

Changing Urban Typo-morphology of the Middle East Region Under Globalized Development: Amman and Irbid Cities in Jordan as Cases

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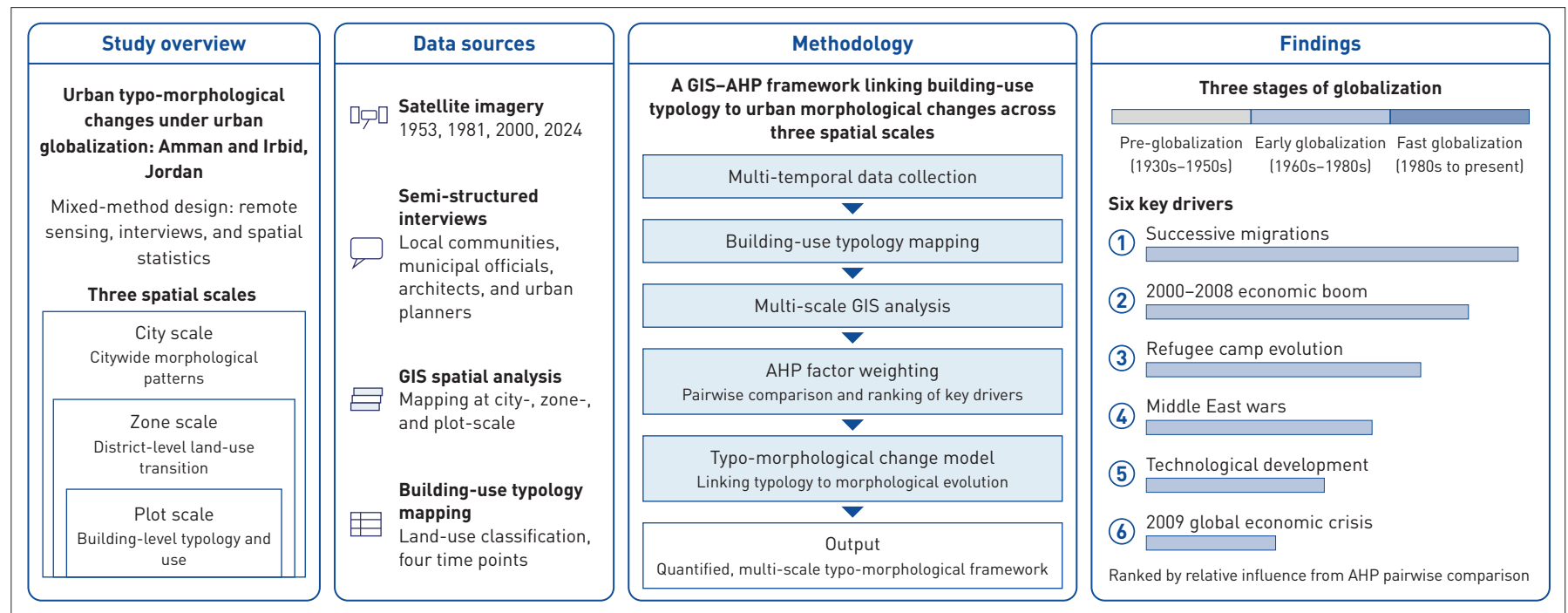
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GRAPHICAL ABSTRACT



ABSTRACT

Globalization connects cultures and economies, influencing urban structures, land use, and building functions. It has influenced the Arab world's transformation under globalized development, but the state of the art on urban typo-morphology in the Middle East remains inadequate. This paper explores changing typo-morphological characteristics under globalization through the cases of Amman and Irbid. It analyzes building use typologies for 1953, 1981, 2000, and 2024 using satellite images, interviews, and GIS-

based spatial analysis across three spatial scales—city, zone, and plot. To enhance our results, the Analytic Hierarchy Process (AHP) was applied to quantify and rank factors influencing typo-morphology changes. The results show that Jordan experienced three stages of globalization: pre-globalization (1930s–1950s), early globalization (1960s–1980s), and fast globalization (1980s–present). Six key factors have driven typo-morphology changes under globalization: successive migrations; the 2000–2008 economic

boom; refugee camp evolution; Middle East wars; technological development; and the 2009 global economic crisis. The first three are the key drivers for Amman and Irbid’s morphological evolution. These findings demonstrate how economic and social forces shape urban form over seven decades. Typo-morphology serves as an effective analytical approach for understanding globalization’s impact on city evolution. This approach, integrating the GIS–AHP framework, introduces a quantifiable dimension to urban typomorphological analysis, providing a novel framework for examining globalization’s spatial impacts in Middle Eastern cities.

