)	Family unit All ethnicities are welcome	1) Malaysian who homeowner-occupants and furnish/renovated their home exterior and/or interior spaces 2) Malaysian household that consists of family members (spouses, children, parents, grandparents, and/or in-laws). 3) All participants must be 18 years old and above, minors are not included. 4) Malaysian household who has lived for several years.

Table 1. The unit of analysis: Criteria for participants (Source: the author)

Initial data collection provides basic background of Malaysian respondents and their home modification experience, household structure, years of occupancy and willingness to participate in this project. Normally, an investigation within a housing compound is perceived as a private area[33], particularly within the Malaysian community. Ultimately, 15 households were selected carefully based on the stated criteria for home interviews. During the home interviews, two methods are adopted to capture the cause-and-effect relationship between ethnicity influences and the physical configuration of spaces.

Mental map drawing, the first method, generates 2D drawings or sketches while interviewing using semi-structured questions. According to Ozcetin and Rottmann (2022), this method enables exploring and showing how occupants reconstruct their domestic lives through past and current spatial practices. This session allows participants to elaborate what are their home experiences and how the transformation from old to new spaces took place at their home[34].
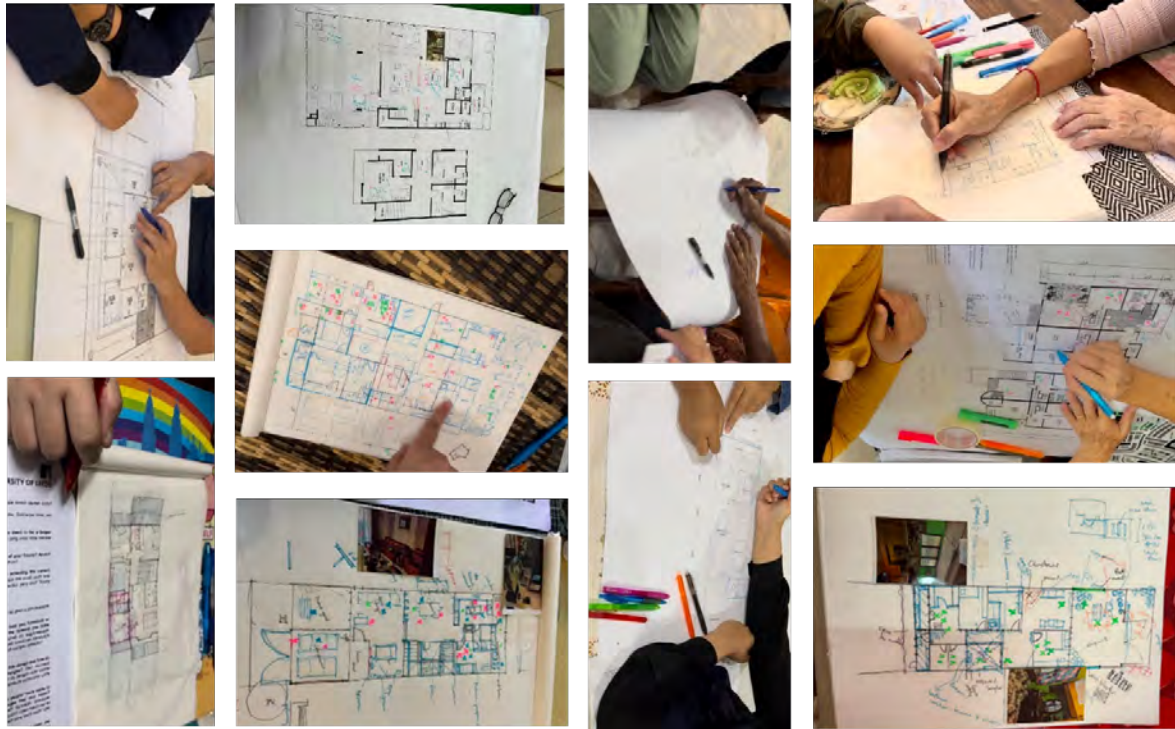
Fig 3: Mental Map Drawing sessions with interviewees during fieldwork (Source: authors)

The second method is observation with impromptu questions to clarify certain elements that were unclear during the first session. A home tour and photo-taking were done prior to the consent of the interviewee. It is a following step to enable the researcher to better visualise further information compared to the 2D visual on paper. Information on the material used for the floor, walls, and ceiling, the ornamentation and decorating, the style and placement of the furniture in the space, and any other tools that might be there. To provide the participants with more freedom to express their personal experiences and home practices, the inquiry technique is unstructured. This method allows the researcher to capture the actual current room and better visualise the transformability of the space so that it fully captures participants' narration of their lived experiences in 3-D reality[35]. Methodologically, this study relies on the participants' views and conscious experiences to achieve the objectives of this study.
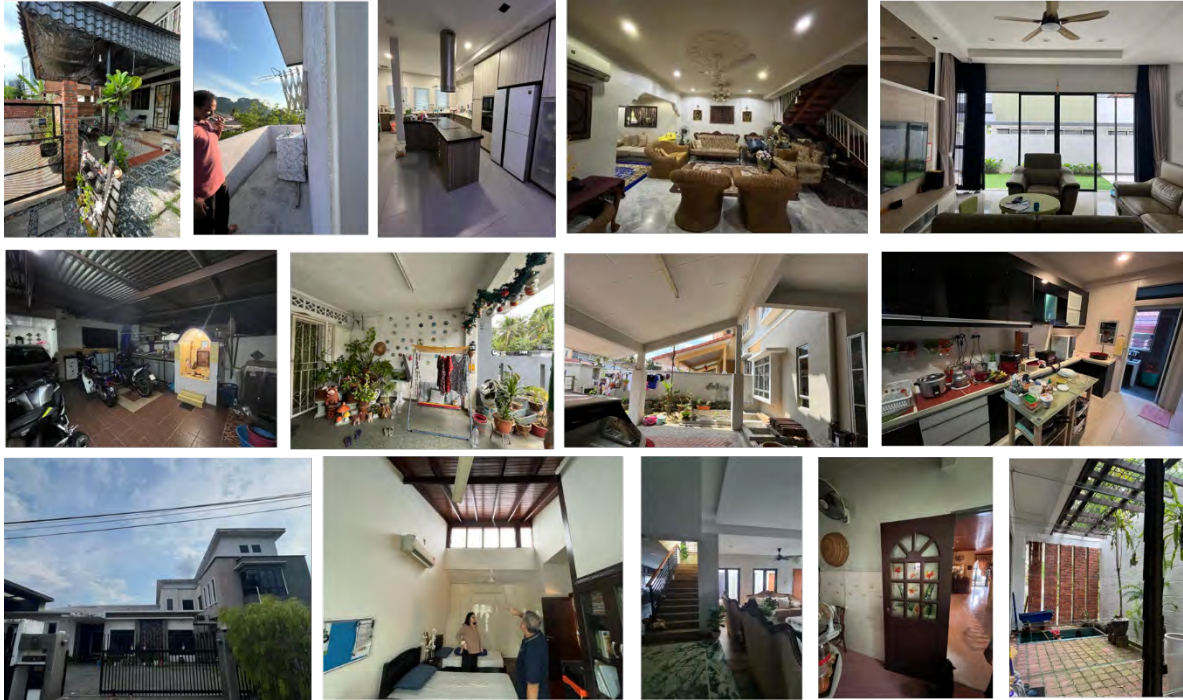
Fig 4: Home tour sessions with interviewees during fieldwork (Source: authors)

