Discovering the Integrative Spatial and Physical Order in Traditional Arab Towns: A Study of Five Traditional Najdi Settlements of Saudi Arabia

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Abstract: Understanding how traditional societies generated urban and architectural forms requires an understanding of socio-cultural forces: family and clan structure, social organization, religious practices and beliefs, and the collective social relationship between the built environment's members. Examining the Najdi built environment led to the identification of a hidden order that is based on how inhabitants of each built environment within the Najd region responded to the surrounding environmental conditions and how they accommodated their various daily life needs by using operational core concepts. These core concepts were generated by local inhabitants and guided by a holistic hidden order. This study interpreted the process of making places within the hidden order of five traditional settlements in the central Najd region of Saudi Arabia and highlighted the socio-cultural forces that drove the order by surveying how the core concepts were translated into tangible urban spaces and physical objects and the extent to which intangible meanings became embodied within the built form. The aim is to develop an understanding of how culture and human behavior influence the built environment by presenting five Najdi traditional settlement cases and highlighting how the settlements interpreted socio-cultural forces in various ways to shape and characterize their built form by generating a holistic hidden order. .

Keywords: Najd; Hidden order; Built environment; Physical Form, Urban; Socio-cultural; Values; Integrative Order.

1. Introduction

In the past, inhabitants of traditional settlements in Saudi Arabia's Najd Region had to rely on a number of shared and agreed upon 'generative processes'[1] to ensure that their places were produced and organized in such a way as to reflect their daily way of life and their needs for living. These processes developed by settlement inhabitants helped to transmit the influence of cultural settings in their places to reflect their socio-cultural values in day-to-day practice. To understand why the traditional built environment took on the form it did, as well as how locals took on that form, we examine this dual level of understanding by viewing the traditional built environment as a domain guided by what this paper calls the 'hidden order' or the 'integrative spatial and physical order.'

The hidden order is driven by a number of generative processes that were developed by local people to generate and control the process of

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(1) The generative processes are mechanisms that work collectively and respond to one another to ensure that the produced spaces, places and physical objects respond to the traditions, lifestyle and needs of inhabitants. For example, the generative process of the house access (the door) is a component that controls and maintains the privacy of the house's internal spaces for its owner and ensures that the house's outside space is preserved to practice quick social activities. In parallel, the same process works collectively and responds to the spatial order to extend the hierarchical order of spaces that existed at the level of urban space and integrates that order with the inner parts of the house (see Alnaim, 2020).

making of the built form. These processes work collectively and are represented as spaces and territories, arranged in a particular organizational manner, and are related to one another, through spatial and physical elements, in a specific way. The hidden order, as identified by the traditional Najd settlement study, is driven by several beliefs, traditions, and principles and the hidden order developed over time to align with those beliefs, traditions and principles. We assume that the order worked as an unwritten law to control how socio-cultural principles and physical forms interact to reflect the way of living of inhabitants.

William Porter, describes the force, or character, of an Arab town, as driving a number of fundamental principles:[2] (1) it guides its geometry, form, and continuity, (2) it encourages potential actions for its society, by responding to inhabitants' daily practices, and (3) its symbolic representation suggests a relationship among people in time and place where symbolic forms may contain embedded meanings that are shared and agreed upon among people (Cited in Bianca, 2000). These principles can be seen as examples and as part of the generative processes that inhabitants established while using the integrative spatial and physical order in producing their traditional built forms.

A few key definitions require clarification as they are used frequently. Christopher Alexander describes the terms 'urban and architectural forms,' the 'built environment,' and the 'built form' as the rules by which human beings interact with the environment and organize practical solutions that they develop over time. These rules are appropriate to the local customs, society, and climate that form a social structure (Alexander, 1977).

The form and its space constitute primary elements of architecture (Meiss, 1990). The 'physical form,' the 'physical object,' the 'architectural form,' and the 'form,' all refer to the element, component or geometrical formation of a building that has a function and reflects a certain meaning. The shape preferences of an individual or group of people may be culturally based or rooted in personal memory or convention (Lawrence, 2013). Rudolf Arnheim defines forms as being not a result of coincidence, but an evident conception and acceptance of many people, which express their behavioral settings and personality (Arnheim,

1977). John Habraken developed four stages related to the architectural form: sharing, designing, seeing, and controlling. In each stage, variables and constraints contribute to the form's appearance which makes understanding the built form's context a sine qua non in grasping the logic behind the form's shape and formation (Habraken, 1985).

To be able to grasp the physical form we need to understand that spaces establish the relationship between inside and outside, which implies that spaces possess a varying degree of both enclosure and openness. The character of a place is viewed as the general atmosphere which is the most comprehensive property of any place (i.e., the place's architectural elements), which makes the character of a place an articulation tool for how things are made in any place (Norberg-Schulz, 1981). To understand the spatial and physical order, it is important to view the built environment both through space (i.e., the two-dimensional organization of spaces) as well as through character, the three-dimensional organization of the elements, or physical objects, which establish a place.

Here, we will use Najd, the central region of Saudi Arabia, as the main case to observe how the hidden order is developed and how locals adopted this hidden order in their process of making of the built form. Three steps have been followed to understand how the hidden order (the integrative spatial and physical order) contributed to the identity of the Najdi built environment. The first step is to understand the context, socio-cultural forces, and characters of the Najd region. The second step is to develop an understanding of the hidden order's internal and external forces and how these forces generated the Najdi urban forms[3]. The third step is forming the hidden order and understanding how various mechanisms are working collectivity to establish a homogenized built form. By examining five cases in the Najdi built environment, we argue that this hidden order encouraged locals to produce diverse but unified built forms across the region, which led to the characterization of the traditional Najdi built environment[4].

(3) The external forces in place driven by values in which each has a different strength (in terms of influence) that collectively contribute to generating each built form, while internal forces enabled people to decide what is suitable for them and which visual appearances and identities suit them.

(4) The diversity manifests itself not only by having different physical form appearances, but also from the implicit meanings in the architectural forms derived from the minor differences of socio-cultural values, religious convictions, natural environment, and local know-how of building materials techniques in each built form.

2.The Five Najdi Case Studies

The Najd region lies between three deserts which border it on three sides: it is enclosed on the north by Al Jowf, on the east by Al-Hassa and the Eastern region, on the south by Al-Rub al Khali (the empty quarter) and Najran, and on the west by Hijaz. Najd is a vast, eroded plateau which gently slopes from 1,524 m (5000 ft) above sea level in the west down to about 609 m (1998 ft) in the east (Fadan, 1983).

The Najd, or central region, and especially the city of Riyadh fell under different influences starting from 1818 when Ad-Diriya (the former capital of the first Saudi state) was occupied and destroyed by the Egyptians (Alnaim and Aba Al-Khail, 2010). In, 1824, the small-town of Riyadh, which was located near Ad-Diriya, became the capital of the second Saudi state. Since then, the central region in general went through urban, social, economic and political changes.

The urban and architectural development of the central region between 1824 and 1902 was prolonged and tended to continue to sustain its traditional techniques and principles (Figure 1). This is not to say that no foreign concepts or techniques impacted the central region and influenced the local quality of life. Many travelers visited different parts of the region in the nineteenth century, and they noticed some adaptations to the new technology of that time, but in general, changes in politics and society were the main factors that pushed the whole region to open up and grow (Al-Hemaidi, 1991).