KEYWORDS

Globalization; Middle East; Jordan; Urban Transformation; Typomorphology; Building Use

HIGHLIGHTS

- Integrating a GIS–AHP framework quantifies urban typomorphological change in the Middle East
- Exploring globalization context with urban typomorphology theory
- Tracing the three globalization evolution stages of Jordanian cities from traditional to modern
- Identifying conflict-driven migration as the most significant driver of urban typomorphological changes
- Adaptively reusing heritage reconciles global trends with local identity

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1 Introduction

Globalization has changed the relationships between producers and consumers, altered the connections between work and daily life, and influenced people’s lives, priorities, and authorities worldwide^[1]. In the urban context, globalization refers to the

growing integration of cities into worldwide economic, cultural, and political networks, driven by cross-border flows of capital, goods, services, ideas, and people^[2]. This process reshapes local urban structures by concentrating investment in key nodes and transport corridors, promoting high-rise developments and mixed-use districts to meet global market demands. As a result of globalization, cities undergo spatial restructuring that often prioritizes commercial and financial typologies over traditional residential patterns, leading to new hierarchies of land value and morphology^[3].

The influence of globalization on Middle Eastern cities manifests in diverse ways, including urban sustainability initiatives and shifts in architectural forms. Historically, Arab and Islamic cities held global significance; however, colonial legacies and fragmented civic institutions limited their integration into global networks until the late 20th century^[4]. Today, cities like Dubai, Muscat, Beirut, Amman, and Cairo exemplify this transformation through projects that blend urban management with economic, social, and environmental goals^[5]. While globalization has spurred development, it has also introduced tensions between global trends and local identities. For example, Jordan’s urban landscape underwent significant changes in the late 20th century, marked by rapid expansion and openness to international planning theories^[6]. During this period, the country’s development reflects broader regional patterns, where globalization drives economic growth but challenges architects and planners to preserve cultural distinctiveness. By integrating global influences with contextual sensitivity, Jordan’s urban environment illustrates both the opportunities and complexities of globalization in shaping contemporary cities.

Urban morphology examines the form, structure, origin, and evolution of cities, analyzing physical transformations across spatial scales to understand urban changes^[7]. Urban morphology is influenced by various globalization factors that lead to changes and transformations in the spatial, economic, and social patterns of cities, from macro-scale urban patterns to localized areas shaped by geography and cultural heritage^[3,8]. Typomorphology, which studies the relationship between building typologies and urban forms, provides a framework to trace these transformations by classifying buildings according to their use, scale, and arrangement within the urban fabric^[9–10]. In this paper, typomorphology is operationalized as the longitudinal classification of building-function types (residential, commercial, institutional, cultural, etc.) across a fixed spatial grid, used to trace how building form and function co-evolve with Amman’s and Irbid’s urban fabric between 1953 and 2024. Under globalization, typomorphological analysis

reveals how existing low-rise residential blocks are redeveloped into commercial podiums or mixed-use towers, and how heritage structures are repurposed as boutique hotels or cultural centers^[10]. Moreover, by examining changes within standardized spatial units such as grid cells, researchers can systematically quantify morphological evolution over time^[11].

Studies about typo-morphology in the Middle East have been limited. Scholars have argued that understanding the typo-morphological elements of architecture taking Erbil in Iraq as a case study, such as house layouts and facades, can lead to preserving the architectural identity of a place in the face of rapid urbanization and globalization^[12]. Houshmand E. Masoumi et al. have explained the urban morphology of Istanbul, Cairo, and Tehran, and the transformations in historical neighborhood typologies, highlighting the differences in urban form and mobility patterns^[13]. Land use in the Middle East has also changed significantly due to policy decisions, technological developments, and population growth^[14–15]. However, these studies have examined typo-morphological form and heritage identity in isolation, failing to connect changes in building functions to globalization as a structural force. Meanwhile, existing research on Middle Eastern urban transformation under globalization has received insufficient attention, resulting in a notable gap in our understanding of the emerging urban challenges faced by Amman and Irbid in Jordan.

Since the typological and morphological evolution of cities is crucial for effective heritage management and sustainable urban development in Jordan, this paper addresses this gap by analyzing building-use changes in the downtown areas of both cities between 1953 and 2024. By synthesizing historical maps, GIS analysis, the Analytic Hierarchy Process (AHP) and community interviews, the study identifies the key socio-economic and global factors shaping urban morphology and highlights how globalization interacts with local contexts to inform urban evolution and heritage preservation. The analysis proceeds across three spatial scales: the city scale, capturing overall morphological growth; the zone scale, tracking building-function change across a uniform spatial grid; and the plot scale, documenting the functional transformation of individual buildings—to connect broad urban patterns with fine-grained typo-morphological change. This study builds its theoretical framework by integrating globalization theories with the typo-morphological approach. Typo-morphology offers an analytical structure to examine how these global forces physically manifest in the built environment, specifically through changes in building use, typological adaptation, and functional layering. In this context, globalization is viewed as not only an economic process but also a

spatial mechanism that reshapes urban form through the movement of capital, population, and information.