This research utilised two methods for analysis. Firstly, the thematic analysis to examine the interview transcriptions. This analysis aims to generate themes in response to the first question, 'How do the current spaces facilitate the home practices in each household as they define the meaning of home?' The interviews are all audio-video recordings and conducted in a mixed language, English and Malay, to achieve a more engaging and comfortable interaction between interviewer and interviewee. Therefore, it is best to transcribe the whole interview prior to NVIVO coding. The interviews are transcribed exactly word by word for the initial stage to avoid misinterpretation. The data are carefully analysed sentence-by-sentence using a genuine coding process, and as close to existing data as possible. At this stage, the transcriptions is a mixed language between English and Malay since the data are coded genuinely. Later on, once the themes emerge, the interview quotes are fully generated in English translation.

Secondly, visual analysis examines the data from mental map drawings. Photographs of the houses are also stored for analysis. Participant-generated mental mapping is redrawn in the AutoCAD software as the main research tool for several purposes. First, the drawings informed each household of the number of renovations that occurred across the years of occupancy. Second, each unit of analysis is classified into major and minor renovations. Major renovation refers to any modification involving building structure and elements that occurred horizontally and vertically, while minor renovation refers to modification on the ground floor and interior spaces. Third, the structure and architectural elements can be visually interpreted, and the physical

structure is analysed according to the transcribed texts to form 'what' and 'how' into several themes and categories. The photographs of the house provide further detailed input into the 2D drawings for each household. The transformed spaces and architectural elements are examined coherently with the themes from the transcribed interviews that explain the factors that influence occupants' decision to modify their physical configuration of space as they define the meaning of home.

3. RESULTS AND DISCUSSION
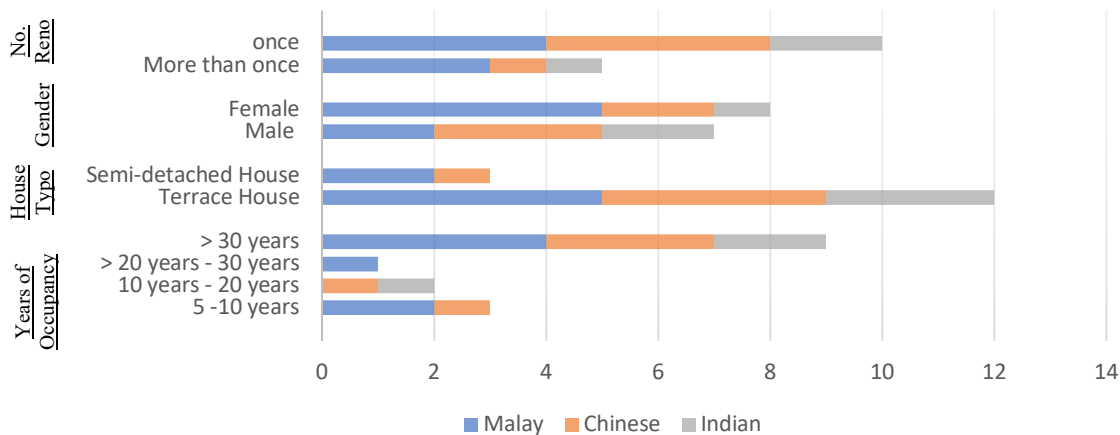
Fig 5: An overview background of the 15 selected respondents for the home interview session. (Source: authors)

