



The effects of material, structural characteristics, and construction technology on the identity of contemporary mosques in Erbil city

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Article history

Received 05.03.2025

Accepted 17.07.2025

Available online 12.12.2025

Keywords

Erbil (Kurdistan Region of Iraq),
Mosque Architecture,
Architectural identity,
Material characteristics,
Structural systems,
Durability and maintenance

Abstract

Mosques serve as a symbolic architectural feature in Islamic cities, representing their spiritual and cultural identity. Modern mosques incorporate new technologies in their structural systems and use innovative materials, addressing social and cultural needs while adapting to local economic conditions. Architectural identity refers to a unique style in building design and its social environment. Erbil, the capital of the Kurdistan Region in Iraq, has experienced significant developments in various areas since 1991. This study aims to identify the architectural identity of contemporary mosques that were influenced by new technology and materials. The study compares traditional (≤ 2002) and contemporary (2003–2023) mosques in Erbil in terms of materials, structural systems, and implications for construction technology, durability, and maintenance. This is achieved via a qualitative analysis of traditional mosques' spatial and mass composition throughout the ages, creating a basic framework for studying contemporary mosque architecture in Erbil (sample of 32 mosques classified into 4 groups). The results demonstrate that traditional buildings were based on brickwork, load-bearing walls, vaults, and domes that require mortar deterioration. Contemporary mosques use reinforced concrete frames (2–4 core columns) with brick, stone, marble, GRC panels, and synthetic claddings. Industrializing the building process changes implementation requirements and deterioration profiles (e.g., cladding separation, reinforcement corrosion, exterior ageing). In addition, the symbolic identity of Erbil's traditional mosque was shaped by the influence of the traditional Erbil architecture, which remains deeply rooted in people's memories. Hybrid Islamic, a typical rationalist, and new modern architecture mosque styles characterize contemporary mosques. The research concludes that traditional and modern mosques in Erbil feature distinct design elements, but some new contemporary mosques still retain a traditional identity. The conclusion highlights the need for two separate sets of operational and conservation guidelines tailored to the material-structural characteristics and projected life cycles.

DOI: 10.30657/pea.2025.31.40

1. Introduction

Identity is a lifestyle or life values that connect the past with the present, distinguishing individuals and groups in interactions (Jenkins, 2003; Ozaki, 2005). It is a complex framework encompassing social and political hierarchy factors, and an organized collection of meanings and images derived from mental perception (Popescu, 2006; Eram & Gur, 2007; Nooraddin, 2012).

Identity in Architecture is a collection of unique characteristics essential to defining a building. Architecture expresses and shapes, projecting a specific image of identity (Salama, 2002).

Contemporary architecture refers to current design movements and prevailing fashionable trends in architecture. It is changeable, always creating and reflecting society's continuous requirements, principles, and aesthetic expectations (Venturi, 1977).



A mosque is a place of worship for communal gatherings, religious activities, and prayer (Okuyucu, 2016). Through centuries of evolution, mosque architecture embodies cultural, architectural, and religious influences (Al-Bukhari et al., 2020). Contemporary mosque architecture refers to a diverse range of architectural styles and methods that are prevalent in the current age (Venturi, 1977). It is distinguished by its receptiveness to novel concepts, materials, technologies, and design principles. Mosque architecture is constantly evolving to reflect current cultural, social, and technical realities (Kahera, 2007).

The city of Erbil, the Capital of the Kurdistan Region in Iraq, is one of the oldest inhabited cities in the world. Its long history, particularly during the Islamic Era, has seen significant architectural development (Mumford, 2016).

Mosques in Erbil have a history dating back to the 7th century, which was unfortunately lost due to various historical circumstances. In addition, the construction of mosques has evolved progressively due to technological innovations and social and cultural transformations. This has created visually impressive structures that stand out in urban contexts (Abdullahi, 2010).

Many studies have examined mosque design, analyzed its architectural configurations, and assessed diverse architectural characteristics for different purposes. Studies are scarce on Erbil's mosques, with some conducted by non-architectural researchers who studied historical mosques. This research aims to identify, evaluate, and explore the architectural identity of contemporary mosques in Erbil based on a comprehensive theoretical framework through a qualitative-descriptive approach. The study addresses the chronological development of mosques to extract architectural features as a basis for the identity of Erbil mosques. Consequently, a comprehensive theoretical framework will be analyzed regarding mosques from previous periods and contemporary mosques to determine their architectural identity. In order to achieve these objectives, several questions were posed:

1. Are contemporary Erbil mosques built with the same "style"? Can they be classified as "approaches"?
2. Do traditional mosque architectural styles have a role in shaping contemporary mosques in Erbil?
3. What are the identities of contemporary mosques and their architectural elements in Erbil?
4. Are there differences in architectural characteristics between traditional and contemporary mosque designs in Erbil?

Based on the above, the current study seeks to substantiate the following hypothesis:

A general analysis of the chronological development of architectural characteristics of the traditional mosques built before 2003 in Erbil may lead to identifying the architectural identity of its contemporary mosques and discovering design characteristics that may differ from their predecessors.

2. Literature review

The current study will discuss and review previous literature in two basic groups: first, providing the most recent and

relevant information about contemporary mosque identity; second, analysing the previous studies on mosque architecture in Erbil.

2.1. Previous literature on traditional mosque architecture

Prior studies have extensively discussed contemporary mosques differently to understand their various architectural styles and aspects. The study by Mahmood (2011) highlighted the influence of Ottoman architecture on the fundamental designs of Mosul's mosques, providing an analytical comparison of styles, features, and symbolic forms to evaluate the identity of cultural and architectural continuity. In addition, Qualitative analysis of traditional and contemporary Mosque design characteristics by Okuyucu (2016) aims to identify variations and similarities in physical compliance, architectural principles, spatial fiction, aesthetics, and their respective effects on psychological perception. Moreover, the study by Nejad et al. (2019) examines the identification, analysis, and adaptation of architectural sacred values in traditional mosques to enhance the spiritual design quality of their building. It seeks to connect the gap between traditional spiritual significance and contemporary architectural emotional and spiritual relevance for users. Similarly, Nadyrova and Nadyrova (2020) examined the architectural characteristics of mosques in Tatarstan built from the late 1980s to the present. Several factors were determined, including compositional structure, space-planning solution, and ornamental and artistic design. Al-Tamimi and Pankina (2023) examined the architectural features of historical and contemporary mosques in Jordan. They compared plans, construction techniques, materials, and facade structures. The purpose of their analysis was to identify traditional elements that have remained unchanged, determine the building's function and appearance, and analyse new architectural trends influenced by globalization and international collaboration among architects.

2.2. Previous literature on contemporary mosque architecture

Previous studies have explored contemporary mosques' architectural styles and aspects, focusing on the connection between Islamic identity and modern architecture. Mahdavinejad and Saadatjoo (2014) examined the relationship between Islamic identity and contemporary architecture in Saudi Arabia, while El Khateeb et al. (2018) categorized contemporary prayer halls based on their spatial architectural characteristics. Abbaszadeh and Zamani (2020) studied physical design criteria and their relationship with the perception of sacred space in contemporary Iranian mosques. Al-Bukhari et al. (2020) analyzed the framework used in contemporary mosque architecture, incorporating physical design values and highlighting significant cultural aspects. Khamis and Tantawi (2021) investigated the effectiveness of representing hidden values and ideas in design and elements influencing modern mosque design, based on design data and spiritual values associated with religious beliefs. Ibrahim (2021) explored the loss of heritage identity and uniqueness in contemporary mosque architecture in Saudi Arabia, arguing that new designs

do not adequately satisfy functional, security, safety, environmental, and aesthetic requirements while balancing 'originality' and 'creativity'. Jahic (2022) examined the architectural language of modern mosques, aiming to convey their contemporary context while respecting fundamental Islamic precepts. Lopes and Hasnan (2022) studied mosque designs in Brunei, arguing that political, social, cultural, and economic variables shape religious architecture, creating unique national forms. Sekhri et al. (2023) examined the contemporary character of the Great Mosque of Algeria to determine whether it reflects the historical significance of ancient mosques. Table 1 summarizes the main points.