2 Study Cases: Amman and Irbid Cities

Amman and Irbid were selected for this study due to their significant urban transformations influenced by globalization. Amman, the capital of Jordan, has experienced rapid urban growth in recent decades, with its population reaching 4,920,100 by the end of 2024^[16], leading to significant land use changes^[17], and also experienced rapid shifts in building use, reflecting the impact of global economic and cultural forces. Irbid is located in the north of Jordan, about 80 km north of Amman. It is known for its rich history and cultural significance and serves as an important center for education and trade in Jordan. The city has witnessed rapid growth and urbanization in the last seven decades, which has changed its spatial organization and urban fabric^[18]. As a result of urbanization, particularly in response to regional migration and development pressures, Irbid has undergone notable changes in its urban structure and became the second-largest city in Jordan from a village^[19].

Analyzing both cities provides insights into how globalization affects building typologies and urban morphology in different urban contexts within Jordan. Downtown Amman and the Irbid refugee camp were selected as focal zones, as both areas exhibit the clearest manifestations of global-market pressures, demographic flows, and socio-economic transitions.

3 Globalization Stages in Jordan

Globalization has reshaped the balance of power and transformed the political, social, and economic systems in the Middle East. Overall, the Middle East is undergoing significant changes in urban development and planning, reflecting broader economic and social transformations in the region. In Cairo, architects and practitioners engaged with global influences in their designs and practices^[20], which also impacted architectural and urban developments in the Arabian Gulf countries. The architecture in these regions showcases a unique blend of global influences and local traditions, resulting in a diverse array of styles and designs^[21]. For example, in Jordan, architecture has evolved in response to various factors, including influences from different forms of modernism, globalization, and the pursuit of a national architectural identity^[22]. However, skyscrapers and modern architectural scenes in the Middle East, shaped by globalization, have integrated cultural elements and symbols,

achieving a harmonious balance between contemporary technology and historical traditions^[23].

The evolution of Jordanian cities reflects successive phases of globalization that have reshaped architectural identity and urban form. Drawing on globalization periodization frameworks in the urban literature^[2,4,24], and grounded in Jordan's historical record of political events, migration waves, and economic shifts, this study proposes that the development of Amman and Irbid can be divided into three stages—pre-globalization (1930s–1950s), early-globalization (1960s–1980s), and fast-globalization (1980s to present)—each defined by distinct socio-economic dynamics and morphological transformations.

3.1 Pre-globalization Stage (1930s–1950s): Early Development and Local Influence

The pre-globalization era covers late-mandate and early-independence years when urban growth was locally driven. At this stage, Amman and Irbid were still small regional towns with modest populations, and their built form remained rooted in traditional typologies^[25–26]. For example, early Amman expanded by adding government and villa style buildings of local stone (e.g., Fawaz al-Mhanna's 1940s city hall), gradually growing from a small village settlement into the capital. Housing was low-rise courtyard villas and ranch-style homes with gardens, and only rare houses served dual civic or commercial purposes^[25]. A notable feature of such housing units was the small spaces facing an open courtyard, which became a central element in the architectural narrative of the region.

Irbid likewise preserved its 1920s–1930s Damascene stone-house core^[26]. Migration in this period was mostly regional, notably a small influx of 1948 Palestinian refugees to Jordanian camps^[27], so there was little demand for new globalized building types. Most of the buildings in Jordan at that time were constructed by local craftsmen, Arabs who came from neighboring countries, or foreigners, as there were no qualified Jordanian architects at the time^[22]. In sum, the 1930s–1950s morphology shows organic, continuity-based growth (e.g., stepped hillside neighborhoods, stone fences, simple mixed-use streets) rather than any wholesale embrace of international style or economy.

3.2 Early-globalization Stage (1960s–1980s): Western Culture Transformed Architectural Components

The early-globalization era corresponds to Jordan's postwar modernization and first wave of global integration. Economic changes (e.g., oil-boom remittances, rising trade) and geopolitical events dramatically increased urban growth, and new planning

regimes were adopted—for example, the 1988 Greater Amman Master Plan, funded by United States Agency for International Development (USAID) set formal controls on expansion and heights^[28]. In the 1960s, the international style was introduced in Amman and other Jordanian cities, especially in the architecture of hotels, public institutions, and universities^[29].