The variety in climatic and topographical conditions contributed to generate different configurations for the traditional Saudi settlements, especially in the Najd region. Local people in each region responded directly to the local climate and topography and developed their urban and architectural forms to meet their individual conditions. This resulted in Saudi Arabia having a 'mosaic' of traditional urban architectural forms with different spatial and visual characteristics. However, the climate and topography varied, and consequently, the local building materials and techniques varied from mud to many different types of stone and wood in shaping the final forms of settlements in different regions of Saudi Arabia. Figure 2 shows the variety of spatial configurations and topography of the five chosen settlements in the Najd region: Old Riyadh, Alkhabra, Ad-Diriya, Ushaiqer, and Sudus.

Each case in this study successfully passed through a five-step selection process (Figure 3). First, identifying the case, its location, significance, and importance in the central region's collection of traditional built environments. Second, how well the prospective case's traditional urban fabric is physically preserved and to what extent it is ready for the fieldwork to take place within its confines (this point recognizes the need to reconstruct the traditional daily life of the inhabitants). Third, identifying the volume and quality of collectible primary and secondary data for the prospective case to support the analytical research approach. Fourth, considering the economic system that supported each settlement's inhabitants is considered. The study intentionally selected cases that sustain inhabitants' daily life needs through a variety of industries including agriculture, trading, ranching, etc. Fifth, diversity is a key measure, as the aim is for the study to have unique urban patterns across cases.
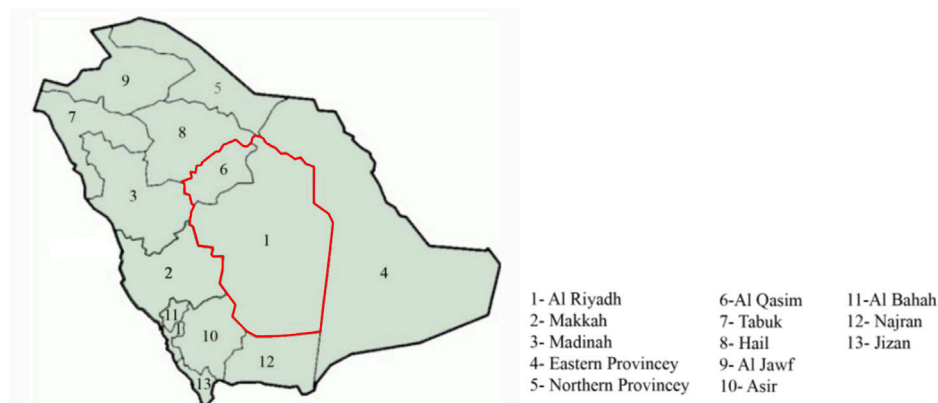

1- Al Riyadh	6-Al Qasim	11-Al Bahah
2- Makkah	7- Tabuk	12- Najran
3- Madinah	8- Hail	13- Jizan
4- Eastern Provincey	9- Al Jawf	
5- Northern Provincey	10- Asir	

Figure (1) Saudi Arabian provinces. Source: Saudi Arabia Wikipedia

old Riyadh

Alkhabra

Ad-Diriya

Ushaiqer

Sudus
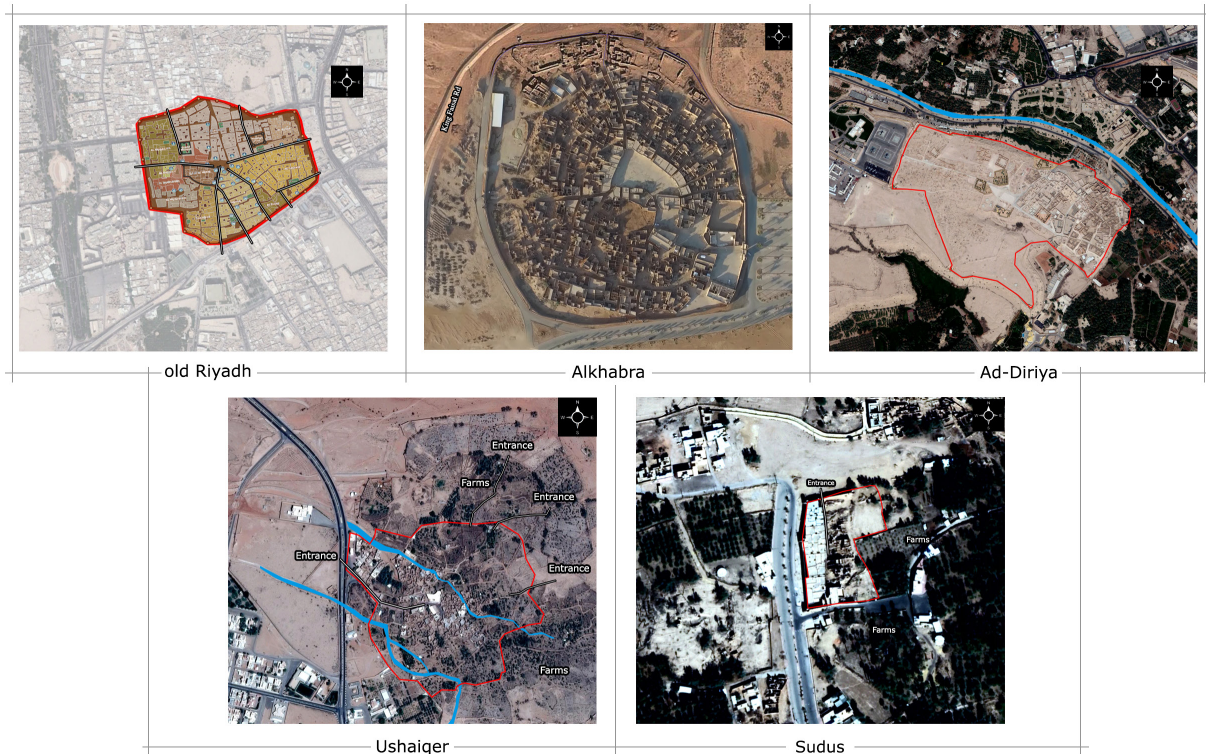
Figure (2) The different patterns of built form in the five traditional Najdi settlements

The Settlements Represent All Geographic Regions of Najd.

Geographical Distribution

Each of the Settlements Still Contain Large Parts of their Original Architecture.

Each Settlement has its Own Unique Urban Pattern.