2.3. Previous literature on mosque architecture in Erbil

Previous studies have examined mosques in Erbil city using various research methods. A study conducted by Ali and Qadir (2015) focused on the symbolism associated with mosques as a cultural aspect that addresses the need to establish and define society's identity through the physical appearance of mosques in Erbil, Iraq. The research explores the architectural aspects of mosques, which embody two significant symbolic values: one that is spiritual and sacred, and another that derives from their fundamental design elements. Similarly, Abdulhamid et al. (2016) discovered, through a graphical study of Erbil mosques, how the essential architectural principles of mosque buildings were lost by examining the proportional relationship of the site's boundaries and the prayer hall with other mosque elements.

Accordingly, a summary of the literature is shown in Table 1

Table 1. Summary of literature review

Field context study	Previous studies domain	Previous studies
previous literature on the Traditional Mosque	The spiritual meaning of the connection between traditional and modern sacred space The link between Traditional and Contemporary Mosque architecture Design characteristics.	(Mahmood, 2011; Nejad et al., 2019; Nadyrova and Nadyrova (2020) (Okuyucu, 2016; Al-Tamimi and Pankina, 2023)
previous literature on the Contemporary Mosque	The Identity's relations to Mosque design Contemporary Mosque architecture	(Mahdavinejad and Saadatjoo, 2014; Elkhateeb et al., 2018; Ibrahim, 2021; Sekhri et al., 2023) (Al-Bukhari et al., 2020; Mahdavinejad and Saadatjoo, 2014; Elkhateeb et al., 2018; Abbaszadeh and Zamani, 2020)
Previous literature on Mosques in Erbil	Chronological evolution of mosque design The Social Identity's relation to mosque design Mosque Design Characteristics	Nadyrova and Nadyrova (2020) Ali and Qadir (2015) Abdulhamid et al. (2016)

Therefore, it is concluded that previous literature focuses on contemporary mosque architecture, examining its layouts and addressing the most variables for varied objectives in different countries. Studies of contemporary mosque architecture and its relationship with identity in Erbil are minimal. Hence, the current study will identify the architectural characteristics of contemporary mosques, particularly the primary architectural attributes that shape the architectural identity of contemporary mosques in Erbil.

3. Architectural identity

The idea of identity has a variety of meanings and definitions across a wide range of fields. Identity linguistically refers to the meaning of the same thing, its reality, and its essence. Identity in architecture is the concept that architectural elements, shapes, and vocabulary reflect the lifestyle of society that creates them, covering culture, religious beliefs, and social values (Alkouatli, 2018). Identity refers to distinguishing natural or cultural characteristics that separate individuals, groups, communities, or civilizations. The notion of architectural identity refers to a specific architectural trend developed in creating buildings, structures, and associated social life (Salman, 2009; Torabi & Brahman, 2013). Similarly, architectural identity is a characteristic that reflects the true nature of architectural constructions (Al-Assadi & Al-Dewachi, 2020). Additionally, identity is defined by its distinctive characteristics that differentiate it from other countries and reflect its civilized nature (Salman, 2019; Nikezic et al, 2021). Rappaport defines identity as the capacity to differentiate and recognize one element from another. This aspect can refer to physical characteristics like nature, manifestation, and physicalism related to shape, size, decoration, construction, etc. It may additionally apply to specific activities within the environment or its functions (Moore, 2019). Gabr describes identity as a product of tradition and a foundation of authenticity in contemporary society (Gabr, 2007).

3.1. Effective variables in shaping architectural Identity

Torabi and Brahman (2013) showed that seven factors could shape the identity of contemporary architecture. These factors are the shape and form of the building envelope, space dimension, design principles, materials, relationship with context, temporal organization, semantic organization, and spatial organization. (Kousid, 2025). Worldwide, there is a minor modification to the physical attributes of the environment, including its form, size, shape, decoration, building system, activities or methods, and purpose. Visual attributes are the components of architectural identity that convey unique characteristics to a building. These aspects may be analysed and examined using several methods, such as studying "Mosques" functional parts.

The focus of the mosque's functional parts in the current research is on the prayer hall, the courtyard space, and other service components. The prayer hall is the primary area of mosques where worship and prostration occur. As to the research conducted by (Omer, 2008; Budi & Wibowo, 2018; Budi, 2006), there exists a spacious and unenclosed location

where Muslims may congregate for prayers. Mihrab and minbar will be in the qibla wall, and it should be emphasized that the longest side will be directed to Mecca (Kahera et al., 2009). The courtyard served as a fundamental component in the earliest design of the Prophet's Mosque. It serves as a connecting zone between public and sacred spaces. It is an additional Friday location for users (Abdulhameed et al., 2016; Budi, 2006; Kahera et al., 2009). Besides, Mosques consist of several functional components, including service rooms such as ablution areas, a library, a lecture hall, an imam's room, an imam's house, a treasury, kitchens, and storage spaces, which might vary from one mosque to another (Abdulhameed et al., 2016; Macaulay, 2008).

3.2. Mosque architecture feature

Minarets and domes are symbolic representative elements. The dome has always symbolized mosques, regardless of its origins. Dome design is essential to traditional Islamic Mosque design. Domes might have spherical, elliptical, pointed, or onion shapes. (Asfour, 2016; Ashkan et al., 2012; Ghannam & Awwad, 2019). The minaret is the primary vertical element in mosque buildings. The tall structure previously used for making the prayer call five times a day has since been replaced with sound speakers (Zaki et al., 2008). Figure 3 provides clarification on the mosque's basic components.

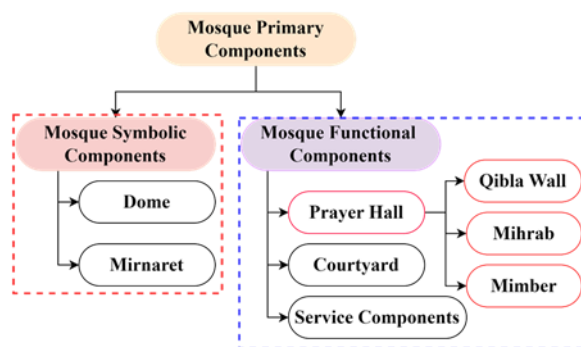


Fig. 3. Mosque functional and symbolic components

3.3. How can “contemporary” be linked to mosque architecture?

What is the exact meaning of the term "contemporary"? According to Merriam-Webster, contemporaneous refers to anything that occurs, exists, is alive, or originates within the same period. The language of mosque architecture might be characterized as "contemporary" due to its dedication to universal Islamic principles that shape the design of the built environment (Ardalan, 1993). Moreover, the mosque is free to express itself architecturally and materialize in many forms since neither the Quran nor the Sunna provides specific directions on its design, and community prayer does not need certain space conditions; the only requirement is an orientation towards the Kaaba and a clean area (Serageldin, 1989). What is referred to as "Islamic" art, design, or architecture is, in the sense of "culture", a human products. Accordingly, contemporary architecture refers to the wide variety of architectural

styles, methods, and approaches that are currently prominent. Therefore, contemporary mosque architecture combines several "Islamic" design principles and traditional "Islamic" aesthetics. Architects and designers aim to build spaces for mosques that not only meet their functional requirements but also integrate innovative and contemporary elements (Hoteit, 2015; Wirakusumah et al., 2021).

In addition, Mosque design must show awareness of the existing characteristics that establish a sacred location's symbolic significance and unique identity. This may be achieved by including minaret, mihrab, or dome components. It is important to aim for innovation while maintaining the mosque's spiritual essence (Kahera, 2009; Fethi, 1985). Accordingly, to define the characteristics of the Contemporary Mosque, it is necessary to establish various categories, including Architectural significance within the built environment, Activities and objectives, Architectural elements, Architectural style, and Sustainability concerning design and material choices (Sari et al., 2024; Alotaibi et al., 2024; Azmi & Kandar, 2019).