Building design during this period witnessed modern local architecture, and modernism merged with local forms^[30]. Morphologically, multi-story concrete apartment blocks with commercial ground floors proliferated along new arterials, replacing many older low houses and densifying neighborhoods. In Amman, mixed-use strips and semi-commercial boulevards were introduced in place of purely residential lanes^[31]. Similarly, Irbid expanded rapidly in these decades: the founding of Yarmouk University in 1976 alone drew thousands of rural families, producing new rental blocks and local markets. Thus, the 1960s–1980s captured the shift from village-like townships to more urbanized, mixed-typology quarters: a hybrid of imported planning ideas and traditional dwelling forms, reflecting an economy that was increasingly tied to the region and international capital.

3.3 Fast-globalization Stage (1980s to Present): Rapid Urban Growth and Transformation

In the late 1970s and 1980s, rising oil prices led to an economic boom that influenced most areas of society, including the construction industry. Middle East countries ushered in a new phase of development and construction led by both international and local architects. In Jordan, and particularly in the capital Amman, two architectural trends dominated: eclectic designs that demonstrated wealth and power (modernism), and traditional Islamic architecture^[29]. From 1980 onwards, the emphasis was placed on sustainable architecture and the use of traditional building materials^[26]. In addition, the rapid urban growth from 1983 to 1996 significantly increased the area of the capital^[32], which led to an increase in construction activities. Irbid experienced analogous change, albeit at smaller scale: its built-up area grew nearly nine-fold between 1967 and 2020^[33], driven by infrastructure improvements and refugee inflows, and many old stone dwellings (especially in the Tal) were “deserted or torn down” to make way for multi-storey housing and malls^[26].

Moreover, this period aligned with Jordan's neoliberal turn and full integration into the global economy. In this era, urban transformation accelerated under foreign investment and media flows. Amman's skyline was reshaped by high-rise mixed-use complexes: for example, the Abdali central district megaproject

put Amman “on the map as a globalized city,” with landmark towers and a pedestrianized mall street. The 2000s saw a boom in enclosed shopping malls (e.g., Mecca Mall, Taj Mall) that catered to new consumer lifestyles while undercutting many traditional souq streets^[22]. Critics note that such developments ushered in “alien” glass and steel architectural forms disconnected from local identity^[34].

This architectural development was a response to the globalization of building techniques and new ideas in architectural concepts. Major Jordanian cities, such as Amman, were forced by globalization to new urban developments to attract capital and compete with the global market^[35]. In terms of typo-morphology, this era introduced distinctly global typologies—such as office towers, mixed-use podiums, and gated compounds—which replaced older courtyard villas.

3.4 Summary of the Three Stages

The three stages reveal a clear progression from localized, culturally embedded architecture to globally influenced urban morphology. Each globalization wave introduced new economic and demographic pressures that reconfigured spatial patterns, from courtyard housing to modernist blocks and finally to vertical, commercialized cityscapes. This progression demonstrates that globalization shaped Jordan’s urban form through two parallel channels: material forces—migration, investment, and technological change—that restructured land use and building typologies, and symbolic transformations—shifts in identity and heritage adaptation—that redefined architectural character. Together, these channels explain why Amman and Irbid did not simply modernize uniformly, but evolved through layered, hybrid morphologies that reflect both global pressures and local continuity.

