

An Overview of the Factors Influencing the Formation Transformations of Residential Building Facades in Riyadh

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Abstract: The design of residential building facades may be influenced by a variety of urban, cultural, social, economic, geographical, and legal factors. These factors all have their reflections on the formation methods and styles used in these facades, which create an initial impression of the local community's architectural, urban, and cultural surroundings. Within a theoretical framework, this paper focuses on the factors influencing the transformation of residential building facades in Riyadh. The paper will analyze these transformations within a time segment extending over the twentieth century, the first of which deals with traditional residential buildings; the second will analyze the facades of transitional residential buildings; and finally, the analysis will reach modern residential buildings. In conclusion, the paper seeks to establish standards and guidelines that will help develop residential building facades. It also provides a platform for producing a distinct aesthetic and a clear identity for residential building facades in Riyadh.

Keywords: Residential Facades, formation, Transformations, Factors.

1. Introduction

Architecture is one of the obvious ways that each country's culture is expressed, especially through the facades of buildings. Visible appearance is the most effective and immediate way to form an impression of the built environment. However, the most effective examples are those that emphasize the elements of locality and traditional identity.

One of the biggest issues with modern residential buildings in many Arab major cities is the reliance on imported building styles and Western ideas. This has been applied without strict controls and determinants of design policies and decisions, which led to a hybrid style.

Facades now face many transformations that affect their architectural form, character, and style. The character of Riyadh's residential buildings has been shaped over the centuries by

certain architectural features of traditional Najdi residential buildings. The Najdi features were initially straightforward and related to traditional materials. They were created and emerged in response to specific local needs. They remained in their traditional form in Riyadh until the end of the Third decade of the twentieth century. However, with the development of urban growth and the extension of residential buildings outside the traditional center, the shapes of residential buildings differed, when major transformations happened in the society, such as economic and regional changes. This paper seeks to address the manifestation of transformations in residential buildings' exterior facades to accommodate the social, economic, and environmental needs of the local society in Riyadh, the most populated and fastest developing city in Saudi Arabia.

2. Methodology

The study has mostly focused on architectural facades and their visible components, like openings, materials, patterns, and colors. This paper will use analytical, historical, and comparative methods. It will compare and analyze.

Residential buildings' facades over time. This paper will be organized chronologically and will undertake a cross-analysis of the traditional, transitional, and modern residential buildings in Riyadh. The study goes through the factors that led to the transformation of the housing building facades and how the new changes are reflected on those facades. Firstly, the study will start with the traditional buildings that were built between 1902 and 1950, then move on to the residential building facades that were built between 1950 and 1980, which represent transitional residential buildings, and finally, the study will go through the modern residential buildings between 1980 and 2000.

3. Transformation and Residential Buildings' Facade (The Dual Dialogue)

Transformation, as a concept, is the process of changing something from one state to another. It is a permanent and continuous process where everything is subject to transformation and development.

The forms of this transformation vary and can be studied in countless ways. The changes and developments that occur in any city have a direct impact on the architectural design of its buildings due to the necessity of adapting and balancing with the requirements imposed. The process of designing residential building facades is not only concerned with the physical aspects but also mainly with the spiritual aspects related to privacy, safety, and comfort, and these are in constant transformation and change to suit the changing needs of the population. This process is mainly affected by the social conditions, the economic potential, and the cultural background of the population using those buildings.

These changes have grown and continued, and many factors have contributed to influencing the shape of the housing models, which makes it difficult for architects to deal with them. In a historical study of residential buildings in Riyadh, it can be noted that these changes did not affect the

design of the facades of residential buildings until the third decade of the twentieth century, as there was no indication of transformation and change in the architectural formation, nor did any change or development occur in the methods of construction until that time. We can trace the development of Riyadh's housing types to three types of housing associated with social developments, economic developments, and the development of building materials and Technologies: traditional housing, transitional housing, and modern housing. The research will study the transformations of residential building facades in Riyadh in these periods, which represent a time segment spanning the twentieth century.

4. A Historical Backdrop of the Development of Residential Building Facades in Riyadh

The development of residential buildings' facades in Riyadh will be studied to comprehend how their patterns developed, transformed, and changed throughout and after the modernization period.

Historically, the capital of Saudi Arabia, Riyadh, contains a historical core with a vast Islamic architectural and urban planning heritage (Eben-Saleh. M,1998). Old Riyadh is characterized by its unique architectural character that reflects Najdi architecture through several symbols used for multiple functions, such as environmental and aesthetic functions (Al-Naim, M. 2021). Up until the early 20th century, residential building facades kept their traditional appearance. The core of the city was surrounded by new formal and informal urban developments that differed significantly from traditional core planning and design (Eben-Saleh. M,1998). These new fragments present striking physical contrasts and separate economic and social environments that co-exist without much integration (Eben-Saleh. M,1998). In general, the housing buildings in Riyadh can be divided into three main phases.

4.1. Residential Buildings' Facades in Riyadh (1902-1950):

The city was only about one square kilometer. Residential spaces in the old city consisted of clusters of mud houses. Fig.1 shows the old city of Riyadh.



Figure (1). A layout plan of the urban fabric of old Riyadh (Al-Hathloul, S. 2002).

The residential buildings were mainly characterized by square or rectangular plan shapes in response to specific social, cultural, and environmental conditions. They were arranged around courtyards that regulated the interior microclimate. They were also built with shared sidewalls (Eben-Saleh, M,1998).

The external form of the traditional settlements was mostly formed, by solid masses with few openings to the outside, see fig. The architectural formation elements emerged in response to specific local needs provided visual components that characterize the built environment and influence its identity (Al-Naim, M. 2021). and were integrated with the religious convictions and socio-cultural factors of the inhabitants. Those elements served some technical and environmental purposes (Al-Naim, M. 2021).