On the other hand, some standard features of contemporary mosque design have been mentioned by (Al-Tamimi & Pankina, 2023; Ali & Qadir, 2015; Abbaszadeh & Zamani, 2020; Khamis & Tantawi, 2021) as (a) Innovative architectural forms give rise to unique shapes, elements, and materials that result in visually engaging buildings that prominently stand out in the urban environment (Azmi & Kandar, 2019); (b) Technology integration: This includes the incorporation of advanced lighting systems, audio-visual systems, and climate control systems; (c) Sustainable Design: This entails using eco-friendly materials, energy-efficient technologies, the use of natural light, and green construction methods to reduce the environmental impact of the mosque (Alotaibi et al., 2024; Azmi & Kandar, 2019; Ali & Mustafa, 2024); (d) Urban adaptation involves using contextual design aspects to ensure that the mosque fits well with its urban surroundings while maintaining its distinctive characteristics; (e) Enhanced flexibility in functionality (Al-Buhkari, 2020). In length, technical elements reflect the materials or technology used to produce forms, depending on the characteristics of the selected system. The development of the form serves as an objective representation of the methods used, and technology articulates the construction process. The outcome depends on the technological capabilities that attempt to convert concepts into physical entities and communicate significance to others (Rahmat et al., 2019).

Conversely, Contemporary Mosque architecture, as viewed from a design school perspective, has been categorized into various styles: hybrid styles or Westernization (1800-1900), revivalism (1900-2000), traditional or vernacular, conservative or conventional, adaptive, modern, postmodern - high-tech, eco-green, eco-tec or high technology types. These classifications have been discussed by (Hattstein & Delius, 2007; Rasdi & Tajuddin, 2007; Verkaaik, 2012; Wirakusumah et al., 2021; Abdel-Hady, 2010). Moreover, the emergence of modernism in mosque architecture was facilitated by traditional limitations. This was achieved by incorporating symbolic imagery, technical knowledge, historical context (Verkaaik, 2012; Ministry of Municipalities, General

Directorate of Planning and Engineering, Baghdad), and socio-cultural effects on the needs of Islamic ritual activities (Wira-kusumah et al., 2021).

To summarize, Contemporary Mosque design displays significant variety, frequently incorporating elements from traditional Islamic architecture, cultural identity, and international design trends.

3.4. Effective variables in contemporary mosque identity

The current study summarizes the most important variables in shaping contemporary mosque identity as follows:

1. Contemporary mosques' analysis regarding changes and innovations in architectural design composition. This evolution in design will incorporate the following variables:
 - a. Mosque functional components include the most important parts of the mosque, such as the prayer hall, courtyard, Ri-waq, minaret, dome, and service components.

- b. Mosque architectural design characteristics include the most important design principles for both spatial and mass design characteristics as follows:
 - Spatial configuration includes spatial layout organization, prayer hall shape, and axial direction.
 - Mass Configurations include prayer hall mass composition and materials, dome form, size, materials, minaret shape, form, and material.

2. Contemporary mosque analysis regarding the school of design. This analysis will be evaluated from the point of view of design approaches.

This research investigates contemporary architectural aspects that shape mosque design, particularly regarding the evolution and innovations made to their architectural elements and design features. Figure 4 offers additional details.

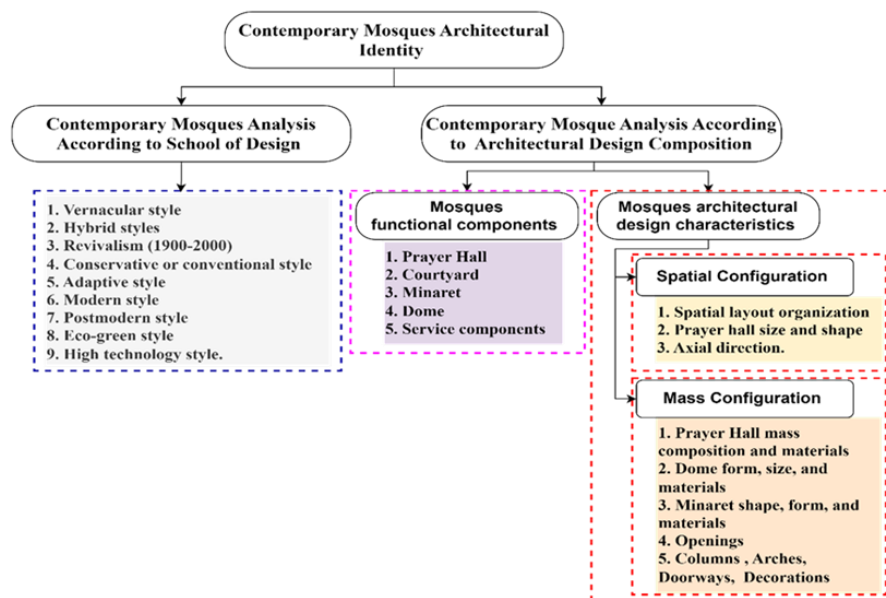


Fig.4. Architectural design characteristics in shaping contemporary mosque identity

4. Materials and methods

4.1. Historical background of the urban morphological development of Erbil

Erbil city has unique architectural and cultural characteristics, a strong sense of social integration, and remarkable prospects for economic growth (Mumford, 2016). The Citadel of Erbil has always embodied the characteristics of an urban lifestyle and distinct cultural-social aspects while also serving as a functional location for economic, historical, and military activities and interactions. The Citadel has had an important effect on the formation, structure, and future growth of Erbil.

In addition, the citadel's location and prominence have influenced the layout of surrounding areas, resulting in concentric circles and a radial axis. The Citadel has consistently served as the central hub of Erbil's urban growth throughout its history (Figure 5, a, b).

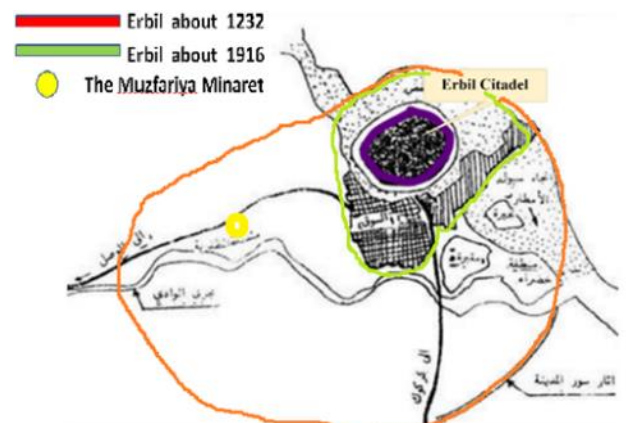


Fig. 5a. Old Erbil, Adapted by authors from (KRG. Ministry of Planning

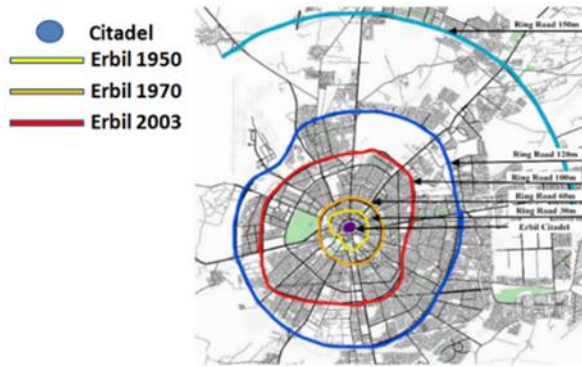


Fig. 5 b. Erbil Today, Adapted by authors from (KRG, Ministry of Planning; Pimenov, 2024)

4.2. Historical background of mosque evolution in Erbil

The development of Erbil's mosque architecture, which is an essential component of its identity, may be understood through three main periods:

4.2.1. Traditional period

That uses local traditional building construction, materials, and crafts, and it has two eras:

- **Abbasid Era:** (7th to 13th centuries) Medieval Era, before Mongol Invasion. During this time, Sultan Muzaffar's period was considered a golden era. Historians highlight mosques and madrasas that existed. Unfortunately, all these buildings were lost following the Mongol Invasion, except Muzfariya Minaret (Choli), which remains a remarkable masterpiece (Nováček, 2013; Wafaei, 2023). The remains of minarets provide valuable insights into the construction techniques, architectural materials, and decorative styles used (Hayef, 2022).
- **Ottoman Era:** (16th to 19th centuries) all Iraqi regions and cities were under Ottoman rule, leading to a form of stability. The significance of this era lies in the fact that all old architectural remains belong to this period. The first mosque built in the Citadel, the Grand Mosque, is in the centre of the Citadel. The traveler Yaqout Hamawi mentioned it in 1220 A.D. Historian Ibn Mustawfi referred to it as the Fortress Mosque around the same time. The Citadel Mosque has undergone several renovations, with the Mihrab bearing an inscription indicating renovation in 1720 A.D. (Abbas, 2017; Stansfield, 2021). Numerous mosques from that period surround the Citadel.