4 Methodology

4.1 Analysis Framework

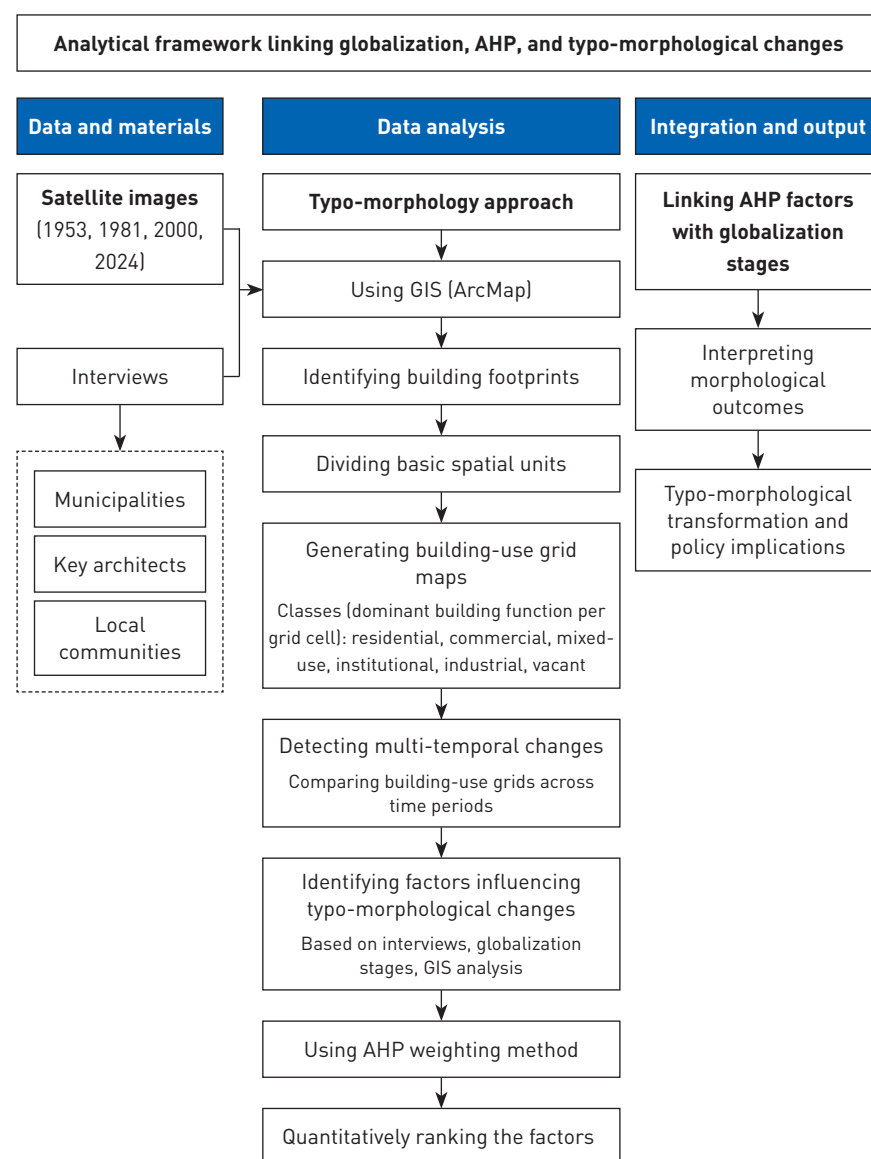
This study introduces a GIS–AHP framework for spatial unit zoning that includes building use units. It combines the typological approach of “building typology,” which classifies buildings by their form and function; a “morphological approach,” which examines the spatial configuration and physical fabric of the urban environment; and “building use” analysis, which tracks how occupancy and function change over time, all within an urban transformation context. The spatial zoning procedures, GIS analysis, and AHP weighting method applied to these units are detailed in the following sections.

Dividing the study area into different spatial zones offers valuable insights into urban dynamics and transformations. Following the zoning, the AHP-derived weights were used to guide the analysis, emphasizing the most influential factors on typomorphology changes. The division in this study is followed by an examination of the challenges involved and the formulation of possible rules and strategies for optimization. It is important to note that spatial zoning does not only refer to mundane functional aspects but is closely linked to the unique physical urban landscape and its associated land use practices. As Fig. 1 shows, this study assigns “zoning systems” to building use zones.

4.2 Methods and Materials

The research aims to track the urban transformation in the cities

Fig. 1 Analysis framework.



of Amman and Irbid to examine the effects of globalization and changes in typo-morphology. This research process includes the following steps.

1) Data collection: historical maps, satellite images, and municipal planning documents were gathered to establish a timeline of urban changes.

2) Field observation and qualitative data: site visits and interviews with local communities, municipal officials, architects, and urban planners were conducted to gain insights into the original functions of specific buildings.

3) GIS-based spatial analysis: the collected data were integrated to identify patterns in morphological evolution, changes in building use, zoning shifts, and the impacts of globalization on urban form.

4) The AHP weighting: using the factors revealed by GIS analysis and interviews, the AHP method was applied to make pairwise comparisons, compute priority weights, and check consistency—Consistency Ratio (CR) < 0.10—rank and validate the key driving factors by quantifying each factor’s relative influence on changes in typo-morphology.

Obtained from the Royal Geographical Center, Jordan the satellite images include historical photographs and maps from the years 1953, 1981, 2000, and 2024, focusing on the urban development of Amman and Irbid. These archival materials form the basis for a typo-morphological analysis aimed at identifying spatial features, patterns of continuity and change in built-up areas, and building use typology across different zones (Fig. 2). In-depth interviews were conducted with local communities (N = 22), architects and urban

planners (N = 7), and municipality officers (N = 5). These interviews were to help understand the historical context of the changes in building use, the demolition or reuse of buildings, and the social motivations of the residents. Through research and fieldwork, this study brings together and adds knowledge from the social groups with which it works. The building use zones within the study area were defined through a combination of field observations, historical maps, documents from the municipalities, and notes from the interviews. This methodology was used to holistically capture and analyze the socio-spatial changes that have taken place over time as part of the typo-morphological transformation of the study area.