As a result, the most important architectural formation elements in traditional residential buildings were the doorways, which appeared in a variety of styles, shapes, and ornamental applications and with varying degrees of accuracy and woodworking skill, using natural themes, geometrical patterns, religious texts, or very basic ornamentation (Al-Naim, M. 2021). Another important formation element in traditional residential buildings is the window, which was named the Furjat (Al-Naim, M. 2021). It was usually located in the upper parts of a wall and close to the roof to ensure the interior privacy of the house, and these openings were small, so they could be closed with mud or stone during the



Figure (2). Traditional pattern of Riyadh (RCRC,2023)

winter seasons without affecting the building's structure (Al-Naim, M. 2021) see fig. 3. This element was developed to be an inside and outside element according to the user's needs, and without affecting the privacy of other buildings, it was used to decorate the building's exterior walls by using different alignments, arrangements, and densities. Fig .3 also shows another important formation element named Shuraf (Al-Naim, M. 2021), which is located at the end of a building or on its edge. It has different representations, such as curved lines, the shape of plant leaves, the shape of an arrow, straight lines, different angle positions, or a pyramid shape (AbuGhazzeh, T. 1997& Al-Anbar, A. S 1999 & Aleid, S. 1994. Al-Naim, M, & Aba Al-Khail, I. 2010.)

According to Al-Hathloul, the city had expanded northward when a new area known as al-Futah grew, which contained several palaces with similar characteristics and architectural features to those in the old center. It was built using local Najdi building techniques and materials (Al-Hathloul, S. 1996).

By the end of the 1950s, the transition away from the traditional construction methods started, and reinforced concrete was utilized in the construction of a palace at Al-Nasiriyah. This was the start of the transitional residential and commercial buildings, which were built outside the boundaries of the traditional center (Eben-Saleh, M,1998).



Figure (3). Examples of traditional formation elements in Riyadh Source: Author

4.2. Residential Buildings' Facades in Riyadh (1950-1980):

Several significant changes in the social, political, and economic environments influenced the overall residential environment (Lang, J. 1994)

The transitional phase marked the beginning of the decline of the historic core, and a demarcated social change between the population living in the traditional and transitional quarters appeared around them (Eben-Saleh. M,1998).

Changes in the traditional courtyard housing pattern have been accompanied by three projects: ministries' buildings, Al-Malaz housing, and Al-Nasiriyah district, which had a significant influence on Riyadh's architectural development. They were the first to introduce the concept of villa types to the city in the middle of the 1950s, which spread quickly in Riyadh (Al-Hathloul, S. 1996).

Villas were built on square lots with setbacks on all sides, with no interest in determining the area of these squares, the percentage allowed to build

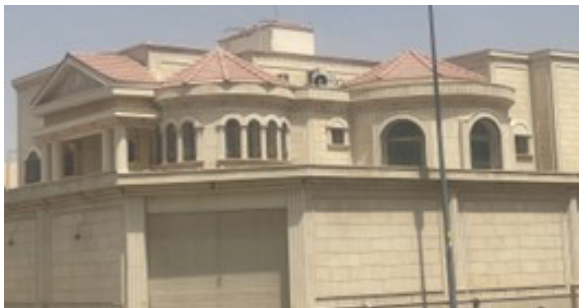


Figure (4). The transitional residential buildings in Riyadh

on them, or the width of the facade overlooking the street. The map below shows the plan of al-Malaz neighborhood in Riyadh which includes the villa type.

The absence of interior courtyards is the most critical property of this villa type. Al-Sala replaced traditional courtyards, which are in the center of the villa. All the windows had a rectangular or square shape and opened to the outside. Saleh Al-Hathloul characterized the villa's style as "international Mediterranean."



Figure (5). A layout plan of al-Malaz Housing in Riyadh (Al-Hathloul, S. 2002)

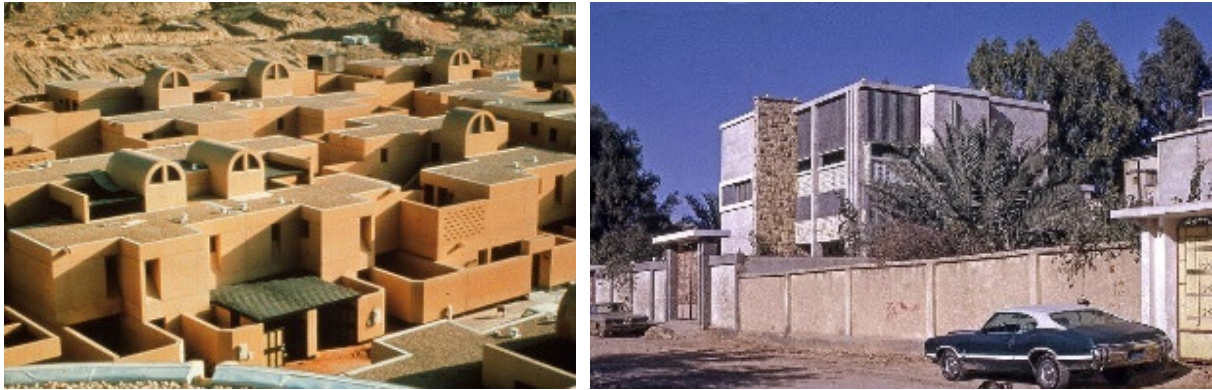


Figure (6). Examples of villas 'style in Riyadh between 1960-1970 (Al-Hathloul, S. 2002)

The methods of construction, use of materials, and ideas of suitability were unfamiliar and alien to the residents. In the late 1960s and early 1970s, owners began to add their touches to villa facades. The architectural style of villa buildings underwent some changes from those in the 1950s: concrete ribbons around the windows were used as the only decorative element on the exterior facades, and gateways became more integrated with the fence. Stone was widely used on villa facades and gateways to represent social status and luxury. A second story on top of the first one has been added as well. There were no motifs on the exterior facades. The effects of the climate on the new residential units were also given little consideration. This style of residential buildings, which dates to Riyadh's transitional phase, is directly attributable to the city's multicultural population.