4.2.2. Modern period

- **The Era of the New Iraqi State 1921-1990...** Erbil's architecture in this era was significantly influenced by the introduction of modern town planning, featuring grid streets and cars. Technically, architecture witnessed many developments using new building materials and techniques (namely, cement and concrete), along with new water supply and electricity infrastructure. Amazing new architecture to deal with architectural heritage was developed

to produce new designs to combine Modernity and Heritage, and there are some notable mosques of this era.

- During the Transitional Era, 1991- 2003, the Kurdistan Region had autonomy. This period was marked by economic challenges and the establishment of a new government, which required governmental advancements and cultural changes. Many mosques were constructed during this period, and they were very simple and only functional to provide prayer spaces (Guranowska-Gruszecka & Gady, 2018).

4.2.3. Contemporary period

From 2003 to the present, following the implementation of the New Iraqi and Kurdistan constitutions, this era has seen numerous global architectural experiments and trends influenced by various cultures. These influences have also impacted mosque architecture. Several factors have significantly shaped the design of mosques in Erbil, including (a) an expanding economy, (b) the rapid growth of urban areas, (c) an increase in investments in real estate and architectural projects, (d) the emergence of new construction companies utilizing innovative techniques and materials, (e) the involvement of architects and craftsmen from different Iraqi governorates and foreign countries, and (f) a broad openness to global culture, with new inhabitants (workers and employees) arriving from outside Erbil, alongside the renewal of various aspects (legislations, economy, technology, socio-culture) (Al-Jaff et al., 2017; Holton, 2008; Çaksın & Eryıldız, 2024), despite the significant socio-cultural conservativeness of Kurdish and local traditions.

So, Contemporary Identity in the City of Erbil combines High local conservativeness and openness to international global Culture.

4.3. Research Methodology

The current research is based on the Grounded Theory qualitative approach for analysing mosques using a three-step method (as shown in Figure 6)

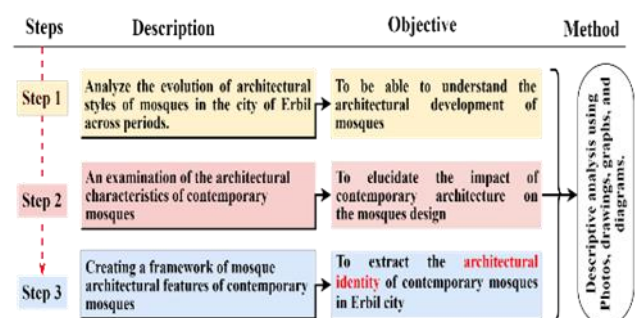


Fig. 6. Research methodology process

It focuses on mosque architectural characteristics from early periods to the present day. Eventually, the first approach starts with a comprehensive outline to demonstrate the stylistic evolution of mosques in Erbil throughout four periods. This is to create a grounded framework for mosque identity in Erbil.

Later, an in-depth examination of contemporary mosque architecture constructed between 2003 and 2023 was conducted to emphasize its key architectural features. Finally, an investigation was conducted to extract the architectural Identity of contemporary mosques.

A Grounded Theory qualitative approach was used to achieve the research goal. The primary objective of the Grounded Theory approach is to develop a substantive theory. Moreover, creating a meaningful outcome requires a deep understanding of the concept and the ability to transform research data into a well-integrated conceptual framework (Charmaz, K., 2014). Grounded Theory involves formulating concepts, hypotheses, and theories based on empirical evidence, which allows for the transformation of phenomena to a conceptual-theoretical level. Accordingly, traditional mosques were evaluated to generate a significant concept organized into a well-structured layout to achieve the ideal circumstances for the most effective architectural variables in shaping mosque identity in Erbil. In sequence, architectural characteristics of contemporary mosques were evaluated based on the conceptual framework of architectural identity in Erbil. Figure 7 illustrates a specific operational step suggested.

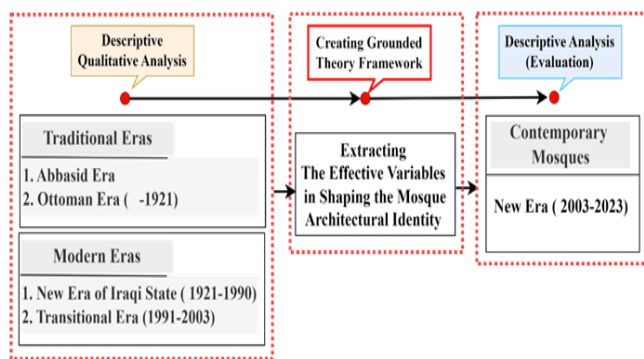


Fig.7. The concept of Grounded Theory for current Research methodology

4.4. Research factor

The current study addresses the architectural design characteristics of mosques, which include most of the design principles for spatial and mass design characteristics as follows:

1. Spatial configuration includes spatial layout organization, prayer hall size, and shape.
2. The mass configuration includes prayer hall mass composition, dome form, its size and material, minaret, its shape, form, & material, façade design and material, and architectural details involving openings, arches, columns, etc. More are provided in Table 2.

It is worth fixing and confirming these notes:

- The current study is focusing on the external architectural form and characteristics.
- The current study did not deal with interior architectural characteristics, which require further research, also because the interiors of mosques are always witnessing renewals and modifications.

Table 2. Mosque architectural design characteristics

Main Architectural Design Characteristics	Specific Architectural Design Characteristics
Spatial Configuration	a. Mosque layout design
Mass Configuration	b. Prayer hall size and shape
	c. Prayer hall mass composition
	d. Riwaq (colonnades)
	e. Dome form, size, materials
	f. Minaret form, number, materials
	g. Façade design, finishing materials
	h. Architectural elements
	i. IDecoration Elements
Structure & Technology	j. Structural system
	k. Modern Technology

The current study did not deal with designers' and architects' concepts or intentions for those mosques; the paper deals with the outcome of building, many times the original design suffers from many Interventions of donors, contractors, or craftsmen (personal notes and interviews of authors)

4.5. Sample selection strategy

The sample selection approach has been implemented in two levels: First, eight random samples of Traditional and Modern mosques built before 2003 throughout four distinct eras were selected as a case study. In length, each of the case studies represents its most popular design in the chosen era. Figure 8 and Table 3 (7 samples) detail eight samples in the first level of work. The ground theory-based analysis framework was extracted, as shown in Figure 9. In sequence, at the second level, 32 samples were randomly chosen from those built two decades ago to understand the architectural design aspects of contemporary mosques.

Table 3. First step samples

Period	Construction period	Case study	Name of mosque	Construction date
Historical Period	Abbasid Era	#C1	Choli Minaret	Abbasid period
		#C2	Citadel Grand Mosque	1720
	Ottoman Era	#C3	Haji Dawood Mosque	1785
		#C4	Khanaqa Mosque	1805
Modern Period	New Iraqi State 1921-1990	#C5	Rashad Mufti Abubaker Al-Siddeeq Mosque	1973
		#C6	Said Aziz Naqshbandi	1986
	Transitional Era 1991-2003	#C7	Al-Sawwaf Mosque	1991
		#C8		1999

5. Results and discussion

5.1 The first step

This study uses a qualitative methodology to examine the architecture of all selected samples of mosques, investigating the historical background of mosque evolution in Erbil through two periods with 4 eras. Respectively, Fig. 8 (Appendix A-Table 4, Table 5, and Table 6) explains data about them. A detailed comparative analysis was conducted through (Appendix B, Table 7)

Figures 6 and 7 provide important information on the methods of construction, architectural materials, and ornamental designs used in mosque architecture. Other characteristics of mosque architecture can be assumed to be similar to those in other Mesopotamian cities.