4.3 Basic Spatial Unit

To facilitate the analysis of typo-morphological changes across the study periods, a spatial grid was overlaid on the study area for both Amman and Irbid. The grid, composed of uniform cells (25 m × 25 m), functions as a consistent spatial unit through which building footprints are analyzed temporally (Fig. 3). The cell size was chosen to balance sufficient spatial resolution for capturing individual building footprints and use across the extensive urban study areas, allowing for capturing zone-level morphological and functional transformations^[36], as well as the detection of patterns in building distribution, density, and use transformation over time, offering a structured way to evaluate the impact of globalization across different urban zones. By applying this grid-based method, the study can more accurately compare urban transformation

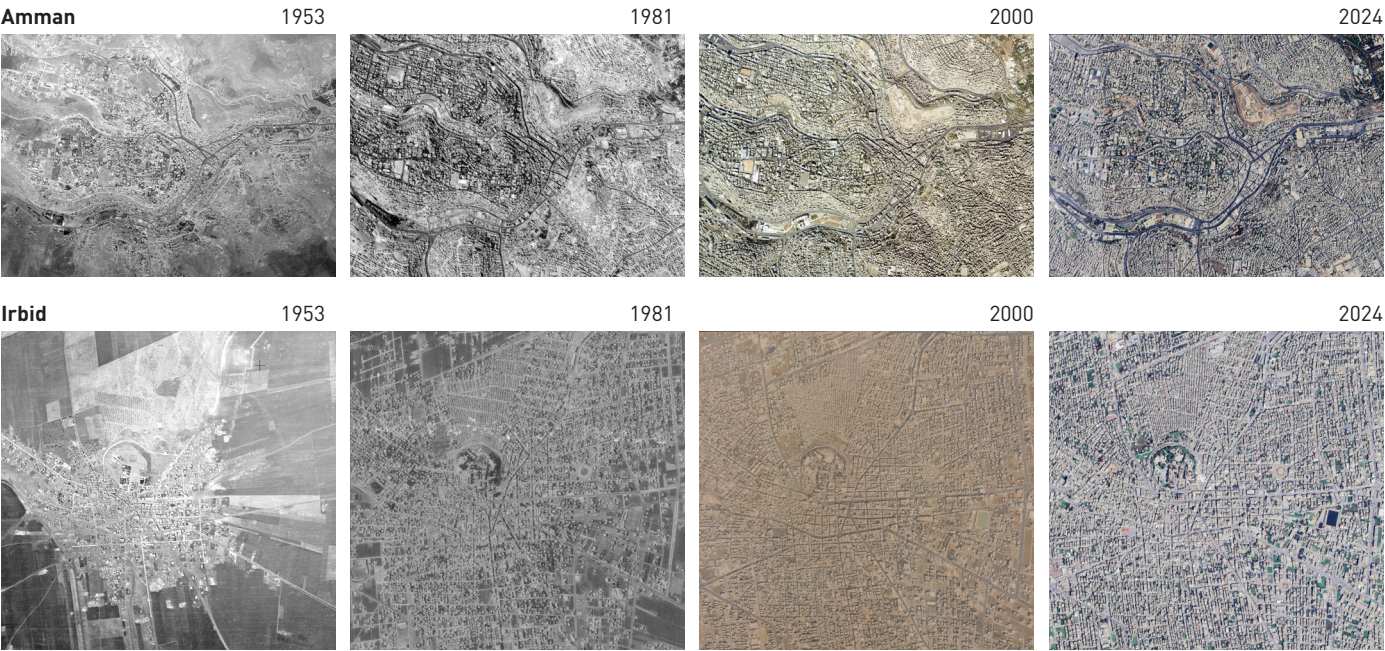


Fig. 2 Satellite maps of Amman and Irbid (1953–2024) [source: Royal Geographic Center, Jordan].