By the late 1950s, multi-story apartment buildings had grown rapidly in Riyadh. Fig. 7. Shows the first multistory apartment blocks in Riyadh were built in 1959, in response to the city's expansion. These buildings included direct openness to the outside. The main facades contained several windows and balconies overlooking the streets. The side facades of the buildings were retained for services and staircases, and the window openings there were limited and located above eye level so as not to invade the privacy of the neighbors (Al-Hathloul, S, 1981). This type of building has increased, especially in the northern expansion areas of Riyadh. Most of the inhabitants of the apartment buildings were foreigners because Riyadh's preferred living in detached villas. (Al-Hathloul, S, 1981& AL Abdullatif, Abdullah Ali. 2021).

Al-Hathloul mentioned that in the late 1960s, the design of multistory apartment buildings took a different direction that departed from privacy conventions. In these buildings, the designers started to apply a typical facade that incorporated large windows and balconies to all four sides of the building, paying no attention to what the building looked like. So, residents of villas there had to develop new solutions for their residences that would assure the protection of their privacy (Al-Hathloul, S, 1981).

Finally, we can say that the social, economic, and technical developments in this phase caused the main transformations in Riyadh's housing types in both form and content. Two housing patterns can be noticed during this phase:

The style of the detached residential villa with a central hall and surrounding setbacks from four directions was a response to the social factor represented by the change in lifestyle. Another style is the multi-story housing style, in which the hall area was reduced to become a corridor, the facade openings increased, and balconies appeared, especially on the facades overlooking the street.



Figure (7). The first apartment buildings in Riyadh in the late 1950s (Al-Hathloul, S. 2002)



Figure (8). The apartment buildings in Riyadh in the late 1960s (Al-Hathloul, S. 2002)

4.3. Residential Buildings' Facades in Riyadh (1980-2000):

Riyadh experienced considerable change through the mid-1970s and early 1980s in social and urban contexts because of the economic boom. This has consequently led to significant growth in the construction industry, where the city is eminently transformed into modern urban dwellings (Eben Saleh, M, 1998). The three main housing models are single villas (independent housing units) duplexes (two adjacent housing units). In addition, the third type is multi-story apartment buildings. (RCRC.2023). The expansive development during this period and the unprecedented growth in the rate of the population expressed the modernist approach adopted by several local architects. Saudi villas can be described at that time as a cross between Western-influenced villas and those appropriated to fit the Saudi family's needs (Al-Hathloul, S., 1981 & Bahammam, A. 1998). The Ministry of Municipal and Rural Affairs implemented new building standards in the 1980s, which led to significant changes in the forms and shapes of villas. Some new architectural features were implemented, such as arches, curved walls, and cylinder parts. The images below show some examples of these shapes in modern villas.



Figure (9). Cylinder shapes in modern villas. Source: Author

The gateways also became more integrated by using some decorations surrounding the entrance to highlight it among the surrounding formation. Fig. 10 shows some examples of the gates in this type of villa.

The staircase was moved from the front facade to an interior element and takes its lighting from above, which freed the main facade to have various shapes and attract major attention by having a major share of architectural formation. Thus, it was distinguished from the other facades in terms of formation.

New building materials were introduced and used in the finishing of the exterior facades. Regular shapes for the openings almost predominated in the formation of exterior facades, with the use of fabricated iron as a decorative element in some openings. The formation styles of the facades varied from vertical to horizontal or mixed; the levels of different floors were distinguished from each other; some decorative balconies appeared as part of the facades. Various formation elements, like the columns and juts, were distributed at different rhythms and heights in the exterior facades of the modern villas, and proportions were not taken into consideration in the formation of the modern villas' facades.

As for the colors used in finishing the facades, they ranged from yellow to beige, and some dark colors were used in the last modern types of villas, with Tyrolean plaster for finishing the secondary facades.

The building systems used to be the main guide for formation, which imposed regular recurrent volumes, horizontal spread of the residential buildings, and limited dimensions of lots for each villa, creating a sense of monotony and limiting the architectural creativity in the facades of the residential buildings. Since the 1990s, the architectural formation crisis has become



Figure (10). Columns and Fabricated iron gates. Source: Author

apparent in the architectural scene of Riyadh's residential neighborhoods, and hybrid formation styles are shown in villa buildings (Giddings, B. Almhrej, M. & Crescian, M 2020), so the image of these residential buildings has shifted to modern buildings. The third type of housing, which we referred to before, was the apartment buildings, which started to spread in Riyadh at the end of the third decade of the 20th century. But this type was unpopular with Saudi families due to the way it was designed, which depends on housing units that share one entrance, which conflicts with privacy traditions.

Developers started to build these types of buildings with a lot of openings and without any architectural or legal controls that controlled the shapes of the openings and the architectural formation elements in those buildings. The fig.11 shows example of the modern residential apartments in Riyadh.