Fig. 8. Abbasid Era: Muzfariya Minaret (Choli)

Historic - Traditional Period: Both eras, the "Abbasid and Ottoman," can be considered to have unified characteristics. Although there are few remains from the Abbasid era, historical references mention the glory of Erbil and its architecture. The remains of Manara Muzfariya reflect this, allowing for comparisons between this era and other Mesopotamian cities. A notable number of mosques remain from the Ottoman era, concluding that the architecture of the second era naturally continued from that of the first era, albeit on a simpler scale. Architectural characteristics are as follows:

- Mosque mass composition was within the organic urban fabric
- The mosque layout design comprised an enclosed courtyard with all components around it.
- Mosque component: prayer hall almost rectangular shape; riwaqs were round courtyards, with one central dome or many small domes; one minaret resembled Muzfariya, that of an octagon or cube base; then a calendric shaft with decoration of patterns of brick and glazed brick; Communal services as rooms round court such as religious school, Takye, kitchen for poor, dormitory rooms.
- Structural system: bearing brick walls with brick or stone columns, ceilings of brick vaults or brick domes, and wood ceilings for small spaces
- Elements and materials: Finishing materials included bricks, stucco, and colorful ceramic tiles; these were the same materials used for architectural elements (openings and colonnades with round or pointed arches) and architectural decorations (calligraphy, geometric patterns).

All the above characteristics are considered to correspond to traditional Islamic Mosque architecture in general and exactly to Mesopotamian architecture, depending on local materials (namely bricks) and local craftsmanship.

Modern Period. Both eras of the Iraqi state and transition reflect modern aspects of the 20th century, namely modern legislation, city planning, and technology.

Modern planning: Grid streets affected the mosque's mass composition, leading to isolated masses. The mosque layout did not rely on arranging all components around the courtyard, and the riwaq was positioned in front of the prayer hall. Other components were excluded from mosques, except for water closets.

Modern technology: The concrete skeleton is introduced as the main structural system. The use of electricity for lighting and sound speakers, as well as modern sanitary facilities for water supply and drainage

While traditional aspects of mosque architecture continued with the building of domes and minarets as original components, the hemispherical central domes or pointed shapes resemble Manara Muzfariya as closely as possible. Most finishing materials, architectural elements, and decorations are traditional and modest in scale. However, due to economic difficulties during the transitional era, mosques had to be simple and as purely functional as possible, sometimes lacking decorations or domes and featuring symbolic minarets made of concrete columns.

Hence, the present study identifies the most important variables in the identity of mosques, which are obtained from the architectural characteristics of traditional mosques over two periods with four eras. Thus, this will serve as a strong conceptual basis and a grounded theory that can be used in subsequent research on mosques that belong to the contemporary period. Figure 9 provides an in-depth representation of the traditional mosque identity summary.

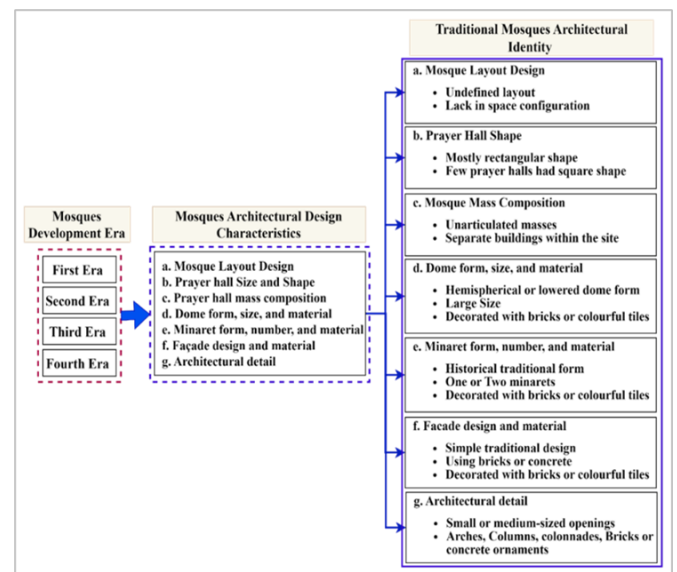


Fig. 9. Extracting the traditional mosque's architectural identity in Erbil

5.2. The second step

In this step, the study focuses on contemporary mosque architecture (Contemporary Period). From 2003 to the present day, the field of architecture has seen significant changes and innovations. These are due to increased economic activity, urban growth, and increased collaboration between corporations for project investments. Mosques and other building types have been influenced by many international factors in this new development period. (Appendix C, Table 8) provides architectural details of 32 mosques built during this period. (All information and data gathering, photo shoots, and drawings had been excluded by site visits of the authors with interviews with officials of those mosques.) The samples are displayed chronologically.

Contemporary Period: Over the last twenty years, new concepts for mosque architecture have been developed that reflect the current era and contemporary designs. After providing an in-depth look at the architectural characteristics of mosques, it can be concluded:

The basic configuration of most mosques typically does not include a specific courtyard. Prayer halls are often square or rectangular in shape, supported by two or four concrete core columns, and feature an entrance colonnade (riwaq). These prayer halls are distinct from the other spaces within the complex, with domes primarily taking the form of a hemisphere, although some may exhibit pointed or lowered dome designs. Minarets come in various forms and are constructed from different materials, including metal. Additionally, some conventional shapes are frequently observed. Other components are widely incorporated, such as Quran schools, funeral services, event halls, charity services, and more.

The primary structural system is a concrete skeleton. Meanwhile, the finishing materials for the exterior are various traditional and newly manufactured options: cement finishing, ceramic tiles with various patterns and colours, stone, marble, gypsum, and even plastic panels or GRC panels. In many cases, bricks remain primary finishing materials. However, various decorations and ornaments, including multiple styles, shapes, patterns, and materials, were available; still, many mosques reflected a simple, functional architectural style. The conclusion is that diverse characteristics must be classified more profoundly.

5.3. The third step

This study has developed a framework for comparing traditional and contemporary mosques' characteristics to illustrate the modifications or continual existence of architectural characteristics. The 32 mosque samples presented in (Appendix D, Table 9,10,11,12,13)

6. Findings

The findings indicate that the most significant architectural characteristics of contemporary mosques, as mentioned in Section 5.4 with Fig.4, were organized into several groups based on how their attributes align with the Ground Characteristics

of Traditional Mosques of Erbil (Section 7.1 with Table and Fig. 8).

Accordingly, the current study classified the characteristics of contemporary mosque architecture into four different design approaches, which will answer the first question: (*Are contemporary Erbil mosques built with the same "style"? Can they be classified as "approaches"?*). The approaches are categorized as follows:

1. **New Erbil Traditional mosques** reflect the city's rich history and cultural heritage. They incorporate traditional architectural forms and feature local materials, such as patterned bricks and glazed tiles, as outlined in (Table 9). Moreover, this perspective appears to stem from the elements of traditional mosques. Consequently, this addresses the second question of the current study: *Do traditional mosque architectural styles influence the design of contemporary mosques in Erbil?*
2. **Hybrid Islamic mosques** incorporate architectural elements and details from different Islamic styles, such as Turkish, Egyptian, and Parisian etc. Multiple building materials are used. As shown in Table 10
3. **Typical Rationalist mosques** are characterized by pure design, such as Aldo Rossi's concept in building type, including a minimalist plan, a simple dome, and a simple metal minaret. The finishing materials are straightforward and lack ornamentation, featuring standard openings as provided by Table 11.
4. **New Modernist Mosques:** Spatial and mass composition seeks innovations, free conceptual ideas, and regional designs. This approach was influenced by technological innovation, newly developed materials, ecological issues, artistic influences, and personal cultural backgrounds. As provided in Table 12.

In addition, Table 13 clarified most architectural characteristics for the four approaches of contemporary mosque architectural identity that could be the response to the study's third question, involving (*What are the identities of contemporary mosques and their architectural elements in Erbil?*).

Ultimately, the architectural characteristics of traditional mosques reflected the high cultural and social conservatism of Erbil city, along with the use of local materials. Meanwhile, the contemporary architectural identity of the mosques in the City of Erbil lies between high local conservatism and international culture, incorporating innovative materials and new trends. *Therefore, this will respond to the last study inquiry (Are there differences in architectural characteristics between traditional and contemporary mosque designs in Erbil?).*

7. Conclusion

Architecture serves to communicate and shape identity, effectively transmitting its distinctive characteristics and describing an individual's sense of identity. Contemporary architecture includes the latest.