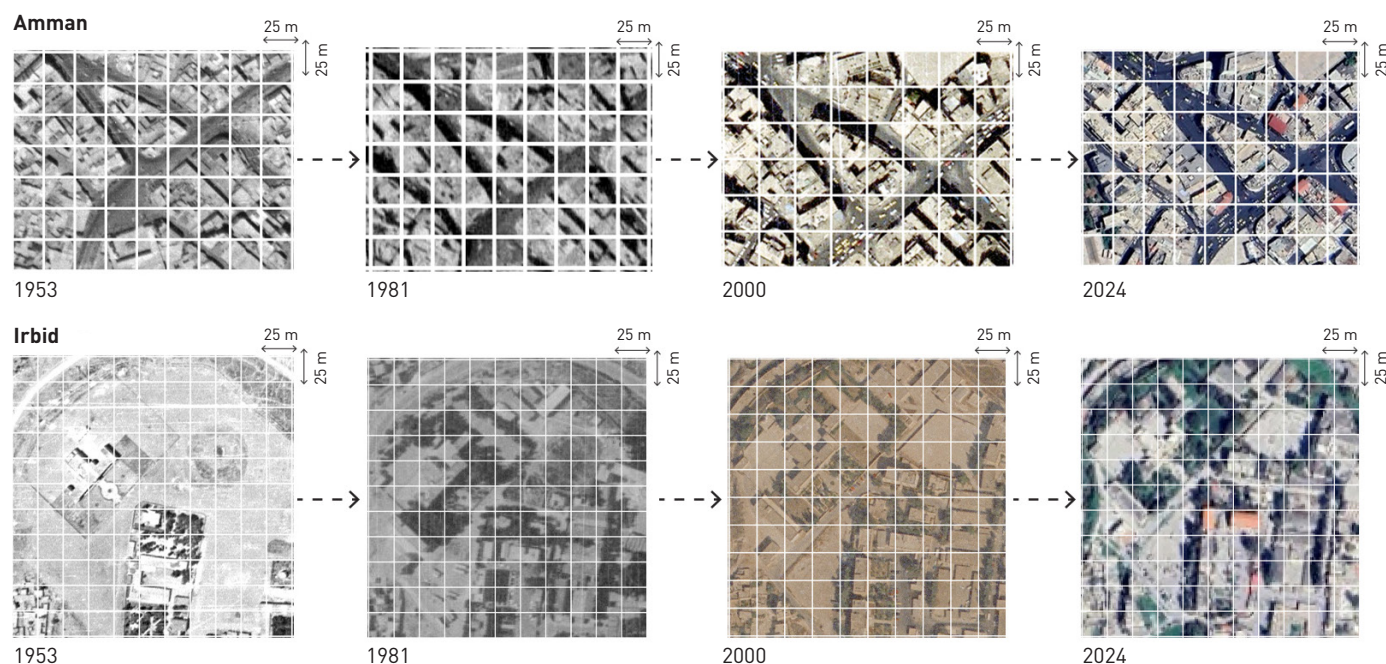


Fig. 3 Spatial grid for typomorphological analysis in Amman and Irbid (source: Royal Geographic Center, Jordan).

within and between the two cities in the years of 1953, 1981, 2000, and 2024.

4.4 The AHP Weighting

The AHP is a widely recognized multi-criteria decision-making method developed by Thomas L. Saaty in the 1970s^[37]. This method translates qualitative judgments into quantitative weights by systematically comparing each pair of criteria based on their relative importance. In this study, the AHP method converted conceptual and qualitative factors influencing typomorphology changes into quantitative weights. Because these factors cannot be easily measured using spatial data alone, AHP enables the incorporation of expert judgment to create a hierarchy of influence. The AHP equations are provided below. This study used Excel to calculate the weight of each factor based on these formulas, then we conducted a consistency check using the CR and ensured $CR < 0.10$ for all values.

The pairwise comparison matrix is calculated by Eq. (1):

$$A = (a_{ij})_{n \times n}, \quad (1)$$

where a_{ij} represents the relative importance of factor i compared with factor j . By definition $a_{ij} = 1$, for all i and $a_{ij} = 1/a_{ji}$.

The preliminary weight is computed by Eq. (2):

$$p_i = \left(\prod_{j=1}^n a_{ij} \right)^{1/n}. \quad (2)$$

Normalization to get AHP weight for each indicator is calculated

by Eq. (3):

$$AHP_{wi} = \frac{p_i}{\sum_{k=1}^n p_k}. \quad (3)$$

The AHP in this study was informed by a total of eight professionals, including four senior planners from the Greater Amman and Greater Irbid Municipalities, two architects specializing in urban morphology, and two academic experts in spatial planning. Each expert completed a pairwise comparison matrix independently. The final matrix was produced by aggregating their judgments through the geometric mean method. Consistency was verified using the CR ($0.0543 < 0.10$), confirming acceptable reliability of the comparisons. A minor sensitivity test ($\pm 10\%$ adjustment of selected pairwise values) showed no change in the rank order of factors, ensuring robustness. In addition, qualitative evidence from 34 local interviewees was used to validate the experts' reasoning, linking statistical weightings to on-the-ground morphological dynamics.

5 Results

5.1 City-Scale Morphological Evolution: Urban Structure and Expansion

Urban structure transformation is influenced by factors such as economic causes, social changes, population growth, and poor location conditions, such as permitting development on hillsides or along arterials without adequate infrastructure capacity. Globalization has driven rapid expansion in Amman's commercial

core, initially downtown, and later into surrounding hills. In an interview, one of Amman’s first urban planners recalled how the city center gradually extended to encompass Lweibdeh Hill and Amman Hill, with many of the buildings being built along the main roads. Between 1953 and 2024, satellite imagery shows that built-up area in these sectors more than doubled, with new commercial developments replacing many low-density residential plots and infilling formerly open spaces.