The outcome of the survey shows that more than 50 households responded to the survey. However, based on the selection criteria, only 15 households were willing to proceed with a home interview session, and they are Malay households (n=7), Chinese households (n=5) and Indian households (n=3). Most of these households stay in terrace houses (n=12) and semi-detached houses (n=3).
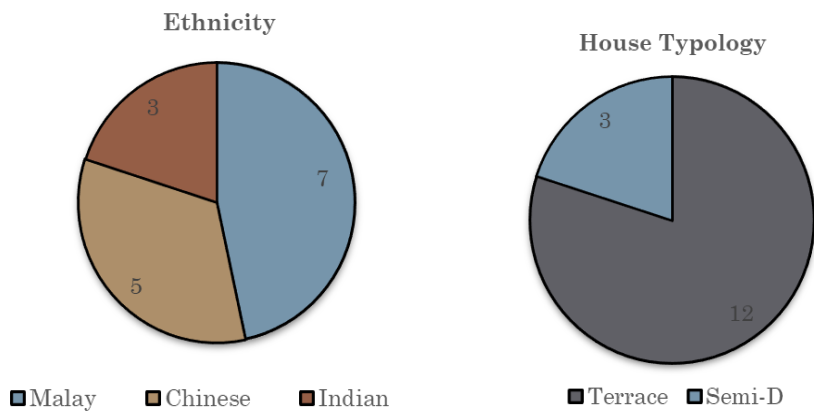
Fig 6: shows the chart that indicates the ethnicity of respondents and the house typology.
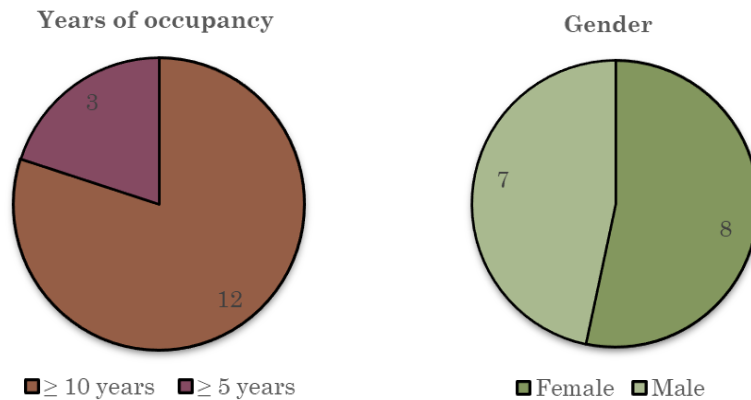
Years of occupancy

Gender

■ ≥ 10 years ■ ≥ 5 years

■ Female ■ Male

Fig 7: shows the chart that indicates the years of occupancy and the gender of respondents.

Most respondents (n=12) have lived in their houses for over ten years. Nine out of fifteen households have more than thirty years of occupancy, three out of fifteen households have more than ten years, and the rest have more than five years of occupancy. The outcome of this survey has a balance of gender respondents from male and female participants. All households stated in the survey that they had interior and exterior reconfigurations.

3.1   PRELIMINARY FACTORS THAT CAUSE HOME RENOVATIONS

Bourdieu's 'habitus' (1977) explains that the physical setting or field is shaped according to the accumulation of symbolic elements throughout the life experience. Usually, this refers to what made people feel comfortable in a particular setting. For instance, someone familiar with the artistic world would feel more comfortable in a museum or art exhibition. In order to comprehend people's minds and behaviours towards the various definitions and meanings of a home, the theory of practice by Bourdieu explains how an individual responds to the physical setting (the home) based on the accumulation of social and cultural capital (symbolic elements) he or she possessed. Social capital reflects the relations and influence between an individual and society. In contrast, cultural capital is divided into three types: embodied cultural capital associated with the qualities of the mind and body language, such as skills, taste, mannerisms, and clothing); objectified cultural capital refers to the property and material belongings, and institutionalized is the symbol of cultural competence such as authority, credentials and qualification[36].
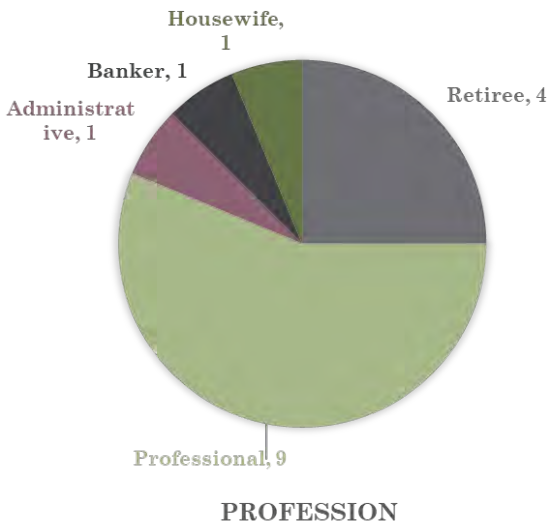
PROFESSION

Fig 8: the preliminary factors that cause home renovations: Participant's profession (Source: authors)

In the preliminary findings, the profession of all fifteen respondents revealed that many of them had a career related to architecture, construction and design, such as civil engineers, technicians, real estate agents, project managers, administrators, or even retirees of developer companies. The rest are working in non-architectural fields, such as insurance agents and bankers. Apart from their profession, respondents indicate that the household structure not only consists of married couple and their children but also staying with their parents, siblings, and extended family (such as the son's wife or daughter's wife), which may also be a factor in home modification.

HOUSEHOLD MEMBERS
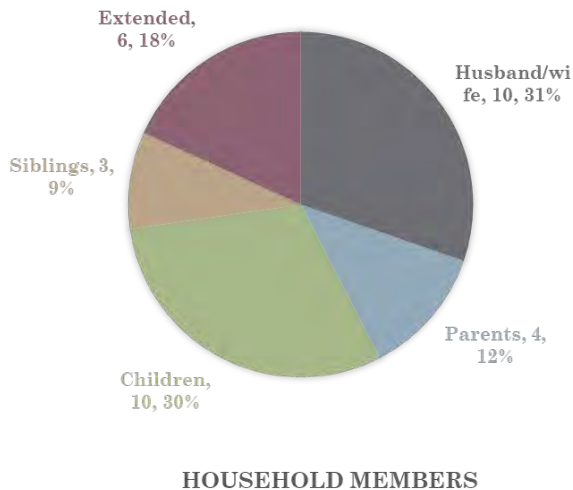
Fig 9: the preliminary factors that cause home renovations: Participant's household structure (Source: authors)
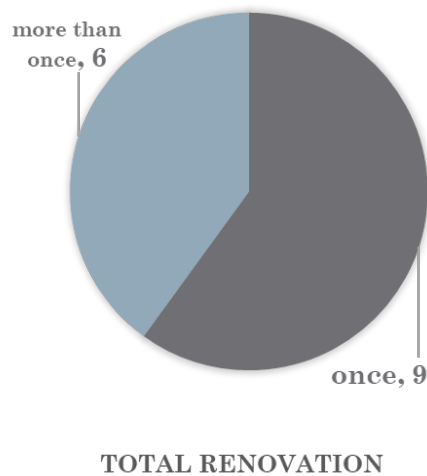
TOTAL RENOVATION

Fig 10: the preliminary factors: the total number of home renovation (Source: authors)

From the aspect of total home renovation in each home, this finding found that the majority had more than one renovation, and some had a maximum of three renovations including a shared-with-neighbour renovation. Hence, the profession and household structure are the preliminary factors that cause home renovations within contemporary row houses.