A mosque is a sacred space where people gather for social events and worship. Mosque architecture has evolved over centuries, reflecting various cultural, architectural, and religious influences. This study aims to analyze and investigate

the architectural characteristics of contemporary mosques in Erbil. This was achieved using a qualitative grounded theory approach based on descriptive analysis and investigations. The research met its objectives through a three-step process. It began with a historical review of the evolution of mosques, divided into two periods and four distinct eras, to extract the most notable architectural features of traditional mosques. The second step involved examining contemporary mosques constructed between 2003 and the present to identify their architectural differences. The final step of the study compared the architectural characteristics of traditional and contemporary mosques. The goal is to identify and classify the most impactful architectural approaches that define the identity of mosque architecture in Erbil. The results indicate that the most distinguishing architectural features of Erbil's traditional mosques serve as a symbol of the city's mosque identity and can be assessed based on various elements, such as: a) a characteristic dome and uniquely designed minaret sections; b) brick as the primary finishing material; c) facade patterns created from brick, glazed tiles, and calligraphic motifs as ornamentation; d) openings shaped as semicircles or pointed arches; e) non-uniform sizes and scales. Additionally, the recent developments refer to: 1- new legislation for building and city organization by the Kurdistan Ministry of Awqaf; 2- a new international investment economy; 3- new imported technologies; 4- a broad openness to global culture and an influx of new inhabitants (workers and employees) from other Iraqi governorates and countries (in terms of legislation, economy, technology, and socio- culture), alongside the high cultural and social conservativeness of Kurdish and local traditions.

Thus, the contemporary identity in Erbil is influenced by both strong local conservatism and international global culture. Consequently, following the classification and analysis of case study samples, we observe that the New-Erbil approach exemplifies high cultural conservativeness, the Hybrid Islamic approach reflects interaction with the Islamic cultures of other countries, and the Typical Rationalist approach showcases realistic pragmatic attitudes. The research revealed that the architectural character of contemporary mosques in Erbil varies significantly regarding spatial layout and mass composition, particularly in the detailed architectural elements found in traditional mosque designs and the modern technology that is integral to the comprehensive change of the international style of buildings that affects the identity of mosque designs in Erbil.

Acknowledgements

This publication is produced with the assistance of co-authors. We express our gratitude to those who helped with this research. It has no external funding.

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Appendix A. Traditional mosques in erbil

Table 4. The most prominent mosques of the Ottoman era

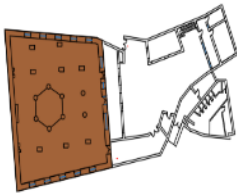
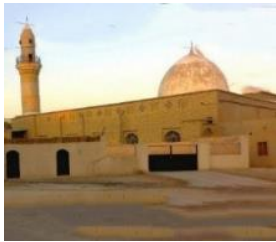
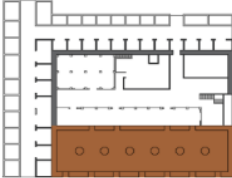
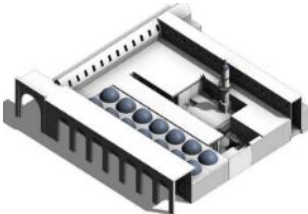
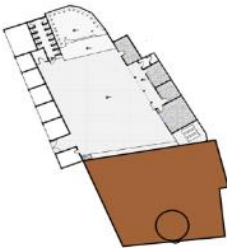
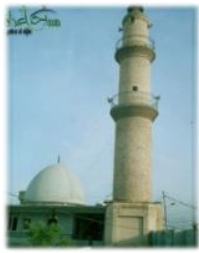
Case study information	Plan layout	Exterior shots
# C2: Erbil Citadel Grand Mosque, 1719 - 1720 A.D It was reconstructed in 1950s to resemble its original form, including a central dome. Original Minaret		 
#C3: Haji Mawlood Mosque, 1785 A.D multi domes prayer hall in original construction	 	
#C4: Khanaqa Mosque, 1805 A.D was reconstructed in the 1950s to resemble its original form, including a single central dome.		 

Table 5. The most prominent mosques of Iraqi State era 1921-1990

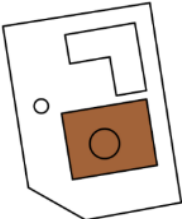
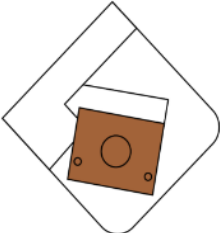
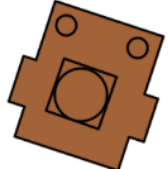
Case study information	Plan layout	Exterior shots
#C5: Rashad Mufti Mosque, 1965		 
#C6: Abubaker Al-Siddeeq Mosque, 1986		 

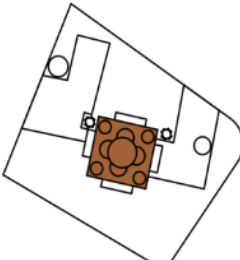
Table 6. The most prominent mosques of the Transitional era 1991 -2003

Case study information		Plan layout	Exterior shots	
#C7:	SaidAziz			
Naqshbandi	Mosque,			
#C8:	Al-Sawwaf			
Mosque,	1999 A.D			

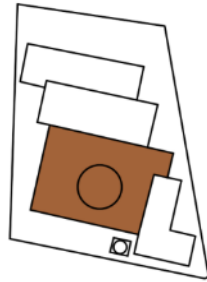
Appendix B. Comparative analysis**Table 7.** Comparative Analysis of Mosques - Traditional and Modern Periods

	Traditional		Modern		
Characteristic	"Abbasi" Era	"Ottoman" Era	Modern Iraq Era	Transitional era	
Mosque Mass Composition	Mass within Organic Urban Fabric		Separate Mass within Modern Planning		
Mosque Layout Design	Enclosed_Courtyard		No enclosed courtyard		
Prayer Hall	Rectangular		Rectangular		
Riwaq	<u>Round the Courtyard</u>	Round the Courtyard	Close to Prayer Hall		
Dome		- one Central Dome - Multiple equal Domes	- One Central Dome	- One Central Dome - No Dome	
Components	Minaret	Octagon Base	Octagon or Square Base	Octagon or Square Base	- No real Minarets
		Round Shaft	Round Shaft	Round Shaft	-Two concrete columns
		Built and decorated by Bricks	Built and decorated by Bricks	Built and decorated by Bricks	as symbol of minarets
	Other	Communal services as small rooms round court		No Communal services Only water closets	
Structural system	Traditional brick bearing walls with brick vaults & Domes and wood		Concrete Skeleton		
Finishing Materials	Bricks, Stucco, Ceramic tiles		Bricks, Stucco, Ceramic tiles, cement	Only cement Finishing	
Architectural elements	Doors & Windows with Arches		Doors & Windows with Arches	No amazing Elements	
Decoration Elements	Brick patterns, ceramic tiles Calligraphy bands		Brick patterns, ceramic tiles Calligraphy bands	No Decorations	
Modern Technology	No modern Technology		Electricity, Sanitary, Sound speakers		
* Statements (of Abbasi Era) with underline are concluded from comparison with other mosques architecture of other Mesopotamian Cities					

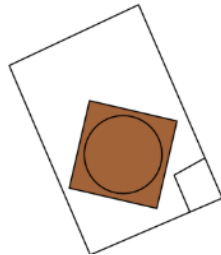
Appendix C. Contemporary mosques in Erbil**Table 8.** The most prominent mosques of the Contemporary Period in Erbil

Case study information	Plan layout	Exterior shots	
#C9: Jalil Khayyat Mosque, 2007			

#C10: Sami Gardi Mosque, 2007



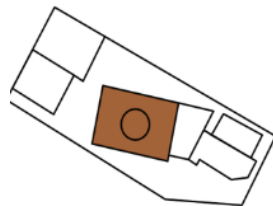
#C11: Abdulkareem Al-Mudarris Mosque, 2008



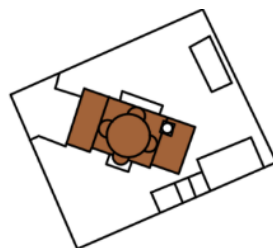
#C12: Salih Dabbagh Mosque, 2009
was established in 1938 and reconstructed in 2009; the minaret was added three years later, in 2012.