Presence of Historical Architecture

Diversity
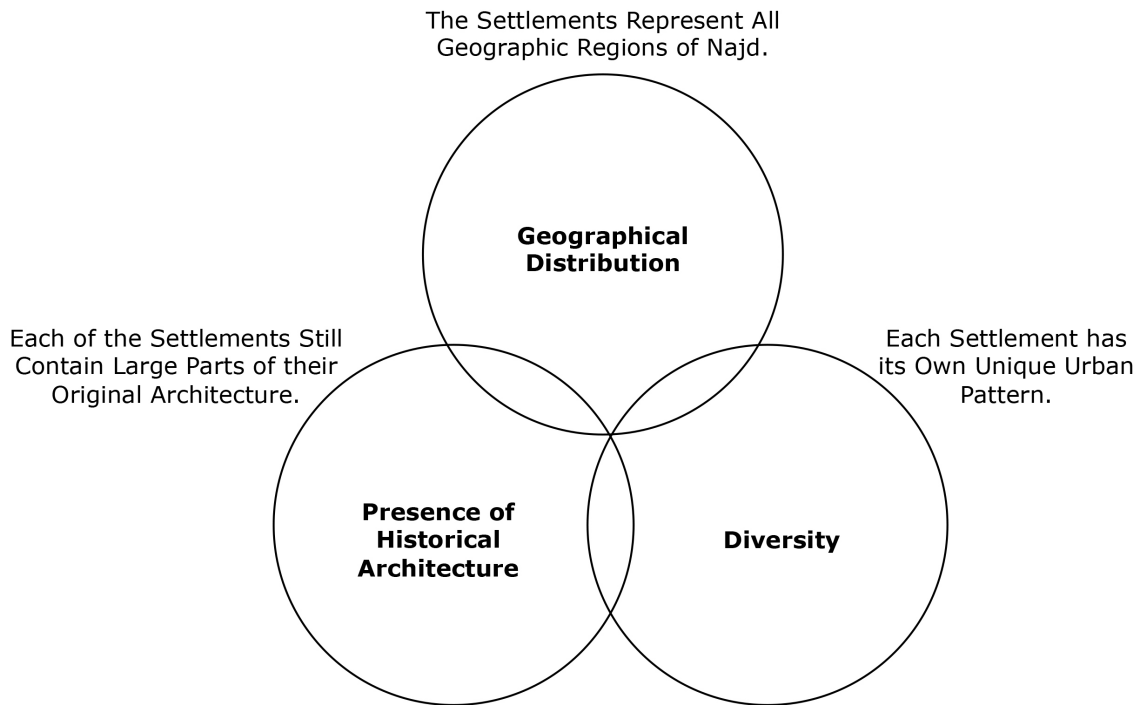
Figure (3) Traditional settlements choice criteria. Source: Author

One interesting observation here is that distinctive topographical characteristics characterized each region and gave each region its identity and its social image. For example, the Hijaz people and other regions' inhabitants recognize a person from the Assir region as 'Assiri,' while a person from Najd was known among the other regions as 'Najdi,' etc. Yousef Fadan notices this, and he argues that this 'Socio-regional distinction is attributed to [each region's] topographical barriers (desert, mountain, or maritime), which lead to sub-cultural differences' (Fadan, 1983).

It is important to view the traditional Najdi settlements from the perspective of these 'sub-cultural differences.' Similar hidden mechanisms may have been present in the other regions, in turn generating their own traditional built forms. The implication is that these hidden mechanisms were flexible enough to interact with local physical parameters and interpret them to form different spatial and physical products. In this sense, we hypothesize that the hidden order (the integrative spatial and physical order) may contain Core Concepts and Forms[5] that can be identified and found to some extent in all the Saudi regions; however, the original study concentrated only on the selected Najdi settlements as an example to identify the integrative order. The broader hypothesis points to potential future research that may take place in the other Saudi regions and elsewhere around the world. It will be fascinating to study and identify what Core Concepts and Forms are common to all regions of the Kingdom and which are unique to each region, which Core Concepts and Forms are common to all of Islam (Ummah), which are unique to each larger region, etc.

3. The Cultural Context of the Najd Region

The hidden order developed and emerged from the interactions of the local communities with their spatial and physical settings. During these interactions, inhabitants start to understand their geographical context by transmitting their socio-cultural values, religious convictions, natural

(5) Core Concepts and Forms such as accessibility, privacy, Haq Alirtifaq (easement right), Alshuf'a (neighbors' right), Alahyaa (reviving the land), hospitality, social structure (relationships among and across tribes and clans), first built has the priority, religious convictions, socio-cultural values, Urf's (traditions and norms) (see Bassiouni, & Badr, 2002; Alnaim, 2008; Adam, 2012; Alshuwaikhat, & Aina, 2014).

environment attributes, and technological parameters to the built environment over time. This is supported by Viquar, when he argued that cultural attitudes of traditional societies reflect a world view that is based on constraint, mutual cooperation, and dependency on systems of subsistence which are centuries old (Viquar, 1998). Rapoport shares a similar view and mentions that the emphasis on culture typically leads to 'a particular worldview' (Rapoport, 1980, 1987). He argues that humans are different and culture functions as a control mechanism to govern the different 'complex' settings within a society, which helps to cohesively monitor each human's individualism within the society (Rapoport, 1980).

Understanding the social structure of Najdi communities enables discovery of the hidden mechanism that generated and governed the production of their traditional environment. We now turn our attention to introducing Najd and framing the main religious principles and social habits and customs that interacted with natural and technological settings to influence and produce the spatial and physical order that may be observed in the traditional Najdi settlements.

Studying the characteristics of any built environment requires that attention is paid to how people lived and achieved their needs in that environment. Understanding how inhabitants of a built environment manifested their perceptual and non-perceptual needs in that built environment is a must as well as how they conducted themselves (their behavior), their level of understanding of the surrounding natural environment, and their building techniques (Rapoport, 1969; Ettehad et al., 2014).

The study observed Najdi society through the lens of the broader Islamic society (Ummah) which through history has established several types of cities and towns, each type known by its functionality and by the way it was planned (Al-Hathloul, 2010). Graburn argues that whatever the type of town produced, the principles of traditional Islamic cities are evident, principles that inhabitants share and are evident across most Islamic societies (Graburn, 2001). It is for this reason that walled communities, public spaces, squares, and gates commonly characterize Islamic cities as these features are deeply rooted in the way in which Muslim society produces its built environment (Costa and Noble, 1978). Graburn also claims that the similarities across locations are due to the shared socio-cultural values and

traditions (Urf's) that led to such a physical production. These shared principles and techniques included observable attributes such as irregular street patterns and introverted residential arrangements that maximized the privacy level of inhabitants (Graburn, 2001)[6]. Although the traditional Najdi built environment shares similar Islamic characteristics, it has its own local social and physical features that make it different in its internal principles and mechanisms that influenced its production.

Basim Hakim provides more insight into the principles that are working in the Arabic-Islamic built environments. He argues that the effect of Islamic religious principles and convictions on the traditional physical environment produced what he called 'the spirit of Islam,' which resulted in the establishment of guidelines and principles for how the built form should be developed in the traditional Arabic-Islamic towns. These guidelines and principles became 'semi-legislative' in nature, and Islamic law drove the development of the guidelines and principles (Hakim, 1986a). Hakim also argues that the spirit of Islam encouraged several specific tools and shared living patterns, such as local habits, customs, and traditions, to be developed based on the knowledge and understanding of a locality, which he refers to as 'Urf' (Hakim, 1986b).

In that sense, not all cities or towns are similar because local people usually inject their preferences, their way of life, and their knowledge about the natural environment and building techniques into their built environment in different ways. To understand the influence of a specific interpretation of the spirit of Islam on shaping an Islamic physical environment in a unique way, consider the example of Damascus, Syria, which inherited from the Romans their grid pattern planning system of space (Grunebaum, 1970). Later, when Damascus became part of the early Islamic empire, the original Roman Hellenistic town structure transformed gradually to an irregular urban form with an introverted residential layout. The change was implemented to meet the religious principles of the new Islamic residents who moved to the town (Al-Hathloul, 1996). It is claimed that the reasons for these changes were the different religious beliefs and the need to develop a new approach that was

appropriate for the new principles that were brought by the new religion (Al-Hathloul, 2010; Hudson, 2000). The influence of the spirit of Islam led Damascus' grid pattern to morph into a semi-irregular pattern by the new residents to meet their new Islamic religious principles and convictions. However, the modification did not overhaul the entire city as the grid pattern still exists to this day in some areas which indicates that inhabitants only modified Damascus' grid pattern when their lifestyle required the grid to be modified. This is likely due to the enormous amount of resources required to change street patterns, no small feat.