3.2 ETHNICITY INFLUENCES ON PHYSICAL SPACE AND THE MEANING OF HOME

Domestic architectural work is perceived as a symbol of identity and cultural expression. However, as domestic architecture develops in globalisation, the formation of physical homes or houses is significantly affected by construction and cost-effectiveness, political agenda and representation identity of a corporate body; therefore, less attention is given to the meaning of home and the suitability for home practice. The design and the characteristics of the physical home for contemporary houses are identical and mirror-image houses. Resulting in a generalised, standard function of living, progressively eroding the socio-cultural practices of the indigenous populations since social and personal demands vary by ethnicity.

According to Lefebvre's concept of spatial practice (1991), the dynamism of home practices influences the physical configuration of spaces; and according to De Certeau (1984) constructing an appropriate domestic space over time in response to personal and social needs is a dynamic 'tactic'[37]. The interview transcription identified and described home interpretations through thematic and visual analysis. The analysis highlighted the main themes and observed the modification in physical spaces.

3.2.1 SAFETY AND BOUNDARIES

"I do not like anyone to see what I am doing. The home now reminds me of my Kampung."

Participants emphasised that their needs for safety and define their boundaries in their own self-expression. There is a pattern in the contemporary row houses are modified to facilitate their perceived need. For instance, the Malay households perceived boundaries by adding a secondary entrance to create a buffer space in between outdoor public space and indoor private space. The homes are modified to provide a semi-public space that act as a place where guests can interact with the homeowners while the indoor living area can be prepared to accept guests inside the house or continue to perform their private domestic activities. Interestingly, each homes has created their own personalisation design based on how they define safety and boundaries, which can be fully enclosed and semi-enclosed as shown in Figure 11 below.

Fig 11: Three Malay homes from different neighbourhood in Selangor create a secondary foyer entrance (S) in each of their homes (Source: authors)

A different situation is found in Chinese homes; their definition of boundaries is more straightforward and clearer. For instance, a high perimeter wall was set in and surrounded the car porch to prevent outsiders or neighbours from viewing the activities inside the house. Another case implemented the same idea; they utilised wild plants and trees to create and demarcate their boundaries and prevent visual penetration inside their home.

Fig 12: The Chinese homes from different neighbourhood in Selangor create a fine line boundary between public space and private living space with no mediating space. (Source: authors)

The design concept used by contemporary Malay households is similar to the traditional Malay house whereby there is always a mediating or in-between space to buffer the public outdoor and private indoor rooms. The components of the Malay traditional house are named according to their zones. 'Anjung,' also known as the porch, is a covered entrance in all typical Malay traditional homes and acts as a transitional zone between the public and private domains of the house. This zone is a favourite place for male dwellers to entertain guests or acquaintances, chat, rest, and observe passer-by activities in the village[38].

Meanwhile, Chinese homes indicate clear boundaries with physical demarcation and resemblance to old shophouses' design; a semi-private space is a family zone, and only the five-foot walkway is a public zone[39]. The participants also mentioned how their current home reminded them of their childhood homes in their hometown, known in Malaysia as '*Kampung*'.

3.2.2 TRADITION AND MEMORIES

"My children and their family live with me. This is the culture."

As shown in the survey's outcome, Malaysian households consist of married couples and their children living under one roof with their extended families. In this situation, as the children grow and marry, the wife or husband shall move in with their parents, which is one of the traditions and cultural values practised by Malaysians regardless of ethnicity. This extension of family members is one of the main factors that influences the original physical configuration of space. In contemporary Malay and Indian homes, they reconfigured each space with bedrooms and attached bathrooms so that all dwellers can appreciate their privacy and shared common spaces.

However, it is a different case in contemporary Chinese homes. Once their youngsters are married, they will be searching for houses that are close by to their parents. From this investigation, one Chinese participant purposely bought the house next to his so that his son and the new family would move into this house. No connecting door or internal path goes directly into both properties. To them, privacy and boundaries are essential for respecting their lifestyle.

Fig 13: Malay, Chinese and Indian homes show the expansion of houses according to their socio-spatial needs. (Source: authors)

3.2.3 RELIGION AND LIFESTYLE

"I changed the space, so it is aligned to what I belief…"

Malaysians embraced a diverse belief system aside from having the majority Malay-Muslim community. Aside from Islam, Christianity, or Atheism, most Chinese people believe in Buddhism, Taoism, ancestral worship, and folk beliefs, or an eclectic mix of these beliefs, and the majority of the Indian community embraced Hinduism[40].

Fig 14: An Indian home created a 'Pooja' built form at car porch and elephant idol symbolises spiritual protection for their home (Source: authors)

One of the most apparent physical changes in many of these homes are the existing of built form of worship. In most cases, the built form of worship is placed within the parameter of their home, as a 'sense of protection and security to avoid any bad or harmful spirit from entering the household'[41].

Fig 15: A contemporary Chinese home created a minimalist prayer area and repositioning their 'Bath' door from facing the main living area. (Source: authors)

In a Chinese-Buddhist tradition, another most common belief that has been practised is the belief system of 'Feng Shui', which originated 1000 years ago[42] . Feng Shui is the art of placement in relation to physical landscapes, climatic conditions, and geographical location, among other things. Most Malaysian-Chinese housing developers adopted Feng Shui consultants and seek advice on housing designs that are in good alignment with 'Feng Shui' practices, or to demonstrate how environmental practices were determined as the good and bad areas in a given space. It includes the placement of the front door, the rooms, the kitchen, and enhancing elements[43]. One of the Chinese interviewee (in Figure 14) expressed how he is concerned about the position of the toilet door facing the main door since he believed it gives a bad energy to his living environment. Also, he added that there should not be any unappealing view when you entering the house, hence the space should be kept clean with minimal decoration.