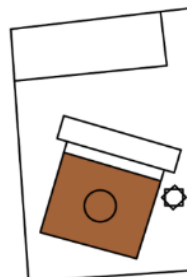
#C13: Saeed AlNawrasi Mosque, 2009



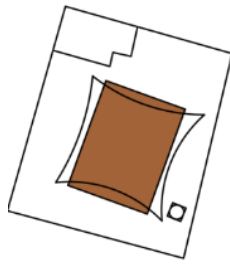
#C14: Ezzaddin Al-Saffar Mosque, 2009



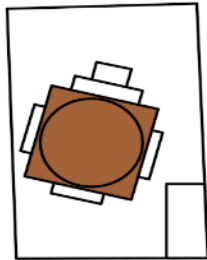
#C15: Jawdat Asaadi Mosque, 2010



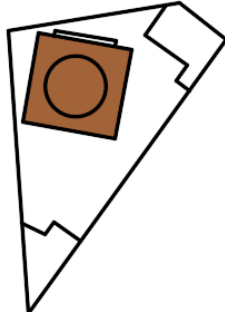
#C16: Bahasht Mosque,
2010



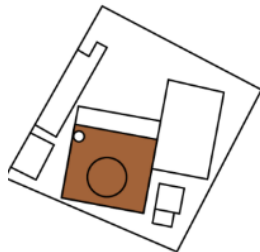
#C17: Berawa Mosque,
2011



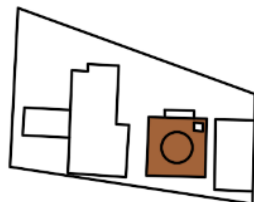
#C18: Sherwan Birezhi
Mosque, 2011



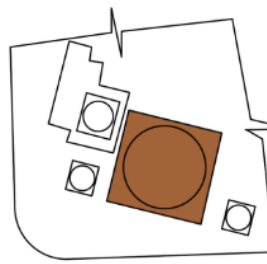
#C19: Shahid Jamal
mosque, 2011



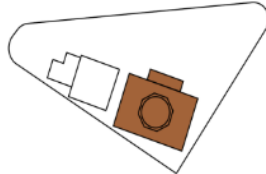
#C20: AbdulHamid Bzini
Mosque, 2011



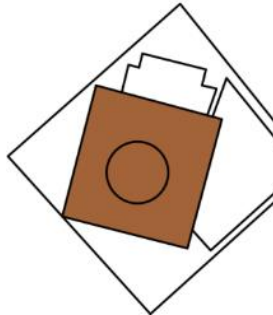
#C21: Nanakaly Mosque,
2013



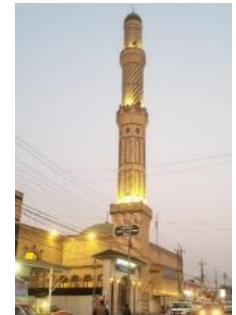
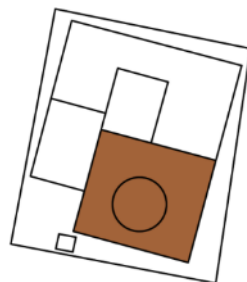
#C22: Isra & Meraj
Mosque, 2013



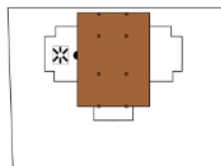
#C23: Ga'etel Mosque ,
2013



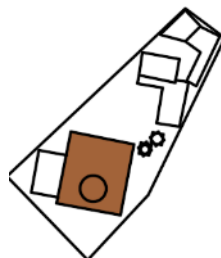
#C24: SaidTayeb Al-
Baqal Mosque, 2014



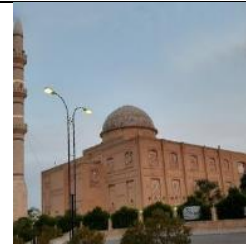
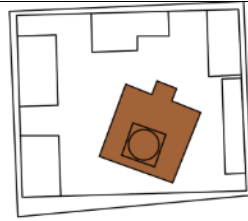
#C25: Abdulla Jawan
Mosque, 2014



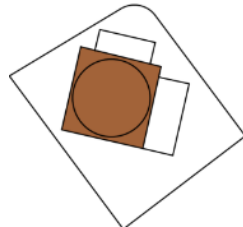
#C26: Rahmah Mosque,
2015



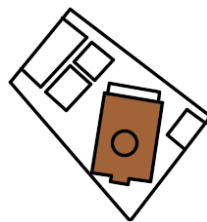
#C27: Khalifah Mosque ,
2015



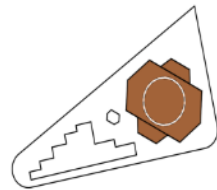
#C28: Mulla Dawud
Mosque , 2016



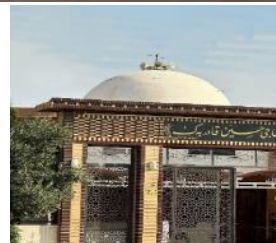
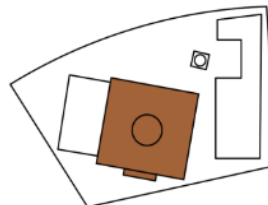
#C29: Shahidain Mosque,
2016



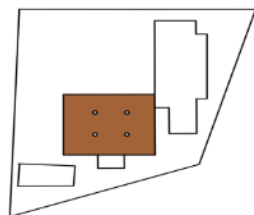
#C30: Sarmamy Mosque,
2017



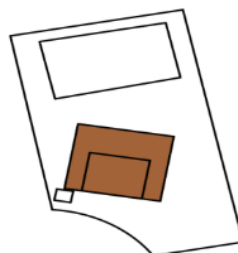
#C31: Husein QaderBag
mosque, 2017



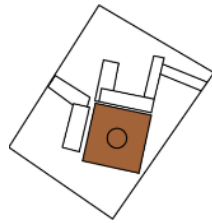
#C32: Dayk Mosque,
2018



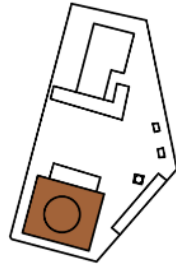
#C33: Hewa City
Mosque, 2019



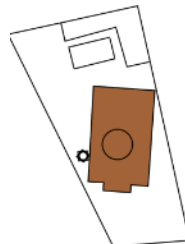
#C34: Ahmad Gardi Mosque, 2019



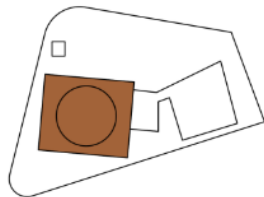
#C35: Lana City Mosque, 2020



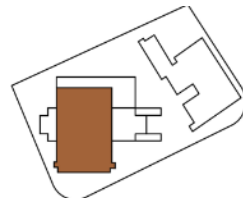
#C36: AbdulWahed Qasab Mosque, 2022



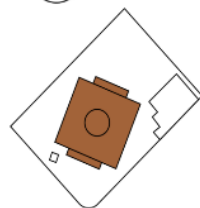
#C37: Altun Mosque, 2022



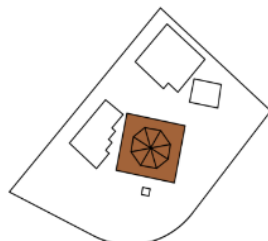
#C38: Daiku Bawk Mosque, 2022



#C39: Al-Refaei Mosque, 2023



#C40: Mass Mosque, 2023



Appendix D. Character of Mosques

Table. 9. Characteristics of contemporary mosques of New-Erbil tradition approach

Characteristic	Design characteristics detail	Salih dabbagh mosque re-build 2009	Sami gardi mosque 2007	Ga'etel mosque 2013	Said tayeb al-baqal 2014	Mulla dawud mosque 2016	Abdulwahed qasab mosque 2022	Shahidain mosque 2022	Al-refaei mosque 2023
1. Mosque mass composition	Separate mass within modern planning	•	•	•	•	•	•	•	•
2. Mosque layout design	Without courtyard Semi-courtyard	•	•	•	•	•	•	•	•
3. Mosque main composition									
a) Prayer hall	Square Rectangular	•	•	•	•	•	•	•	•
b) Riwaq	2 Riwaq closed to prayer hall Riwaq closed to prayer hall	•	•	•	•	•	•	•	•
c) Dome	Hemisphere central dome ceramic tiles Hemisphere central dome cement finishing	•	•	•	•	•	•	•	•
d) Minaret	Octagon base, round shaft, bricks decoration Square base, octagon & round shaft, bricks decoration No minaret Bricks	•	•	•	•	•	•	•	•
4. Finishing materials	Bricks & glazed bricks Bricks, stucco, glazed bricks Bricks, glazed bricks, ceramics tiles, marble Circular arche	•	•	•	•	•	•	•	•
5. Architectural elements	Pointed arches Segmental arches Multi-type of arches Brick patterns	•	•	•	•	•	•	•	•
6. Decoration elements	Brick & color brick patterns Color brick patterns Brick patterns, ceramic calligraphy bands	•	•	•	•	•	•	•	•