4. Understanding the Hidden Order Elements

The traditional built environment in Najd is the result of external forces such as topography, climate, and technology and, more importantly, internal forces (i.e., socio-cultural drivers, religion, customs, shared societal agreement and values, etc.). The repetition of residential organic, irregular masses created the urban structure of the Najdi settlements. Each mass is connected to other masses within the settlement, and as a whole, they generate the urban form.

A mechanism that organizes the urban spaces into a hierarchal order of spaces governed the process by which the urban mass formed. The hierarchal order is meant to arrange the external and internal elements that are related to hierarchical spaces to provide a balance between the private and public, the inside and outside (Alnaim, 2020) (Figure 4). Although the configurations of the Najdi urban forms are slightly different from each other in terms of their sizes and shapes, they share similar principles in urban production, which the study calls 'common urban core forms.' As a result of these common urban core forms, even though each quarter (hella) at the micro-level may have created its own social identity, individual and subgroup physical identity was not significant in such a collective society because the hidden order integrated with and regulated those individual and subgroup identities. This is similar to Maass and Clark's distinction between the majority and minority influences on spaces. Their study suggests that minority outgroups often have very little weight to produce, and they only influence the spaces they occupy while the majority maintains a more influential role.

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(6) The streets being introverted, and irregular is to branch to smaller pathways, which helps to produce a cluster of houses controlled by different clans, their boundaries identified by the streets pattern.
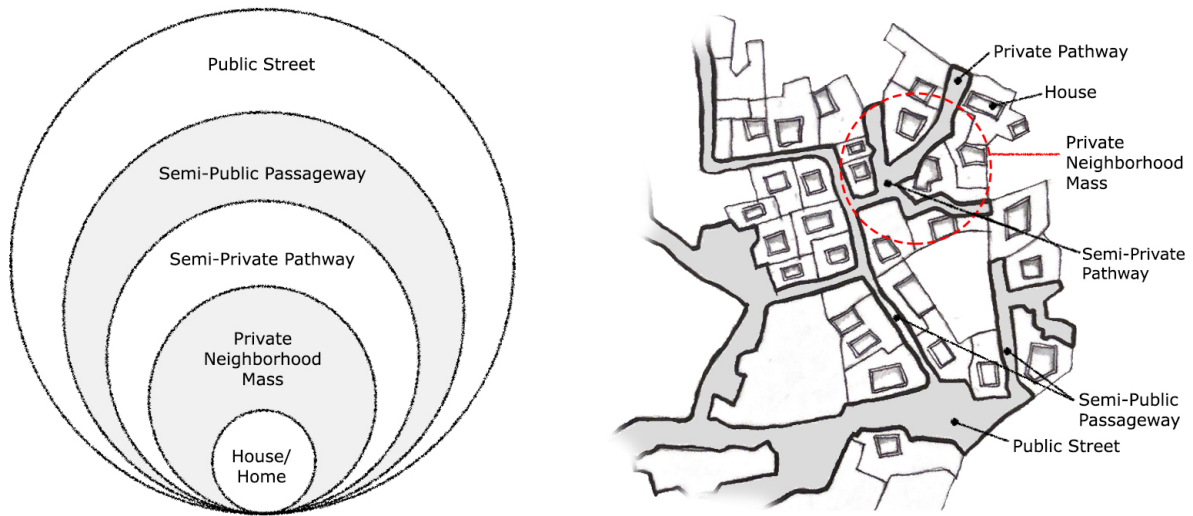
Figure (4) (Left) the hierarchal order of spaces in an urban structure in the Najdi traditional settlements, (right) part of the Ushaiqer settlement which demonstrates how the hierarchal order of spaces influences the organization of the urban structure. Source: Author
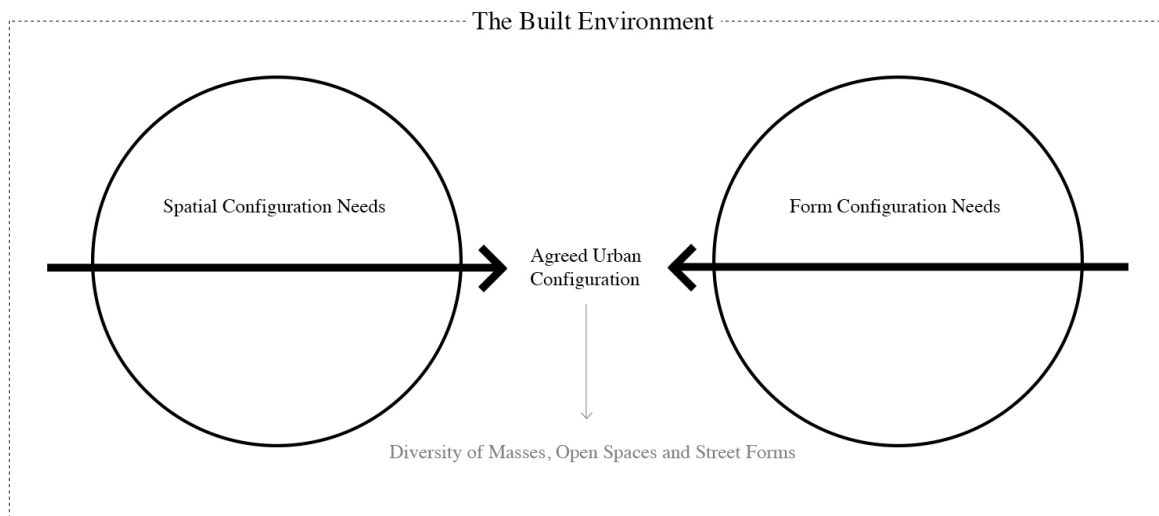

Figure (5) Early conceptual model of the hidden order elements. Source: Author

This influential role of the majority arises because the inhabitants believe that it is essential to the maintenance of a certain level of unified characteristics of their space (Cited in Abrams & Hogg, 1990).