Similar to the ancient traditional belief of 'Feng Shui' in Chinese ethnic, the Indian ethnic group embraced 'Vastu-Vidya' principles for spatial configuration which it is believed to provide well-being in dwellers' quality living[44]. It is evident in one of Indian's home in Figure 15 below. The reconfiguration of physical spaces are seem to be apparent in the Indian households in order to ensure that their living environment is aligning to their belief system. Location of 'Pooja' or built form of worship is one of the biggest challenges for Indian households due to space limitation. Unlike in Chinese homes, their 'Pooja' worship is preferably located in a special room or a special alcove, a sacred and clean corner. In modern days, the worship alter are preferable located in the bedrooms. The reconfiguration of physical spaces seems to be apparent in the Indian households in order to ensure that their living environment is aligning to their belief system and living a lifestyle with a peaceful mind.
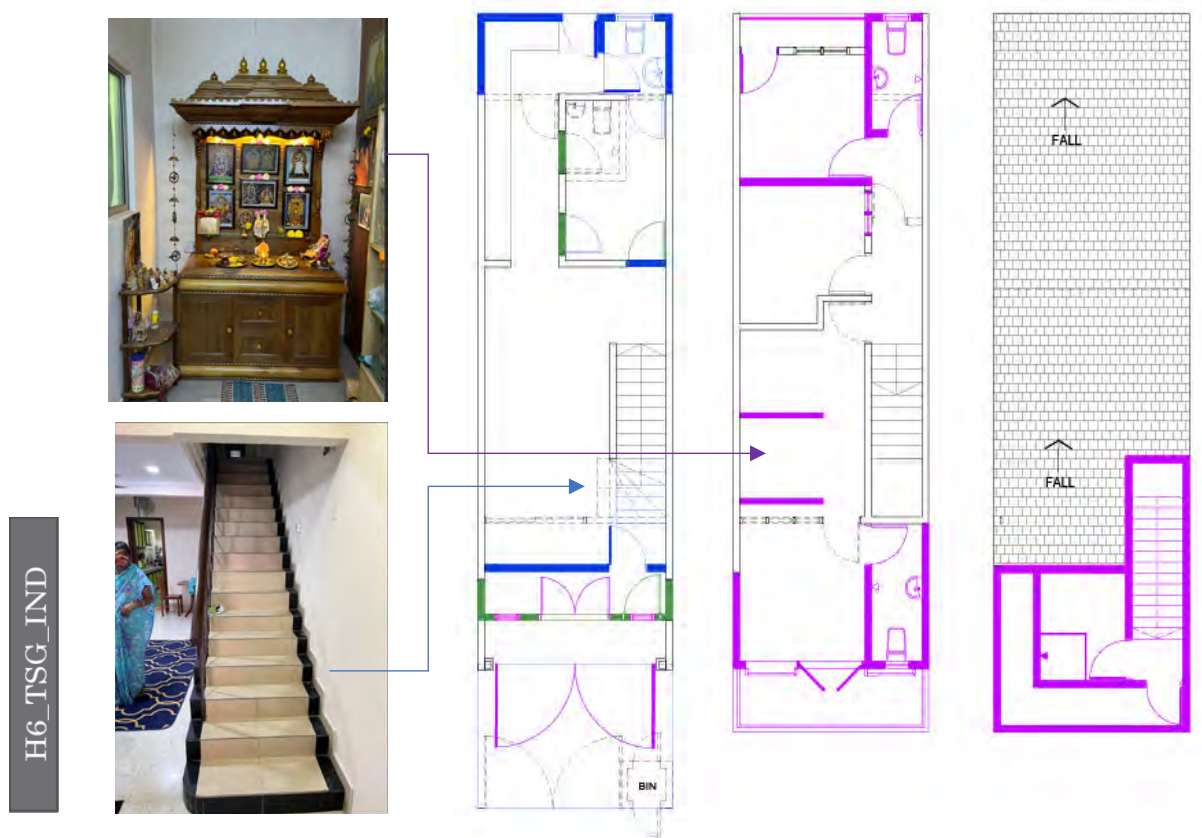

Fig 16: A contemporary Indian home recreate a room for 'Pooja' space and refurbished add several steps with odd number as it symbolises 'income'(good), while even number 'expenses' (bad) (Source: authors)

3.2.4 SHARED SPACE

> "Here we need to tolerate and share spaces. In-between…
> I do not mind sharing because we know the space is limited…"

In contemporary row housing, the shared space is observed to be a negotiation agent between household members and their neighbours. Hence, for a multi-ethnic living environment, the perception of boundaries has different views by ethnicity and culture. From this investigation, the central space constantly negotiated is the house perimeter fencing, frontage, and gate compound to park the car. The houses that face an empty landscape are preferable to other houses since this avoids further social and visual conflicts. In most cases, through interview sessions, the participants expressed that the house perimeter fencing, and the expansion of the kitchen were the first renovations that would come to their minds. The kitchen expansion always affected the neighbour's side fencing since the walls are shared. Therefore, the construction of the perimeter fencing, and the kitchen are the earliest and the main physical changes that occurred in contemporary row houses. The two households, regardless of ethnicity, share the construction costs once both agree on the design.

Usually, the detailing of the fencing design is a 5ft high wall made of stone and highly preferable with bottle design, as shown in Figure 16 below. The practical sense behind this design is that the wall fencing prevents any direct visual penetration of their living space. Moreover, there is a little gap between bottles for natural ventilation. When they occasionally exchange food with neighbours, the food container passes through the gap without having them enter their next-door home property.

The community understand and respects the physical boundary of each house although sometimes there is evidence of social conflict in regard to carpark issues coming from the interviews. one mentioned that "I constructed a shelter for my carpark in front of my house, but I also ensured that the shelter aligned with my house boundary line and did not encroach on the neighbour's boundary." When receiving outside guests during events or celebrations, the households are aware of carpark issues. Due to limited spaces, the interviewees explain that they would often park their cars inside their property and allow external guests of neighbours to use the spaces at their house frontage as a carpark.