All of that has led to morphological changes in Riyadh's urban fabric. Rapid economic growth, along with housing projects, has accelerated the shift of Riyadh's image to a futuristic built environment (Bahammam, A. 2011)



Figure (11). Multi-story apartment building

5. Factors Affecting the Formation Transformations of Housing Architecture in Riyadh

The development of all types of residential buildings has been associated with organizational, technical, economic, and social developments that have deeply touched the existing cultural structures prevailing in society, in terms of the changing concepts of family and the need for more independence for the family members. The architectural formation of residential building facades has both expressed and reflected such effects through different transformations, which were also different depending on time. It is not possible to understand and identify all the factors and reasons that contribute to these transformations within any society without studying and understanding the social, cultural, and economic developments that have affected that society and which, in turn, grow and change with time and produce these new models and elements of the architectural formation of the residential building facades. Those factors can be listed as follows:

5.1. The Effect of Social Openness Factors:

The residential buildings are a result of the interaction between themselves and the social environment in which they exist. The social factors are based upon a set of needs, like the need for independence within the residence as well as the need for comfort and well-being, and the functions that would realize social relationships that are compatible with the local environment and connect the inside of the building with its outside. The

Islamic style and its main formation elements, along with the earlier conservative environment, has affected the design of the facades of the residential buildings in Riyadh. Such an effect can be seen in traditional residential buildings, whose facades were simple ones with a few openings to preserve privacy, which is one of the key requirements for the architecture of a Saudi home because it is a deeply ingrained and ongoing value in Saudi customs (AL Abdullatif, Abdullah Ali. 2021). Thus, the traditional residential buildings emerged from local culture and with considering the environmental conditions. Fig. 12 shows examples of the traditional residential buildings' facades



Figure (12). Few openings in the traditional facades (Heritage commission, 2023)

As for the transitional residential buildings, the development of social status, the influence of different factors over society, and the changes in the usual lifestyle led to new residential models. The “villa” was adopted as the main model of housing, which fit into the grid planning system of neighborhoods; society started to accept the idea of openness to the outside (Al-Ibrahim, M. 1990). Although the status of the building and its exterior facades has improved and there is plenty of architectural modernism in the quality of the design and structure, the new types of villas did not support the requirements of privacy because the design of the facade was oriented toward the outside and all the windows were opened to the streets. The use of large windows and balconies had a negative effect by exposing the house to unwelcome intrusion from outsiders.



Figure (13). Balconies in modern residential buildings. Source: Author

Thus, households have found it necessary to block off balconies and windows, which caused the loss of the architectural identity of residential buildings due to the different materials and methods used in the external finishing. The residents also found it necessary to build fences and barriers between houses (AL Abdullatif, Abdullah Ali. 2021). These fences were the main reason for poor interconnection and a lack of clarity in the relations between the houses and the surrounding streets, giving these houses the appearance of fortresses surrounded by walls, some examples are shown in the photos below (Fig.14)



Figure (14). The fences in the modern villas. Source: Author

Individualism residential buildings, individualism, as well as the tendency among young people to have independent families, has all contributed to a change in the shape and structure of residential buildings, favoring multistory buildings with multiple households rather than one. These buildings had different characteristics, whether in terms of the functional division of the interior spaces within them or in terms of accepting the idea of sharing the same entrance and stairway with others.

So, a lot of privacy standards have been violated in these buildings, both in terms of their interior design and their exterior facades. These buildings open toward the outside and include different formations of windows and openings on the outside that are designed and built as a series of organized and harmonious residential units in terms of both design and construction.



Figure (15). Modern multistory buildings in Riyadh. Source: Author

5.2 The Effect of Economic Capacity Factor:

The impact of the economic factor varies from one society to another and may also vary within the same society. The economic factor contributes to defining the urban and architectural features of the residential complexes in terms of the economic factor's role in determining the type of residential property, whether it is a single detached villa, an attached villa, a multi-family apartment building, or any other type. In addition to the effect of the economic capacity of the owner on determining the formation elements used in residential buildings, the difference between residential buildings of the same style can be noted according to the different

materials of the cladding, decorations, and details, which vary according to the economic capacity of each family. In traditional residential buildings, each residence used to be designated for one family. Moreover, the area of the residence and its richness in architectural formation elements varied according to the economic capacity of the occupant. For example, the Alfuraj element is expressed in different patterns, which can indicate the social status and importance of the house's owner (Al-Naim, M. 2021). This element was represented by triangle or rectangle shapes. See figure 16. The size of these openings and their space density were different from house to house according to the house type, whether it was a house or a palace, so the economic capacity of the house owner can be known by the building's exterior facade. However, many formations were mainly within the interior open spaces opening to the inner courtyard.

In the transitional buildings, several residential models that were in line with the economic capacity of their residents have emerged. These models included mainly single-detached



Figure (16). Small openings in traditional residences. Source: Author

Table (1). The impact of the social openness factors on the residential building's facades

The impact of the social openness factors on the residential building's facades		
The traditional residential buildings	The Transitional residential buildings	The modern residential buildings
- There was no effect of the social openness on the traditional building facades, On the contrary, social privacy has been considered to a high degree as the openings and windows overlooking the outside were narrow and upper. The interior facades obtained the largest amount of architectural formation.	- There was an average effect of the social openness on the transitional building facades which became more open to the outside, - The windows became larger and opened to the setbacks, and the interior courtyard was displayed by the setbacks, some attempts to save privacy were by adding high fences with plastic or metal parts to achieve that privacy, and that dominated the exterior facades of the villas and concealed many of the formations	- There was a strong effect of social openness on the modern residential buildings, many privacy rules and societal considerations were violated in modern facades, as openings have been larger, wider, and repeated with different rhythms, regardless of the functions of the spaces behind them, and a significant amount of architectural formation and decoration was in the main facades that overlook the streets.

villas. Residents seem to have started to give up the traditional housing model, which is viewed as a weak residential model and associated with poverty, compared with the modern one (independent villas) for a single-family (Giddings, B. Almhrej, M. & Crescian, M,2020)

At that time, the villa-style started to represent the Saudis' favorite residential type as a first step towards advancement. In such models, the percentage and presence of formations in terms of the many decorations, inscriptions, and the architectural shape of the openings; the formations of the surfaces; the architectural composition of the volumes used; and the finishing materials used for internal and external decoration vary according to the economic conditions of the building owner, some examples of these facades shown in fig. 17.