The argument here is that the differences that may be seen in the urban form across the five cases – Ad-Diriya, Sudus, Alkhabra, Ushaiqer, and old Riyadh – does not indicate that each settlement has its own urban Core Forms and principles;

rather, the settlements are collectively governed by a common hidden integrative order (Figure 5). It is rare to find a specific form or shape belonging to an individual settlement. This is not to say that the urban forms in the traditional Najdi settlements were identical; in fact, the settlements are characterized by their urban diversity (diversity of masses, open spaces and street forms) and by the unified interpretation process that are related and embodied in the
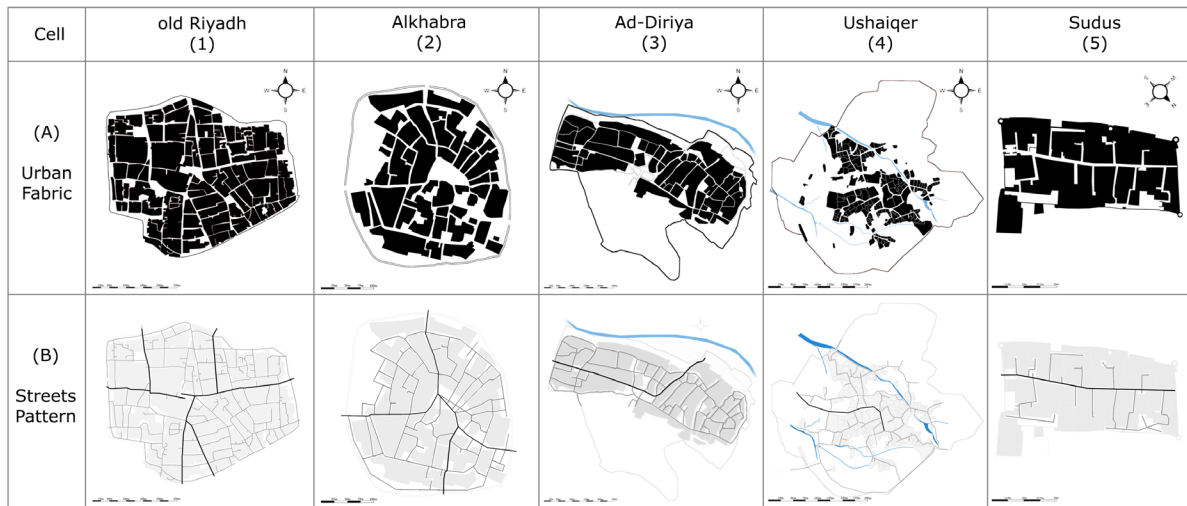
Figure (6) Broad assessment of the traditional Najdi settlements according to the hidden order conceptual model. Source: Author

hidden, common integrative spatial and physical order. This common integrative order governed the process that produced the spatial and physical forms and defines the relationships among them.

For example, quarters with more open spaces and wide streets can indicate that the surrounding community is more open to the outside, while the private and compacted formation of buildings and narrow streets indicates a private community zone. This helps see the macro and micro-level relationships as an encoded process driven by inhabitants who engage the hidden order in generating the built environment at both the conscious and subconscious levels[7]. While part of the generation of the built environment is an encoding process (i.e., the nonphysical hidden boundary that clans identify for themselves among their neighborhood) the local people decode it subconsciously and understand that they are entering another private zone, typically defined and private. This makes the location of public and secondary pathways critical elements, separating two different domains and creating another layer of depth (Alnaim, 2020).

The study tested the hidden order model by examining the urban fabric. This exercise was performed by observing the five settlements in a

sequentially broad based assessment which helped to develop a clear picture of how the hidden order (the integrative spatial and physical order) is embedded in the traditional Najdi settlements. This paper argues that the five settlements – old Riyadh, Alkhabra, Ad-Diriya, Ushaiqer, and Sudus – share similar socio-cultural values and the settlements were influenced by very similar natural environments and used almost identical construction techniques and know-how.

Understanding the impact of the process of production and reproduction of the urban forms was a key to understanding how each settlement adopted the integrative spatial and physical order to create its urban structure. In fact, the integrative order is deeply rooted in the mind of the local inhabitants and has evolved over centuries. It is an accumulation of all the experiences and attempts over generations to produce adequate built environments.

Now, in broad terms, the study will focus on how this hidden order shaped and influenced the urban fabric in the traditional Najdi built environments. From the general assessment of the selected case studies, it is noted that the urban form of the Najdi built environments varied from a circular grid pattern to an axial grid pattern with irregular narrow and winding streets and path-ways (Figure 6 (A)). The physical organization of the urban pattern reflects the high level of diversity in the urban forms of the Najdi traditional
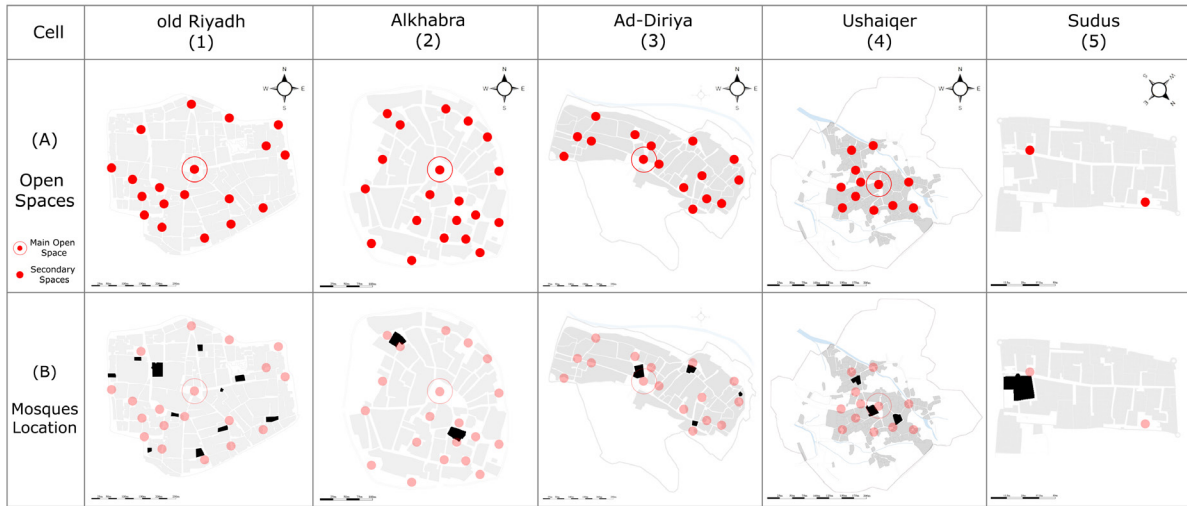
(7) Encoded process. For example, the built environment with its objects, its use of spaces, and its relationships between its users, are tools (devices or mediums) with encoded meanings of the main socio-cultural principles of the inhabitants.

Figure (7) The location of the main open space and other secondary spaces in relation to mosques placement. Source: Author
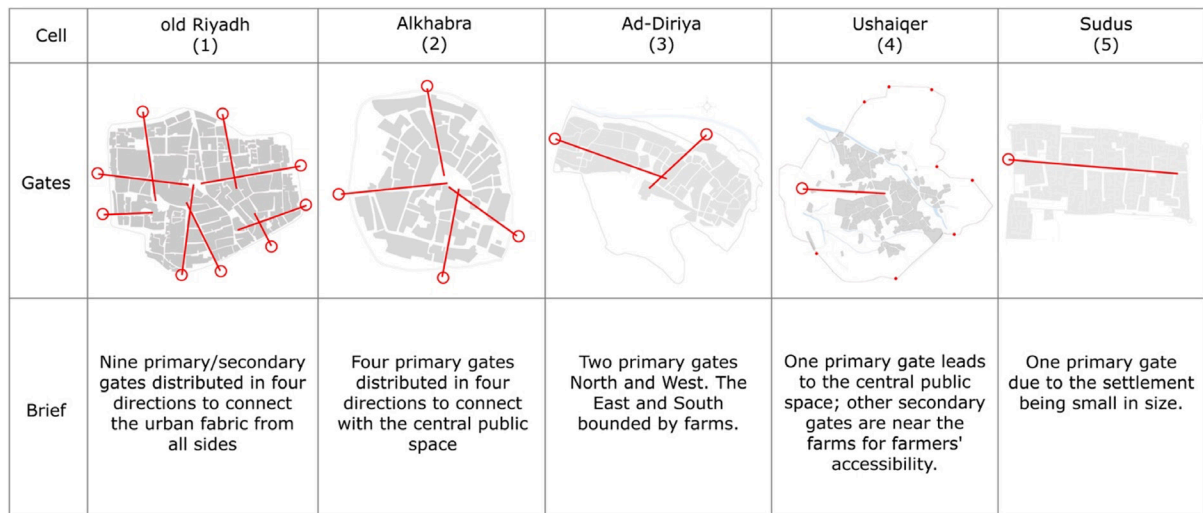