"They are using it temporarily; we understand the space is insufficient to park those cars, looking at the narrow streets. So, I do not mind allowing them to use the space. Suppose I am on vacation or overseas. I will ask my neighbours to help look after the house and have their cars parked inside my porch. This also makes it look as if I am at home. Safety reason." Due to the diverse perspectives in creating boundaries, house frontage and perimeter fencing are continuous topics in contemporary row houses. It is a shared

setting in which people engage in negotiation, self-expression, and identity contestation to define the meaning of home[45].
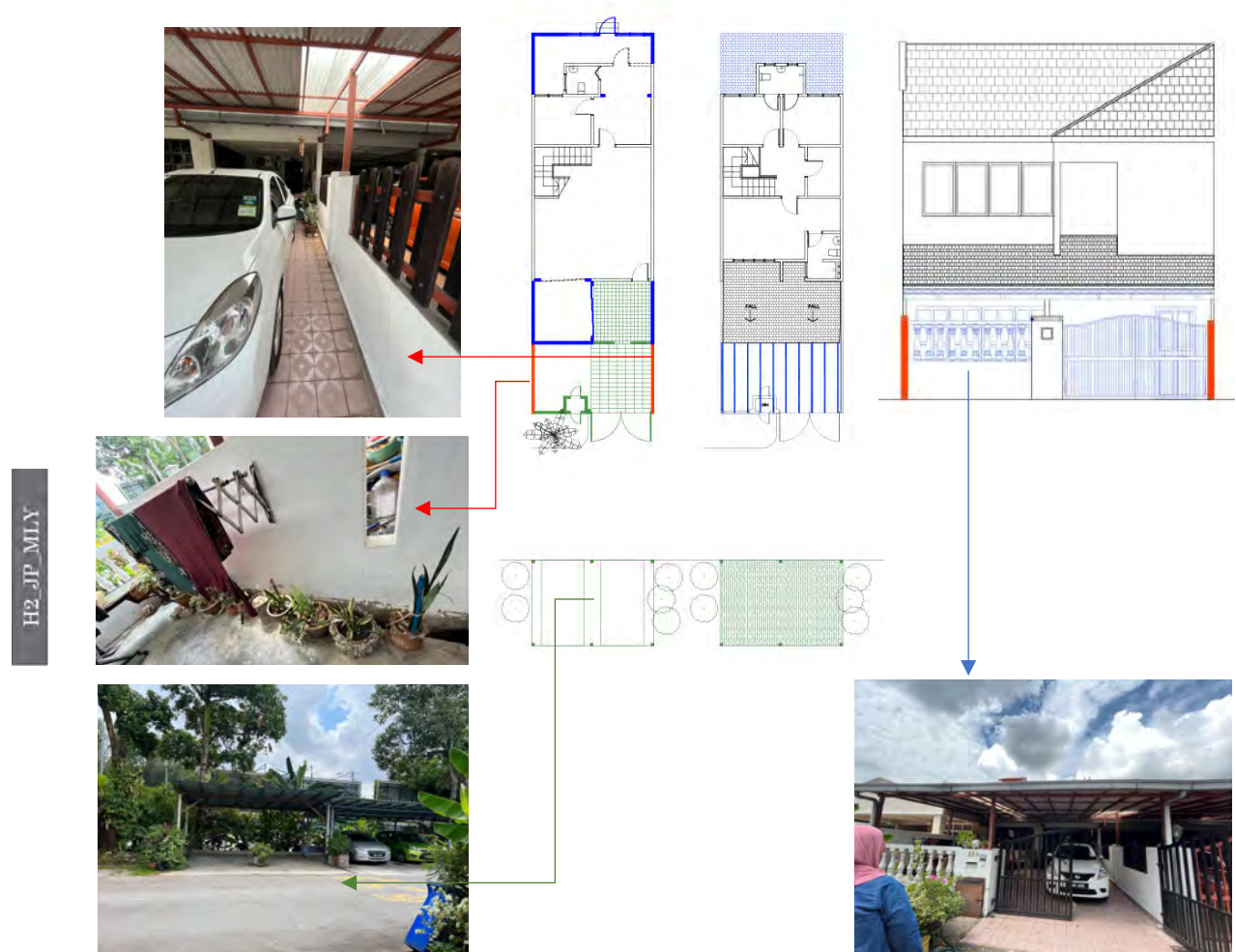

Fig 17: A contemporary Malay home that the sharing wall fencing between both her next doors with different designs and green indication shows the new shelter for carpark. (Source: authors)

Fig 16: A contemporary Indian and Malay homes using bottle design wall fencing. (Source : authors)

Fig 17: Contemporary Chinese homes using wall fencing and wild plants. (Source: authors)

4. CONCLUSION

This paper investigates the pattern of home renovations from each ethnic household and the spatial practice that causes the reconfiguration of these spaces in contemporary row houses. This paper has two main objectives. The first objective is to examine each household's home experience and decisions to transform spaces according to their social and personal needs. The second objective is to understand the pattern of home renovations from each household and the spatial practice that causes these reconfiguring spaces in contemporary multi-ethnic homes. Consequently, this investigation made the following contributions.

First, this paper utilised the phenomenology approach to investigate the influence of ethnicity on contemporary row houses in a multi-ethnic context and achieve the objectives of this paper. From an online recruitment survey, this paper found that the profession and household structure are the preliminary factors that cause home modification within contemporary row houses. Households with professional backgrounds and having additional family members tend to extend and improve their physical spaces following their dynamic lifestyle.

Second, mental map drawings and home tours are adopted as home interview sessions with Malaysian households interested in participating in this session. The outcome of home interviews responded to the hypothesis of this paper. Ethnicity does have multiple views, which are categorised into four themes: safety and boundaries, religion and lifestyle, tradition and memories, as well as community living, which explains how each household influences the reconfiguration of original physical spaces to facilitate their way of living within contemporary row housing and define the meaning of 'home'.