In modern residential buildings, the difference in economic capacity between groups of society requires providing dwellings of different types and levels to meet the diversified housing demand. The economic factor's influence has grown as it has become more crucial for the locals to identify the level of luxury that each homeowner owns. This has been reflected clearly in villa buildings, which have



Figure (17). External formation styles in villas. Source: Author

adopted a hybrid pattern in their exterior facades by increasing the proportion of formations, the size of windows, lighting elements, curved surfaces, gabled roofs, and the use of contemporary covering materials. The architectural formation elements used in multi-family housing apartments have a new language, but they are far from the simple ones used in traditional and transitional residential buildings, which included regular and simple formation elements.

5.3. The Effect of Western Culture Factor:

Each society has its own culture, which influences and reflects architectural products. The styles of the architectural formation the residential buildings' facades in Riyadh have changed throughout the successive time periods because of the designer's culture being affected by the emergence of modern architectural trends and keeping up with technical and technological development, in addition to the effect of the incoming cultures on a big city like Riyadh, which is considered as a big city for many diversified Arab and foreign cultures. Such cultures have affected the local community of Riyadh and contributed to the transfer of modern architectural ideas and patterns. However, Islam was often the most common culture among these incoming cultures, especially the Arab ones, so the architects, during many periods, took inspiration from the vocabulary of formation in Islamic architecture and added it to the facades of residential buildings. They used it to form openings and arches. The image below shows an example of the Islamic patterns in the residential buildings.

This is in addition to the impact of

Table (2). The impact of economic factor on residential buildings' facades

The impact of the economic factor on the residential building's facades		
The traditional residential buildings	The Transitional residential buildings	The modern residential buildings
<ul style="list-style-type: none"> ▪The facades of the traditional residential buildings were not influenced by the building's owner's economic capacity, because the focus was on the interior facades, which had many geometric and floral motifs, rather than the exterior ones. 	<ul style="list-style-type: none"> ▪ The facades of the residential buildings were influenced by the building's owner's economic capacity and living in a detached villa has become one of the forms of luxury. ▪ New architectural formations and s styles that relied on concrete tires appeared. ▪ Explicit attention has been paid to the entrances and fences. ▪The finishing and cladding materials adopted stone in the main facade. 	<ul style="list-style-type: none"> ▪The facades of the Modern residential buildings were Significantly influenced by the building's owner's economic capacity by using different configurations, shapes, and sizes of multiple openings, and curved surfaces. ▪New formation language appeared in high-income neighborhoods



Figure (18). Islamic style in the villa's facades Source: Author



Figure (19). Western patterns in multistory buildings. Source: Author

modern schools and architectural trends on the architectural character of many local architects and, subsequently, their architectural productions. Whether such impact was due to selective reasons (the academic formation of local architects has helped in such selectivity); experimental reasons (without a theoretical link or a professional practice of a clear, systemic nature); or even individual or semi-individual reasons, they are often confined to a single architectural work and did not develop to create a coherent theoretical current that can impact the architecture, thought, and culture. Such a thing resulted in many imported items in modern architecture that were extremely imitative of Western patterns (Jarbawi, A.B. 1981).

They are mostly not in line with the local identity of the traditional buildings in Riyadh, which are distinguished by their cultural and civilizational heritage. This was supposed to become an incentive for designers to create residential buildings that are compatible with the local ones, get, and use architectural items inspired by the traditional Najdi architecture.

5.4. The Effect of the Development of Building Materials and Technologies Factor:

The architectural formation and shaping elements represent an objective embodiment of the technology used.

They can express the method of construction. Since building technology is constantly evolving, it serves as the foundation for changes to the architectural form. The architectural form is always changing due to this ongoing advancement in technology and construction materials, which were local in traditional residences but new and imported in modern residences (Al-Naim, M. 2013). This is in addition to the effects of the construction system in place and the building technology, which was primitive in traditional residences and ultra-fast, advanced, multiple, and developed to save time and effort in modern residences. Following the oil boom in the middle of the 1970s, Saudi Arabia upgraded its building technology and construction techniques (Al-Hathloul, S. 1996). At that time, architecture shifted to new high-quality

Table (3). The impact of Western culture on residential building's facades

The impact of Western culture on the residential building's facades		
The traditional residential buildings	The Transitional residential buildings	The modern residential buildings
- There was no effect of the Western culture on the facades of the traditional residential buildings, which were influenced by the local culture, which was strongly considered in the facades, and expressed the identity of Najdi formation elements associated with the local community.	- The Transitional facades were not influenced by the local identity; they were influenced by Western culture and created new housing patterns and languages. The modern building materials supported this. Western culture.	- Western culture has a strong effect on the design of modern buildings; the identity of Najdi styles was ignored and never considered in modern residential buildings. A hybrid style appeared on the exterior facades, depending on many modern Architectural trends without cultural reference.

construction technologies, methods, and materials made by foreign architectural firms (Y. Mahgoub, 2007)

The construction boom by foreign architects peaked in Saudi Arabia in the 1980s, when residential buildings were constructed with a lack of identity (Eben-Saleh, M, 2001). This modern building technology helped create new and diverse styles and had an important role in liberating the architectural form of residential buildings from local characteristics and in dispersing their architectural character due to the absence of strict regulatory restrictions. fig. 20



Figure (20). New and diverse styles of villas. Source: Author

That, in addition to the reality of using light and modern materials, helped in modeling the residential buildings, both the villas and the multi-story buildings. Finishing materials also have a significant impact on the physical and visual aspects of facades through their formal properties and organizational relationships.