Figure (8) Gates connected with central public space to ensure semi-private spaces preserved from strangers. Source: Author

settlements. Also, note that although the general urban form is different from one settlement to another, the way that streets, open spaces and building masses are arranged and linked leads to similar spatial and physical relationships and social uses, and similar visual appearances (Figure 6 (B)).

However, we argue that a similar hidden order governs the spatial and physical elements. As a result, the external public domain and its components such as mosques, souq (markets), main streets, open spaces, and public building locations were organized and arranged according to the hidden spatial and physical hierarchal order (Figure 7 & 8). This step was crucial as it indicated that the embedded processes of generating the traditional Najdi built forms are similar.

The urban patterns in Arab towns, in general, are influenced by the Islamic religious principles that require the main jumaa masjid (Friday mosque) and other significant public buildings to be placed in the center of the settlement (Figure 7 (A & B))

(8). This urban ordering is deeply rooted in the urban production principles of Islamic society which expresses the importance of and separation between what is public and what is private. For example, a traditional town typically had one jumaa mosque and placed this mosque in the center of the town to let the aathan (Call for prayer) reach to all surrounding neighborhoods. The spatial order emanated from the center, where the jumaa mosque, the culturally governing building, and the market reached out to the deep private parts where the neighborhoods and private houses were controlled by the relationship between the three social structure circles (public, semi-private and private) as well as the hidden integrative order.

To identify the Urban Core Forms that govern the process of generating spatial and physical forms in the Najdi traditional settlements, the study highlighted a number of urban elements of the selected cases (urban fabric, streets pattern, gates, open spaces). Furthermore, the urban form consists of an interwoven group of buildings that created different sizes of masses. Each mass of buildings usually has some connectivity with the town center. This connection takes different shapes, such as irregular path networks called sekka (pl. sekkak). Each network is composed of several private and public passageways and thresholds. The aim of the analysis was to identify the hierarchal depth of spaces that distinguished between the external and internal spaces. It is essential to notice that in some cases there were no paths connecting private neighborhoods except through the town center. This is a result of the social structure that gives a high priority to the medium social circle (semi-private domain) – usually composed of close relatives within the bigger clan – in organizing the urban structure in Najd (Al-Hathloul, 1981; Akbar, 1984; Al-Olet, 1990; Ettehad, et al., 2014).

The urban pattern of Najd is arranged by having a hierarchal mechanism in the decision-making process. Identifying the existence of this

hierarchy has influenced how we can understand the relationship between micro (private) and macro (public spaces) and facilitated the inhabitants' daily practice without interference. The physical arrangement of space and the social interaction facilitated by that arrangement provides evidence of this regulatory process. This leads to the insight that the making process is related, first, to how social groups interact with the built environment to impose their cultural requirement to maintain their privacy while also preserving their relationship with other elements and adjacent neighbors. Meanwhile, the second process is more focused on defining the shared and mutually agreed upon socio-cultural needs among the community, such as the general urban layout that is influenced by the desire to keep the public domain occupied without interfering with the semi-private and private domains (Figure 8). This also gave groups of people in private areas the flexibility to engage in their own process of making places to generate their places in a way that reflects their daily life needs.

For example, the regulatory process is evident when the main sekka (pathway) starts in the town center and becomes smaller in the residential quarters, and the sekka becomes very narrow walkways or cul-de-sacs in the deeper clusters of houses. The arrangement here reflects the impact of social roles in organizing the hierarchal order of spaces in the traditional Najdi towns. This hierarchy is comprised of several pedestrian spaces (sekkak) starting at the public space, then semi-public, followed by the semi-private spaces, and finally the private spaces. A hidden law drives the arrangement process that decides who should be in the space and who shouldn't. In many cases the one clan or extended family exclusively occupied each hella (neighborhood mass) in the traditional settlements. This caused the semi-private urban spaces to effectively be in the private domain, unlike most urban environments. This phenomenon of semi-private urban space rendered private depends on the layout of the urban fabric and the degree to which the semi-public and semi-private spaces are connected with the hella.

In Ushaiqer, for example, as it grew, the settlement adopted the location of flood streams and wells into its urban development which characterized its urban mass. Also, in Alkhabra, the aim was to create clear and wide public streets from four directions that led into the town center from outside the settlement boundaries without

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(8) Circular pattern settlements influenced by old Islamic cities such as Mosul, Aleppo and Damascus. These cities were influenced by the Roman-Hellenistic grid pattern and they represent a late stage in the evolution of urban form in Arab cities over the four centuries. However, these cities still reflect the principles and attitudes that are rooted in the Arabic-Islamic traditional communities, and because these settlements are located in trading routes, they were the focal point for commerce and trading. The influence of migrants and travelers to these areas was significant in shaping the urban form (see Bianca, 2000; Abu-Alkhil: 1979).
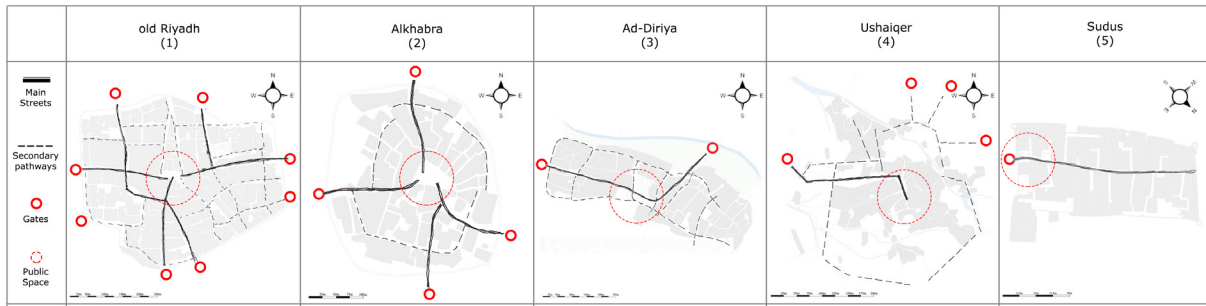
Figure (9) Assessment to how main streets are linked with secondary pathways and the main public space. Source: Author

interference with the private hellas. This type of dynamic organic distribution helped to establish an urban fabric that defined the public domains as being separate from the private domains (Figure 9). From extensive observation, we found that the arrangement of pedestrian spaces establishes a hierarchical order of spaces that formed to gradually separate the direct link between the public and private domain (Alnaim, 2020). This hierarchical order facilitated the distribution and placement of open spaces and public buildings in the urban space, predominantly generating a built form that served the social needs, customs, and values of inhabitants.