Third, this paper provides a new insight into the relationship between ethnicity and spatial practice that embraces cultural values and meanings assigned to their current home for future investigation. Lastly, this

investigation paper suggested a new development of the architectural design matrix to inform spatial practices of each household as a practical guideline for future home design. This study shows that the home is not identical in design but a dynamic product.

REFERENCES

1 C. Norberg-Schulz, "Norberg Schulz Heidegger's Thinking on Architecture," *Perspecta*, vol. 20, pp. 61–68, 1983.

2 D. Al-Tarazi, "'What makes a house a home?': A theoretical model for the architectural design of homes based on human psychological needs to support and promote users' psychological well-being," University of the West of England, 2021.

3 D. Case, "Contributions Of Journeys Away To The Definition Of Home: An Empirical Study Of A Dialectical Process," *J Environ Psychol*, vol. 16, pp. 1–15, 1996, doi: https://doi.org/10.1006/jevp.1996.0001.

4 F. Oswald and H. Werner Wahl, "Environmental Gerontology," in *Creating and Sustaining Homelike Places in Residential Environment*, G. D. Rowles and M. Bernard, Eds., United Kingdom: Springer Publishing Company, 2013, pp. 53–77.

5 R. J. Lawrence, "What makes a house a home?," *Environ Behav*, vol. 19, no. 2, pp. 154–168, 1987, doi: 10.1177/0013916587192004.

6 E. Petridou, "The Taste of Home," in *Home Possesions : Material Culture Behind Closed Door*, First Edit., D. Miller, Ed., New York and Oxford: Berg, 2001, pp. 87–104.

7 D. Case, "Contributions Of Journeys Away To The Definition Of Home: An Empirical Study Of A Dialectical Process," *J Environ Psychol*, vol. 16, pp. 1–15, 1996, doi: https://doi.org/10.1006/jevp.1996.0001.

8 C. Després, "The Meaning Of Home: Literature Review And Direction For Future Research And Theoretical Development," *J Archit Plann Res*, vol. 8, pp. 96–115, 1991.

9 I. Altman, *The environment and social behavior : privacy, personal space, territory, crowding*. Monterey, California: Brooks/Cole Pub. Co., 1975

10 R. Sebba and A. Churchman, "The Uniqueness of the Home," 1986

11 R. B. Taylor and S. Brower, "Home and Near-Home Territories," in *Home Environments*, I. Altman and C. M. Werner, Eds., Boston, MA: Springer US, 1985, pp. 183–212. doi: 10.1007/978-1-4899-2266-3_8.

12 S. Mallett, "Understanding home: A critical review of the literature," *Sociological Review*, vol. 52, no. 1, pp. 62–89, 2004, doi: 10.1111/j.1467-954x.2004.00442.x.

13 J. Sixsmith, "The Meaning Of Home : An Exploratory Study Of Environmental Experience," *J Environ Psychol*, vol. 6, pp. 281–298, 1986, doi: https://doi.org/10.1016/S0272-4944(86)80002-0.

14 S. Ureta, "Domesticating Homes: Material Transformation and Decoration among Low-Income Families in Santiago, Chile," *Home Cultures*, vol. 4, no. 3, pp. 311–336, 2007, doi: 10.2752/174063107x247341.

15 L. T. Graham, S. D. Gosling, and C. K. Travis, "The Psychology of Home Environments: A Call for Research on Residential Space," *Perspectives on Psychological Science*, vol. 10, no. 3, pp. 346–356, 2015, doi: 10.1177/1745691615576761.

16 B. Stoneham and D. Smith, "The house and the home: The balance of architecture and psychology within the residential home," *Researchgate.Net*, no. October, pp. 0–28, 2015.

17 P. Boccagni and M. Kusenbach, "For a comparative sociology of home: Relationships, cultures, structures," *Current Sociology*, vol. 68, no. 5, pp. 595–606, 2020, doi: 10.1177/0011392120927776.

18 H. Easthope, "A place called home," *Housing, Theory and Society*, vol. 21, no. 3, pp. 128–138, 2004, doi: 10.1080/14036090410021360.

19 C. Ratnam, "Creating home: Intersections of memory and identity," *Geogr Compass*, vol. 12, no. 4, Apr. 2018, doi: 10.1111/gec3.12363.

20 P. Bourdieu, *Ooutline of A Theory of Practice (R. Nice, Trans.)*. Cambridge and New York: Cambridge University Press, 1977.

21 M. N. K. Saunders, P. Lewis, and A. Thornhill, *"Research Methods for Business Students" Chapter 4: Understanding research philosophy and approaches to theory development*, Eighth., no. January. Pearson Education Limited, 2019. [Online]. Available: www.pearson.com/uk%0Ahttps://www.researchgate.net/publication/330760964_Research_Methods_for_Business_Students_Chapter_4_Understanding_research_philosophy_and_approaches_to_theory_development

22 E. N. Zharani and G. Selim, "A Review of the Meaning of Home in Multi-Ethnic Settings," *Journal of Contemporary Urban Affairs*, vol. 7, no. 1, pp. 103–121, Jun. 2023, doi: 10.25034/ijcua.2023.v7n1-8.

23 D. Samad, N. Zainon, F. Azli Mohd Rahim, and E. Lou, "Malaysian affordability housing policies revisited. Open House International," no. 1, pp. 44–51, 2017, [Online]. Available: https://e-space.mmu.ac.uk

24 A. S. Suryadi, H. H. B. Mohidin, A. M. Ressang, A. M. Aini, S. S. S. Mahdzar, and M. M. Jusan, "Integrated Space in Low-Income Housing in Kuala Lumpur," in *Lecture notes in Civil Engineering*, Springer Science and Business Media Deutschland GmbH, 2022, pp. 425–432. doi: 10.1007/978-981-16-6932-3_37.

25 S. R. Ju, S. A. Zaki, and Y. K. Choi, "Contextual modernization; New town planning in Petaling Jaya, of Malaysia," *Journal of Asian Architecture and Building Engineering*, vol. 10, no. 1, pp. 93–100, 2011, doi: 10.3130/jaabe.10.93.