The development of building materials that are less expensive and lighter and competition in the use of modern construction technologies have led to a wide variety in the use of finishing materials and the use of huge amounts of glass, with many relationships and connections between the external finishing materials in transitional and modern residential building facades. This is in addition to the visual pollution caused by the wear of the finishing materials or the lack of organization and coordination of their use within the urban scene (Jawad, H. J. 2013) all of which had a bad impact on the building's value and identity.

5.5. The Effect of the Developments of Planning and Organizational Factors:

The planning factor has a great impact on the architectural product since it is the system directing the main structures of architecture in any city.

It also defines the divisions of the different architectural areas along with the building systems. Moreover, planning legislation and regulations are highly important for setting the architectural form of the buildings in each area; this form is related to the building heights, the number of floors, the minimum and maximum areas, the building percentage, setbacks, and many other determinants, which help the designer have more flexibility in studying and making the architectural form while realizing distinctive aesthetic percentages to enrich the shape of the building. Moreover, the planning regulations and building systems are very important on the architectural front: they affect the shape of the building in many aspects, like the decorative juts, fixed and movable sheds, balconies, and their protrusion from the walls, to guarantee harmony between the building's facade and the other facades of nearby buildings, as well as unity in architectural

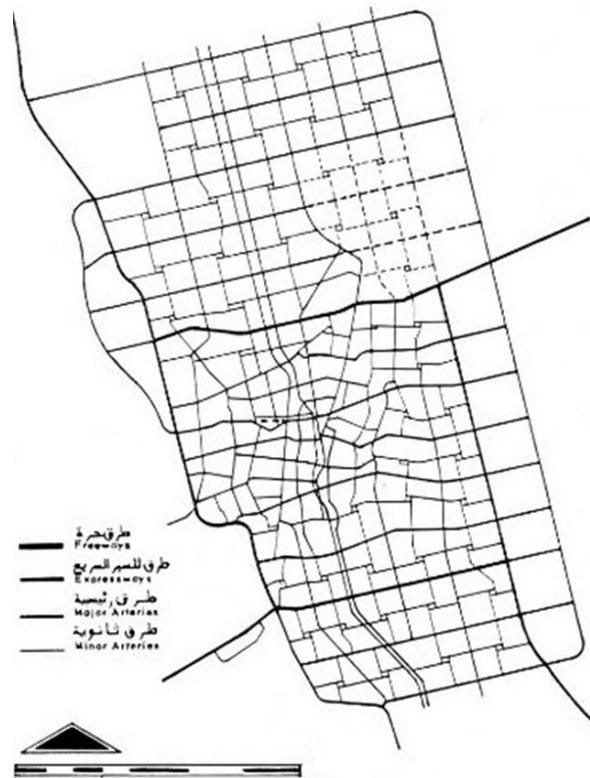


Figure (20). The 1972 master plan for Riyadh. (Al-Hathloul, S. (2002)

Table (4). The impact of the development of building materials and technologies factor on the residential building’s facades

The impact of the development of building materials and technologies factor on the residential building’s facades		
The traditional residential buildings	The Transitional residential buildings	The modern residential buildings
<p>□ The facades of the traditional residential buildings were not influenced by structural and technical factors because of Traditional local materials and primitive building technology have been used in these buildings, which were built with local identity and thoughtful formative relationships.</p>	<p>□ The facades of the transitional residential buildings were affected by structural and technical factors, using the modern and light building, and finishing materials, but that resulted in buildings with a weak local identity.</p>	<p>□ The facades of modern residential buildings were influenced strongly by structural and technical factors. Modern building techniques and materials created new and diverse formal styles, and the relationships and qualities of the architectural formation on facades have weakened.</p>

formation methods between the building as a part and the rest of the surrounding residential units as a whole. The oil industry expedited the move from the traditional residential environment to the modern residential one, where the oil industry institutions contributed to suggesting and introducing the villa types as modern residential buildings. They were called villas, which clearly prevailed over the urban residential scene in Riyadh from 1938-1944 (Elsheshtawy, Y. 2011 & Shiber, S.G. 1967) Since that time, building regulations have regulated the architectural development of Riyadh, and they have clearly affected residential buildings, which has led to accelerated modernization and increased the gap between traditional buildings

and modern residential buildings. Between 1940 and 1970, building systems were set and developed as a result of the many planning experiments that were conducted by Saudi planners who followed world practices and applied their ideas to Riyadh, figure.24 below shows the planning system in Riyadh, However, those practices turned out to be foreign ones that did not understand the local cultural context of Riyadh (Bagader, M. 2016, & Al-Hathloul.S.2017)

Whereas imported planning strategies boosted the idea of abandoning traditional styles in favor of modern ones and the pace of developing the population environment in Riyadh changed dramatically in the 1960s (Al-Hathloul, S. 1996), the

Table (5). The impact of the planning and organizational factors on the residential building’s facades