5.Examining the Hidden Order

The outdoor spaces of the traditional Najdi built environments have been examined to understand their urban fabric layout and process of making. We observed how the integrative spatial and physical order governs the outdoor urban spaces, and also represents a holistic process that deeply controls a house's location, spaces and defines the boundaries and relationships among different domains[(9)]. This leads to considering the concept of 'spatial and physical integrity,' which is one of the main core processes that defined the spatial arrangements and influenced its physical forms in the traditional Najdi settlements.

Spatial and physical integrity occurs in a given settlement when all spaces in the settlement are integrated and linked in a hierarchical order based on the social structure found in the Najdi communities. This order is pervasive: we observed it from the most private spaces in the

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(9) The order guided the process of making by linking several mechanisms with each other under one holistic order. It helped to ensure that 'no harm' is done from and between public or private domain.

house (e.g., the bedrooms) to the most public spaces. Interestingly, what defines the boundaries between the public and private spaces is the hidden thresholds, which are 'controlling points,' present physically or non-physically, and that serve to separate different spaces in different domains. Each threshold is a point of reference known by the residents, which guides them to recognize and differentiate between public and private domains.

A comparative analysis across the five cases – Ad-Diriya, Sudus, Alkhabra, Ushaiqer, and old Riyadh – was conducted to examine how the order, in general, manifests itself within the built form of each case. This led us to pursue the next phase of study, which was to enhance and develop a more comprehensive understanding of the relationships between the hidden order elements after understanding the shared processes and mechanisms across the region. (Figure 10).

From the comparative analysis conducted on the five Najdi cases, we noticed that in all the five cases, the hidden hierarchal order of spaces starts from the most private spaces (i.e., bedroom) and extends into the most public spaces, as well as all of the spaces between these two extremes. Although the public space may differ from one case to another (i.e., Masjid, Barahaa, or Souq), the hidden, imposed order means that all spaces in each of the settlements eventually lead to a public domain. Therefore, the integrative order is not focused on driving to a particular type of space, but rather, its primary goal is to establish a sense of ordering for the spaces and physical elements. This is a significant finding as the hierarchy preserves the privacy of other private spaces within the urban forms, which makes the level of control to semi-private and private spaces vary among inhabitants and depend on the arrangement of the built form (Figure 11).
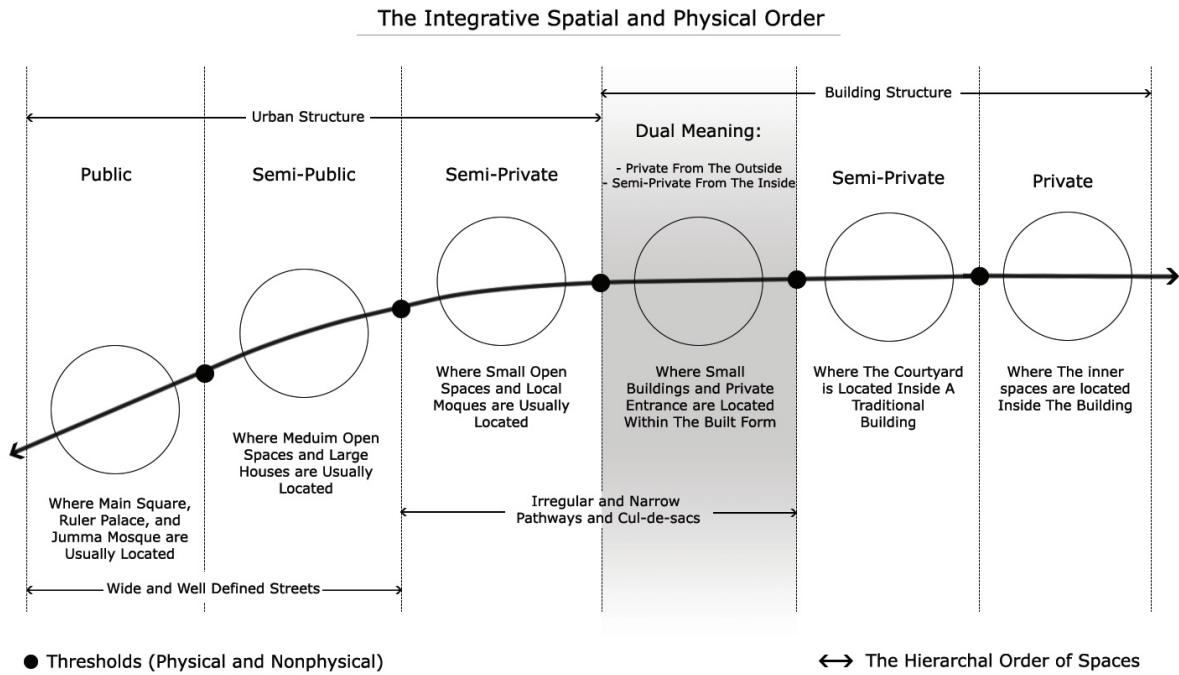
Figure (10) The integrative spatial and physical order founded in the Najdi built environment. Source: Author
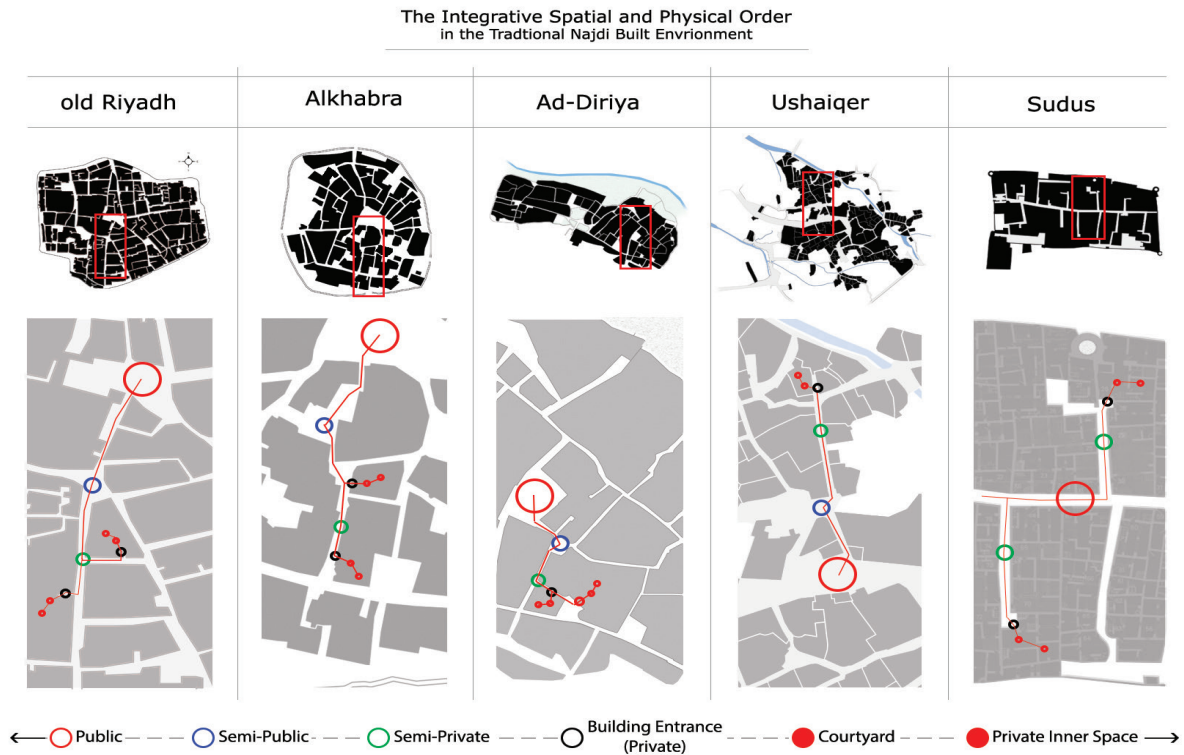