Table. 10. Characteristics of contemporary mosques of Hybrid Islamic approach

Characteristic	Design characteristics detail	Jalil Khayat mosque 2007	Saeed Nawrasi mosque 2009	Ezzaddin saffar mosque 2009	Jawdat asaadi mosque 2010	Isra & meraj mosque 2013	Nanakaly mosque 2013	Rahmah mosque 2015	Khalifah mosque 2015
1. Mosque mass composition	Separate huge mass within modern planning	•	•	•	•	•	•	•	•
2. Mosque layout design	Without courtyard Semi-courtyard	•	•	•	•	•	•	•	•
3. Mosque main composition									
a) Prayer hall	Square Rectangular	•	•	•	•	•	•	•	•
b) Riwaq	1 Riwaq closed to prayer hall 2 Riwaq closed to prayer hall 3 Riwaq closed to prayer hall	•	•	•	•	•	•	•	•

c) Dome	Central hemisphere dome		•			•		
	Central hemisphere dome with half domes + multi-smaller domes			•			•	
	Central hemisphere dome with half domes + multi-smaller onion domes	•						
	Central onion shaped dome				•		•	
	Central pointed dome							•
	Square base, octagon & round shaft, bricks decoration			•			•	
	Square base, octagon & round shaft, stone cladding						•	
	Octagon base, Egyptian style, stone & marble decoration				•			
	Ottoman style minaret with stone cladding							•
	2 Egyptian style shape decorated by bricks & colored tiles	•						
d) Minaret	No minaret		•			•		
	Bricks, glazed bricks, ceramics tiles	•						
	Bricks, stone, Marbel, color ceramics tiles			•		•		•
	Bricks, Marbel, color ceramics tiles						•	
	Stone, Marbel, color ceramics tiles, and stucco				•		•	
	Cement, Marbel, color ceramics tiles, and glazed bricks		•					
	Circular arche			•				
	Segmental arches					•	•	•
	Multi-type of arches	•	•		•		•	•
	Brick patterns, colorful ceramic decorations, and calligraphy	•		•		•	•	•
4. Finishing materials	Stone patterns & colorful ceramic decorations & calligraphy				•		•	
	Multi textures and engravings of stone cladding		•					
5. Architectural elements								
6. Decoration elements								

Table. 11. Characteristics of contemporary mosques of Typical Rationalist approach

Characteristic	Design characteristics detail	Berawa Mosque 2011	Sherwan Birezhi Mosque 2011	Shahid Jamal Mosque 2011	AbdulHamid Bzini Mosque 2011.	Ahmad Gardi Mosque 2019	Husein QaderBag Mosque 2017	Dayk Mosque 2018	Lana City Mosque 2020
1. Mosque mass composition	Separate huge mass within modern planning	•	•	•	•	•	•	•	•
2. Mosque layout design	Without courtyard Semi-courtyard	•	•	•	•	•	•	•	•
3. Mosque main composition									
a) Prayer hall	Square Rectangular	•	•	•	•	•	•	•	•
b) Riwaq	No Riwaq 1 Riwaq closed to prayer hall	•	•	•	•	•	•	•	•
c) Dome	Central hemisphere dome No minaret	•	•	•	•	•	•	•	•
d) Minaret	Metal minaret Cylinder concrete minaret Square base, octagonal round shafts, brick minaret	•	•	•	•	•	•	•	•
4. Finishing materials	Pre-cast concrete, ottoman style Bricks, concrete, stucco Concrete	•	•	•	•	•	•	•	•

5. Architectural elements	Stone, Concrete								
	Polystyrene boards								
	Openings only without arches	•				•	•	•	•
	Circular arches		•						
6. Decoration elements	Segmental arches			•	•				
	Horizontal course, Limited geometrical decoration							•	
	No decoration	•	•	•	•	•	•		•

Table. 12. Characteristics of contemporary mosques of New Modernist approach

Characteristic	Design characteristics detail	Abdulkareem Al-Mudarris Mosque 2000	Bahasht Mosque 2010	Altun Mosque 2012	Abdulla Jawan Mosque 2014	Sarmany Mosque 2017	Hewa City Mosque 2019	Daiku Bawk Mosque 2022	Mass City Mosque 2023
1. Mosque mass composition	Separate huge mass within modern planning	•	•	•	•	•	•	•	•
2. Mosque layout design	Without courtyard	•	•	•	•	•	•	•	•
3. Mosque main composition									
a) Prayer hall	Square	•	•	•			•		
	Rectangular					•		•	•
	Hexagonal				•				
	No Riwaq		•		•				•
b) Riwaq	1 Riwaq closed to prayer hall			•		•	•		
	2 Riwaq closed to prayer hall							•	
	3 Riwaq closed to prayer hall	•							
	Central hemisphere dome	•		•			•	•	
c) Dome	Segmental dome		•		•				
	Central octagonal pyramid dome								•
	Gabled concrete mass without dome					•			
	Innovated modern conical shape	•	•						
	Innovated modern square shape			•	•		•		•
d) Minaret	Innovated modern segmented concrete skeleton					•			
	Simple square shape with concrete finishing							•	
	Concrete, Stone			•					
4. Finishing materials	Concrete, Glass surface				•			•	
	Concrete, Stone, Marbel						•		
	Concrete, Stone, Marbel, Aluminum, stucco		•			•			
	Stone, Ceramic tiles	•							•
	Openings only without arches						•		
	Innovated elements of Geometric Decorations, Pointed Arches					•			
5. Architectural elements	Big surface windows, large cornices				•				•
	Orgee arches		•						
	Innovated elements & segmental arches	•		•					
	Innovated freestanding arches							•	
	Minimal simple decoration		•	•	•		•	•	•
6. Decoration elements	Islamic geometric pattern					•			
	multi textures and engravings of stone cladding, colorful ceramic decorations	•							

Table 13. Conclusion of Architectural Characteristics of mosques of the four Design Approaches

Characteristic	New-Erbil Tradition Approach	Hybrid Islamic Approach	Typical Rationalist Approach	New Modernist Approach
1. Mosque mass composition	Separate mass within modern planning			
2. Mosque layout design	Mostly Without courtyard	Mostly Without courtyard	Without courtyard	Without courtyard
3. Mosque main composition				
a. Prayer hall	%75 Square	%75 Rectangular	%70 Square	%50 Square
b. Riwaq	%75 One Riwaq	%50 One Riwaq & %50 Two Riwaq	%90 One Riwaq	%50 One Riwaq & %50 No Riwaq
c. Dome	All Central hemisphere dome Almost have one minaret, shapes are square base, octagon & round shaft decorated with brick & glazed bricks patterns	Various types of Domes % 50 had one minaret, minarets shapes are of Various Styles	%90 Central hemisphere dome %70 one minaret, the shape of them is simple, and mostly constructed with concrete	Various types of structures All had one minaret, their shapes are Innovative, forms of various shapes with different materials and decorations
d. Minaret				
4. Finishing materials	Dominated by local traditional materials (Bricks)	Dominated by local traditional & imported materials, such as colorful ceramic tiles, marble cladding, and stone cladding	Dominated by simple economic materials like concrete finishing	Dominated by imported new technology materials (concrete, stone, marble cladding, ceramic tiles, glass surfaces, aluminum sheets)
5. Architectural elements	Pointed arches, round arches, segmental arches, and rectangular openings	Pointed, round, and segmental arches, ogee arches, and stone columns Ceramic tiles decorations & calligraphy, brick patterns, multi textures, stone cladding, glazed (color) brick patterns	All had ordinary, rectangular openings, segmental & round arches No Decorations, limited geometrical decorations.	Innovative elements, rectangle openings, and big surface windows Minimal simple decorations, and limited Islamic geometric pattern
6. Decoration elements	Brick pattern, glazed (color) brick patterns, and calligraphy Bands			