The impact of the planning and organizational factors on the residential building's facades		
The traditional residential buildings	The Transitional residential buildings	The modern residential buildings
<p>□ There was no effect of the planning methods on the traditional residential buildings which were planned in the cluster planning system, and the proportion of formations and openings in the external facades have been reduced. Because of the use of compact fabric buildings</p>	<p>□ The facades of the transitional residential buildings were inflected by the planning and organizational factors, which favored many types of the villa and multi-story Buildings, with windows opened to the setbacks and streets and increased in width.</p>	<p>□ The facades of modern residential buildings were heavily influenced by planning and organizational factors, which allowed the use of the ground floor for commercial use in multi-story buildings and overlap between commercial and residential functions, which led to a difference in the composition elements. a lot of disharmonies in the formation elements in addition to disharmony in cladding materials without legal controls, balconies, and wide openings.</p>

city became one with a diverse social composition. This rapid growth that accelerated greatly in the 1970s and 1980s led to inaccurate decisions being made concerning the growth of the city, resulting in the intersection of several traditional and modern practices (Al-Hathloul, S., 2017) and specific models of contemporary housing units were constructed from modern materials (Bahammam, A., 2011). Also, the same villa model was used in different positions and on different sites, which resulted in many problems in the spatial organization of villas. Furthermore, the Saudi villa started to witness changes in its architectural formation and spatial organization according to modern building criteria that did not take Saudi criteria, social behavior or traditions, or cultural values in Saudi society into consideration. The facades of modern residential buildings have started to develop at a faster pace, leading to the emergence of new shapes and styles and increasing the contradiction between the modern built environment and the traditional (Alabdullatif, Abdullah Ali, 2021).

6. Discussion

Various reasons and factors contributed to the transformations in the architectural formation of the facades of residential buildings. This study highlights the impact of these multiple factors, some of which have an immediate effect on the residential building facades and their forming components, such as technical factors, social factors, and cultural factors (S. Ettehad, A.R. Karimi Azeri, G. Kari, 2015). Some of them are objective and measurable factors, such as economic and legal ones. Some others are non-measurable factors and reasons, such as social and cultural factors that may differ from one society to another and from one time to another. It is evident from the study that the municipal building regulations did not clearly address the requirements of local traditions. Therefore, it widened the gap between modernity and tradition. In addition, it led to the deterioration of the formation items in the traditional built environment, whose value and importance have been proven by the study since it highly values the manners of Saudi society. While modern residential buildings take forms that are not related mostly to the culture of Riyadh, their designs lack symbolic value in line with the history and importance of Riyadh.

7. Results

In general, the research reaches a set of results related to the factors that led to the main transformations of the architectural formation on the facades of residential buildings as follows:

7.1 Results Regarding the social openness factors:

- Saudi society's values should be reflected in the form of Saudi architecture. Therefore, we must first comprehend ourselves, the social demands that alter with time, and the connection between a physical change and social dynamism. It is important to note that each component of a building form changes over time depending on how people use it. This modification may have shown how societies evolve and adjust to changing conditions. Therefore, we must respect the values of society and its relations to the formation elements rather than impose ready-made forms. It is important to mention here that our traditional styles and formation elements should, in this sense, be a source of inspiration.

- Because of the adoption of Western models that are far removed from the local environment, modern residential facade models are unable to meet privacy as a social need in Saudi Arabian society. Therefore, the residents made some modifications, such as closing some external openings, building external walls that increased social isolation, and adding fabricated iron to provide a sense of security, to realize that end.

However, this led to the distortion of many exterior facades and negatively affected their architectural formation as well as the overall appearance of the residential areas and the city in general.

7.2 Results Regarding the Economic Capacity:

This study highlights the impact of the economic capacity of each family on the development of the methods of housing in Riyadh. It shows how the pace of developing residential buildings in Riyadh has changed significantly, with villas becoming the preferred type of residence for Saudi families instead of traditional houses. As much as the economic capacity of the homeowner increased, they used more contemporary formations, but in multi-story buildings, which became associated with low-income young people,

as the number of apartments per floor increased, the percentage of formations used in them decreased. The square or rectangular openings are distributed in varying proportions, regardless of the interior spaces behind them.

7.3 Results Regarding the Western Culture Factors:

- One of the primary causes that were discovered was the conflation of the term's "modernization" and "Westernization" in Saudi society. Because of the imported formation elements, which have been given specific meanings to be consistent with values or have been altered to meet the local functions in new forms, some of the architectural products are designed with no identity. The architect or designer cannot create the building form without considering the needs, customs, and culture of the users.

- Within any civilization, the elements of architectural formation cannot be restricted; they can vary from historic elements to modern ones, and we are unable to define their exact borders. They occasionally undergo transformations. Those elements are the architectural language, and they have been developed over a significant amount of time. A culture's success and long-term viability are guaranteed by the presence of a reliable formal language for forming and shaping. The residential building shape represents the cultural ideas of that community (Summan, M.M. 2016) especially the residences that contribute to the city's distinctive and traditional character and have architectural details that reflect the city's culture and the era in which they were constructed. These are crucial for maintaining the city's cultural continuity and passing on many of the meanings and functions of the city to future generations.

7.4 Results Regarding the Development of Building Materials and Technologies Factors:

Modern construction systems have been adapted to serve the external volume formation so that it is compatible with the interior functions. These modern systems have contributed to elevating the structural forms in residential buildings. Moreover, the development of building technology and the emergence of modern sciences and techniques in it have greatly affected the architectural mindset and the way it deals with residential buildings and their architectural formations. Because of

the development of finishing materials and their installation techniques, many Western architectural formation elements have been used in residential buildings.

7.5 Results Regarding the Planning and Organizational Factors:

- Many difficulties and limitations were posed by the determinants of urban planning for residential areas through the laws of dividing and organizing lands, which constrained the design process of the residential buildings and limited the capabilities of the designer to respond to them. Thus, the facades were similar in terms of openings, dimensions, and proportions without taking their location and direction into account.

- Most of the facade designs of modern residential buildings do not consider the relationship between mass and space. Moreover, the combination of commercial activities with residential ones in modern residence patterns and the transformation of the ground floors into commercial and service facilities have created new architectural functions without any responsibilities towards the original residential building. That affected the formation style of these facades. Thus, the concept of unity in the building was lost, and the building lost its character and ability to express itself in terms of formation and design materials.