Figure (11) The hierarchical order of spaces produced by the Integrative spatial and physical order. Source: Author

In old Riyadh, for instance, the entrance of a building is located within a private cul-de-sac which makes the next threshold leading toward the public space a semi-private narrow road. While on the semi-private road, one notices that there is a small semi-public open space that creates another layer of depth (threshold) between the semi-private and other public spaces. The number of 'controlling points' in which inhabitants cross through (thresholds) is one of the main core concepts that shaped traditional Najdi urban form. This makes the threshold serve as an encoding process within the built form of Najd (both visible and nonvisible) (Alnaim, 2020).

It is crucial to emphasize that thresholds may be either physical or nonphysical, but either way they are well known and identified by inhabitants and used as clear or hidden boundaries that differentiate paths, public and private spaces, as well as neighborhoods from each other. In this sense, uses and meanings are not necessarily associated with a physical object, rather it is the process by which a group of people take their shared knowledge and values and convert those to actual practices within spaces, practices that have social implications. This phenomenon is also evident in Alkhabra, Ushaiqer, and Ad-Diriya.

However, in Sudus, the settlement is one big hella (neighborhood), occupied by one clan or extended group of families which effectively made the public and semi-private urban spaces become part of the private domain. As a result, in Sudus the semi-public spaces do not exist as the settlement as a whole is controlled by one blood-related social group, which makes transitional thresh-olds unnecessary. In Sudus, we noticed that the integrative spatial and physical order helped people to decide what they needed from their built environment, and to what limit the built environment should expand. Also, the order defined the boundaries and the arrangements of the spatial and physical elements.

6.Result and Discussion

The findings of this study suggest that the operational Core Concepts and Forms were essential to identifying how local inhabitants used the hidden order as tools to maintain their built environment's characteristics over time. One basic principle identified in the urban formation of the traditional Najdi built environment is 'diversity within unity.' This principle is understood from the previous discussion where there is always the tendency to produce different spatial and physical configurations and shapes within and among settlements, but as a whole (i.e., the Najd region) they serve unified functions and support similar socio-cultural meanings.

The mechanism that is responsible for the 'unity' of the traditional built environment is what this study describes as 'the integrative spatial and physical order,' that served to reproduce the unity and integration observed in the traditional settlements. The integrative order is the main mechanism that constitutes the Core Concepts and Forms and uses them as tools of operation. This means that the order functions by implementing the Core Concepts and Forms. The way that local people interpret the 'tools of operation', and how they modified them to fit their climatic, geographical, and technological conditions, determines the shape and perceptual identity of the built environment at a specific point in time.

That said, the interpretation process of the integrative order we found is based on how the inhabitants of each settlement responded to the surrounding environmental conditions and how the inhabitants accommodated their various daily life needs by using the operational Core Concepts and Forms. The flexibility of the integrative order encouraged the establishment of a hierarchical mechanism in the decision-making process supported by the hierarchal order of spaces to generate uniqueness at the micro-level, as it is more prominent and controlled by the local people, while preserving the shared and agreed-up-on integrative order at the macro-level to ensure that no harm or damage is done to public spaces. Giving individuals and groups the flexibility and ability to contribute to their placemaking under a shared mechanism increased their sense of and attachment to their particular places.

This led people in the traditional Najdi built environment to achieve a level of interdependence: they depended upon each other to do many things. This social feature helped the people to establish a shared process – managed by the integrative spatial and physical order – to produce the spatial and physical forms by implementing the Core Concepts and Forms. In that sense, the study examines the Core Concepts and Forms as a

vehicle of the integrative order to perform and manage the production and reproduction of the built forms. The urban layout differences seen among the five cases are related to the dynamic interpretation process embedded in the integrative order. That gave individuals and groups of people the flexibility to interpret the process to fit their particular geographical and social circumstances.

There is no reason to believe that this hidden order is only found in the Najdi traditional settlements. We hypothesize that the order is a common principle in Arabic-Islamic towns. What this paper calls 'the integrative spatial and physical order', can explain many of the hidden principles, values and beliefs that were deeply rooted in the people's daily conscious and subconscious actions that produced and generated a number of Core Concepts and Forms, thereby encoding those deeply shared principles, values and beliefs into the built environment itself.

Future studies can examine other traditional built environments in Saudi Arabia and worldwide to understand how socio-cultural forces were interpreted and highlighted spatially and physically in individual built forms. This will enable the identification of similarities and differences among various built forms and how similar forces in different cultural contexts can produce different results. These studies can enhance and expand the debate of this study's proposed hidden order, to enhance it and make it a more comprehensive tool as well as generalizing the model to be used in different regions and built forms.

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استكشاف النظام المكاني والفيزيائي المتكامل المولد للشكل الحضري والمعماري: دراسة لخمس قرى نجدية في المملكة العربية السعودية

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ملخص البحث. لفهم كيفية قيام المجتمعات التقليدية بتوليد الأشكال الحضرية والمعمارية، يتطلب ذلك فهماً واسعاً لتأثيرات القوى الاجتماعية الثقافية: كفهم هيكلة الأسرة والقبيلة، والتنظيم الاجتماعي، والممارسات والمعتقدات الدينية، والعلاقة الاجتماعية التجميعية بين البيئة المبنية وساكنيها. ومن خلال دراسة البيئة المبنية النجدية، تم استنباط أنظمة خفية «غير معلنة» اعتمدت في تطبيقها على مدى استجابة السكان المحليين للظروف المحلية المحيطة بالبيئة المبنية والبيئية ضمن منطقة نجد، وذلك من خلال دراسة كيفية توظيفها لتوفير احتياجاتهم اليومية المختلفة من خلال فهم كيفية تطبيق المبادئ المولدة للشكل الحضري والمعماري. إذ تم خلق مفاهيم من قِبَل السكان المحليين وتوجيهها عبر تلك الأنظمة «غير المعلنة». والهدف من هذه الدراسة هو تطوير ومحاولة فهم تأثير الثقافة والسلوك البشري على إنتاج البيئة المبنية، وسيتم خلال الدراسة استعراض عدد خمس حالات استيطان سكني لأحياء تقليدية بمنطقة نجد، واستيضاح كيف تم توظيف القوى الاجتماعية والثقافية بطرق مختلفة لتشكيل وتوصيف الشكل النهائي للبيئة المبنية من خلال محاولة إيجاد النظام المكاني والفيزيائي المتكامل المستنبط من تلك الأنظمة «غير المعلنة».

الكلمات المفتاحية: نجد؛ البيئة المبنية؛ الشكل الحضري؛ الثقافة المجتمعية، القيم؛ النظام المكاني؛ الشكل الفيزيائي.