26 N. A. Samsudin and S. Z. A. Idid, "Influences of Housing Settings And Designs In FulFilling The Malay Residents' Social Cultures," *Journal of the Malaysian Institute of Planners SPECIAL ISSUE IV*, no. IV, pp. 109–120, 2016, doi: https://doi.org/10.21837/pm.v14i4.152.

27 E. O. Omar, E. Endut, and M. Saruwono, "Adapting by Altering: Spatial modifications of terraced houses in the Klang Valley area," *Asian Journal of Environment-Behaviour Studies*, vol. 2, no. 2, pp. 1–10, Dec. 2016, doi: 10.21834/aje-bs.v2i2.173.

28 N. H. M. Razali and A. Talib, "The Concept of Privacy and the Malay Dwelling Interior Space Planning," *Procedia Soc Behav Sci*, vol. 101, pp. 404–414, Nov. 2013, doi: 10.1016/j.sbspro.2013.07.214.

29 E. N. Zharani and G. Selim, "A Review of the Meaning of Home in Multi-Ethnic Settings," *Journal of Contemporary Urban Affairs*, vol. 7, no. 1, pp. 103–121, Jun. 2023, doi: 10.25034/ijcua.2023.v7n1-8.

30 M. J. Gill, "Phenomenology as qualitative methodology," 2014.

31 J. W. Creswell and J. David Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 5th ed., vol. 5th Editio. California: Sage Publication Ltd, 2018.

32 K. M. T. Collins, A. J. Onwuegbuzie, and Q. G. Jiao, "Prevalence of mixed-methods sampling designs in social science research," *Evaluation and Research in Education*, vol. 19, no. 2, pp. 83–101, 2006, doi: 10.2167/eri421.0.

33 H. Lefebvre, *The production of space (D. Nicholson Smith, Trans.)*. Cambridge, M.A.: Blackwell, 1991. [Online]. Available: https://mars1980.github.io/Space/resources/Lefebvre-Production-of-Space-excerpts-1.pdf

34 P. S. Özçetin and S. B. Rottmann, "(Lived) Spaces of Belonging, Culture, and Gender: Spatial Practices of Home for Syrian Women in Istanbul," *Space and Culture*, pp. 1–19, 2022, doi: 10.1177/12063312221089213.

35 G. M Reiners, "Understanding the Differences between Husserl's (Descriptive) and Heidegger's (Interpretive) Phenomenological Research," *Journal of Nursing & Care*, vol. 01, no. 05, pp. 1–3, 2012, doi: 10.4172/2167-1168.1000119.

36 P. Bourdieu, *Ooutline of A Theory of Practice (R. Nice, Trans.).* Cambridge and New York: Cambridge University Press, 1977..

37 M. de Certeau, "'Making do': Uses and Tactics (S. Rendell, Trans.)," in *The Practice of Everyday Life*, Berkeley and Los Angeles: University of California Press, 1984, pp. 1–254. [Online]. Available: https://monoskop.org/images/2/2a/De_Certeau_Michel_The_Practice_of_Everyday_Life.pdf

38 N. Asif, N. Utaberta, A. B. Sabil, and S. Ismail, "Reflection of cultural practices on syntactical values_ An introduction to the application of space syntax to vernacular Malay architecture | Elsevier Enhanced Reader," *Frontier of Architectural Research*, vol. 7, pp. 521–529, Aug. 2018

39 A. Zwain and A. Baharuddin, "Identity Formation of the Traditional Courtyard Shop houses Interiors-Case Study in George Town, Penang," *Akademika*, vol. 90, no. 2, pp. 103–114, 2020.

40 W. A. M. W. Abdullah, N. H. Roslan, S. A. Ismail, M. Mansoor, and N. Elyssa, "Multi-ethnic harmony in diversity country with functionalism theory in Malaysia," *Baltic Journal of Law and Politics: A Journal of Vytautas Magnus University*, vol. 15, no. 3, pp. 493–511, 2022, doi: 10.2478/bjlp-2022-002037.

41 V. Phin Keong, E. Chong Huat, and L. Kim Sin, "Genesis of the Xian Shiye Cult in Malaysia," *Malaysian Journal of Chinese Studies*, vol. 3, no. 1, pp. 37–59, 2014.

42 N. A. A. Lah, M. H. A. Wahab, D. Koh, and M. Saruwono, "Metaphysical Approach for Design Functionality in Malay-Islamic Architecture," in *Procedia - Social and Behavioral Sciences*, Istanbul: Elsevier BV, Dec. 2015, pp. 273–284. doi: 10.1016/j.sbspro.2015.08.231.

43 R. Mohamad, "Unity in Diversity: An Exploration of the Supports Concept as a Design Approach to Housing in Multi-Ethnic Malaysia," Doctoral Dissertation, Massachusetts Institute of Technology, Massachusetts, 1992. [Online]. Available: http://hdl.handle.net/1721.1/68740

44 N. A. A. Lah, M. H. A. Wahab, D. Koh, and M. Saruwono, "Metaphysical Approach for Design Functionality in Malay-Islamic Architecture," in *Procedia - Social and Behavioral Sciences*, Istanbul: Elsevier BV, Dec. 2015, pp. 273–284. doi: 10.1016/j.sbspro.2015.08.231.

45 C. Mulholland, M. G. Abdelmonem, and G. Selim, "Narratives of Spatial Division: The Role of Social Memory in Shaping Urban Space in Belfast," 2014.

HOUSES AND COURTYARDS

Gizem Kahraman
University of Exeter
UK
kahramangizem@gmail.com

Falah AlKubaisy
Mindsets Strategy& Decision Advisors, Muharraq
Bahrain
falahalkubaisy@gmail.com

Mohammed Mashary Alnaim
University of Hail
Saudi Arabia
moha.alnaim@gmail.com

Erna Nuralia Zharani, Gehan Selim
University of Leeds
UK
cnenbz@leeds.ac.uk