7.6 Results Regarding the facades Transformations and their Effects on the Building's Environmental Adaptation:

There is a direct and reciprocal relationship between the environmental factor and the building, and both are integrated units.

Therefore, the environmental factor can be considered as one of the major factors affecting the formation and processing of the elements of the architectural form, which are affected by local climate conditions. Therefore, any transformation in the facades will have a direct impact on their ability to adapt environmentally with the climatic conditions prevailing in Riyadh. This section will compare this ability within the three periods mentioned previously.

In Traditional residential buildings: which represent the clearest example of such environmentally compatible processes and a very well in line with the prevailing climate conditions in Riyadh. There, the residences were shut in towards

the interior courtyard that played a vital role in the house, with all the windows opening onto it (Bahammam, A. 1998) The semi-solid exterior facades reduced the heat exchange with the outside and reduced the impact of dust storms and the sun's heat (Talib, K. 1984).

In transitional and modern residential buildings: These processes were frequently overlooked, where environmental conditions considerations in the design of the exterior facades were low on the priority lists of the designers. This, in turn, has led to the deterioration of modern residence models that often did not meet the environmental challenges in Riyadh. Because these modern buildings have walls that are thin and exposed to direct sunlight, which causes a quick transmission of heat through them, there is no shading analysis included in their exterior facades because of the use of straight and flat openings that reduce shadows, particularly self-shadow. Also, eliminating the inner courtyards led to dark spaces, which forced the designer to enlarge the window areas to have natural lighting. The finishing material also was not mostly isolated, and it was with dark colors, which increase their absorption and reflection of the light, in addition to the impact of using new building materials such as cement and reinforced concrete and external cladding or finish materials that were too far removed from the environmental construction used earlier in traditional buildings, such as mud and stones.

The grid planning systems also had many affected the building environmental adaptation, which exposed housing units to winds, dust, sand, and other external environmental influences such as direct sunlight and heat transmitted by radiation.

All these factors made the exterior facades of the transitional and contemporary residential buildings incapable of withstanding the environmental conditions in Riyadh.

8. Recommendations

As a conclusion: The study of the transformations in the exterior formation elements of residential buildings does not depend on monitoring and documenting them during certain periods only, but rather it must go beyond that to include the possibility of measuring and evaluating these transformations, which contributes to directing them and their effects on residential buildings.

Many design guidelines can be recommended for designing the residential building façades in Riyadh to create residential buildings that convey the city's identity and local character.

The paper reaches the following recommendations:

1. Solve the social, cultural, and privacy challenges that the modern Saudi built environment has been unable to handle according to current municipal regulations.
2. Governmental organizations need to start acting seriously to address the issue of architectural identity in Saudi Arabia as a whole and in Riyadh by creating a set of guidelines that regulate the architectural design of residential building facades and working to encourage a contemporary design approach while respecting traditional elements and offering contemporary resources and housing possibilities, merging the physical and cultural settings in the Saudi urban scene, and incorporating the cultural context into the legislation. One of the most recent initiatives is launching the King Salman Charter for Architecture and Urbanism for the first time on December 1, 2021. This charter aimed to create a unique urban environment with an appreciation of the local identity of each region in Saudi Arabia. It seeks to create urban planning that serves the originality and authenticity of the country.
3. Consider the laws and regulations of modern facades in terms of opening dimensions (length*width*height) so that they are convenient to the spaces they look out on and provide adequate lighting and ventilation while respecting residents' privacy and paying attention to the set regulations to define the building's finishing materials.
4. Support the use of Najdi architectural elements which represent the identity of Riyadh and incorporate them with more comprehensive tools that characterize the contemporary built environment.
5. Do not use simple imitation of patterns in the traditional architectural elements and try to embody contemporary ideas inspired by them through the application of new and improved materials, structural designs, and modern techniques to express the traditional

meanings of the composition (Szalabaj. P, 2014)

6. Understand the significance and concepts of the traditional formation elements to incorporate them into the modern designs of the residential building facades in a way that can bridge the gap between modern formation and traditional formation (Szalabaj. P, 2014)
7. Encourage the research community in universities and governmental organizations to conduct more research about the development of architectural formation elements in Riyadh and other Saudi cities so we can save our own identities. There are only a few studies that address the evolution of Saudi dwellings and their forms and architectural styles.

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نظرة عامة على العوامل المؤثرة في تحولات تشكيل واجهات المباني السكنية في الرياض

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ملخص البحث. يتأثر تصميم واجهات المباني السكنية بمجموعة متنوعة من العوامل العمرانية والثقافية والاجتماعية والاقتصادية والجغرافية والقانونية، حيث تخلق واجهات المباني انطباعاتاً أولياً عن البيئة المعمارية والحضرية والثقافية للمجتمع المحلي. وضمن إطار نظري يركز البحث على العوامل المؤثرة في تحول واجهات المباني السكنية في الرياض، حيث سيحلل البحث هذه التحولات ضمن مقطع زمني ممتد على مدى القرن العشرين في الرياض، فيتناول الفصل الأول المباني السكنية التقليدية، ويحلل الثاني واجهات المباني السكنية الانتقالية، وأخيراً سيصل البحث إلى تحليل واجهات المباني السكنية الحديثة. وخلاصة القول: يسعى البحث إلى وضع معايير وإرشادات تساعد على تطوير التشكيل المعماري لواجهات المباني السكنية، كما يوفر منصة لإنتاج واجهات مباني سكنية جميلة ومتميزة بالعناصر المعبرة عن الهوية في الرياض.

الكلمات المفتاحية: واجهات المباني السكنية، التشكيل، التحولات، العوامل.