These changes have been driven by population migration and technological advances. Field observations and archival photographs reveal that many traditional dwellings were demolished to make way for commercial complexes or adapted into cultural venues, reflecting residents’ growing preference to capitalize on rising land values. The Citadel, Amman’s foremost archaeological landmark, lies at the heart of this transformation zone. Although efforts have been made to preserve its immediate environs, surrounding residential streets remain loosely organized and poorly serviced, underscoring ongoing infrastructure issues.

In 1990, a significant expansion occurred, primarily triggered by the return of Jordanian nationals from the Gulf States following the Second Gulf War. This trend continued with the first wave of Iraqi immigrants, especially after 2003. Subsequent waves of migration,

especially after 2011, illustrate the profound impact of globalization through immigration on the population dynamics of Amman city. Interviews with long-time residents reveal that, between the 1970s and late 1980s, this population growth coincided with a marked shift in land and building use from predominantly residential to commercial functions. As a result, the hills around Amman downtown gradually acquired a reputation as an enclave for the affluent, reinforced by luxury housing and upscale commercial developments. These migration-driven shifts illustrate globalization’s profound impact on Amman’s urban morphology, particularly through capital flows, return migration, and refugee settlement.

Figure 4 shows the morphological expansion of built-up areas from 1953 to 2024, based on satellite images. Globalization has accelerated spatial intensification, particularly around commercial nodes and heritage-sensitive areas, reshaping the character and function of the urban fabric in this historically rich part of Amman.

Irbid’s urban structure transformation can be traced through phases linked to regional geopolitical shifts and economic globalization. Between the 1960s and 1980s, Irbid’s role as a regional hub intensified following the 1967 Arab–Israeli War, especially the northern Jordan, accelerating demand for housing

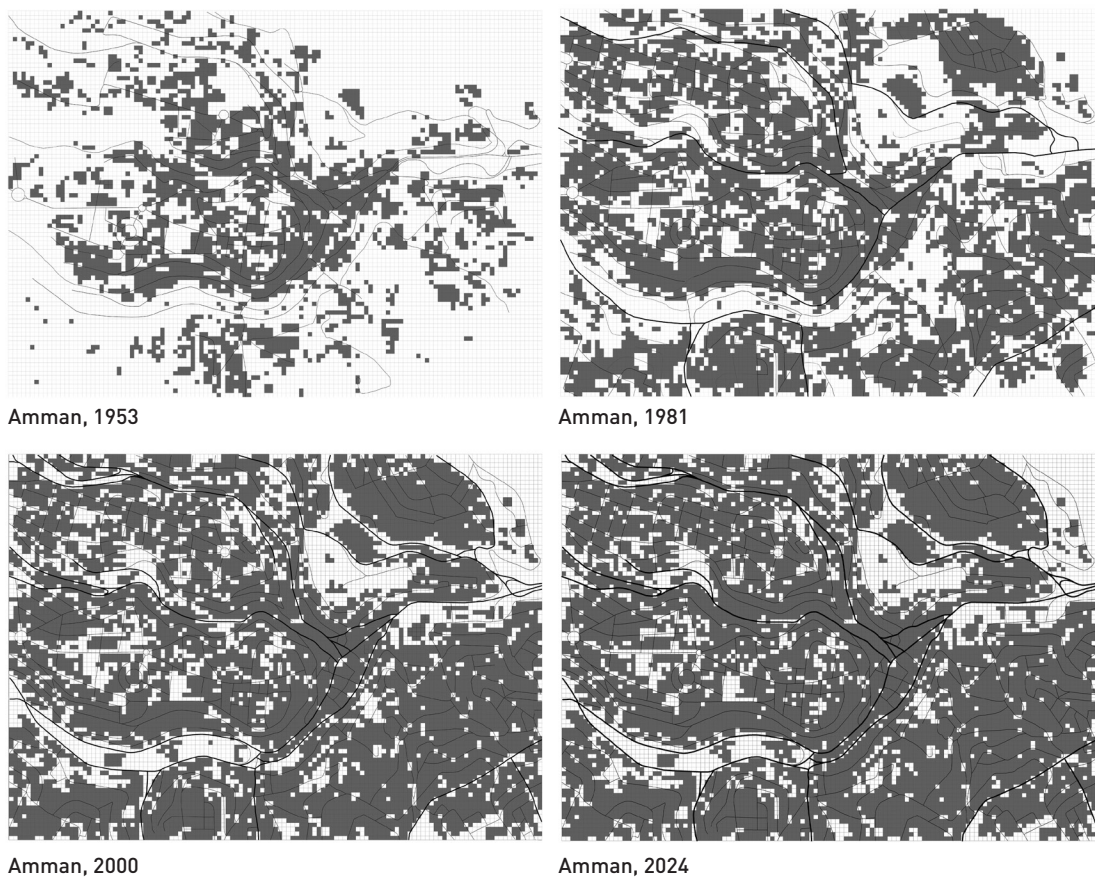


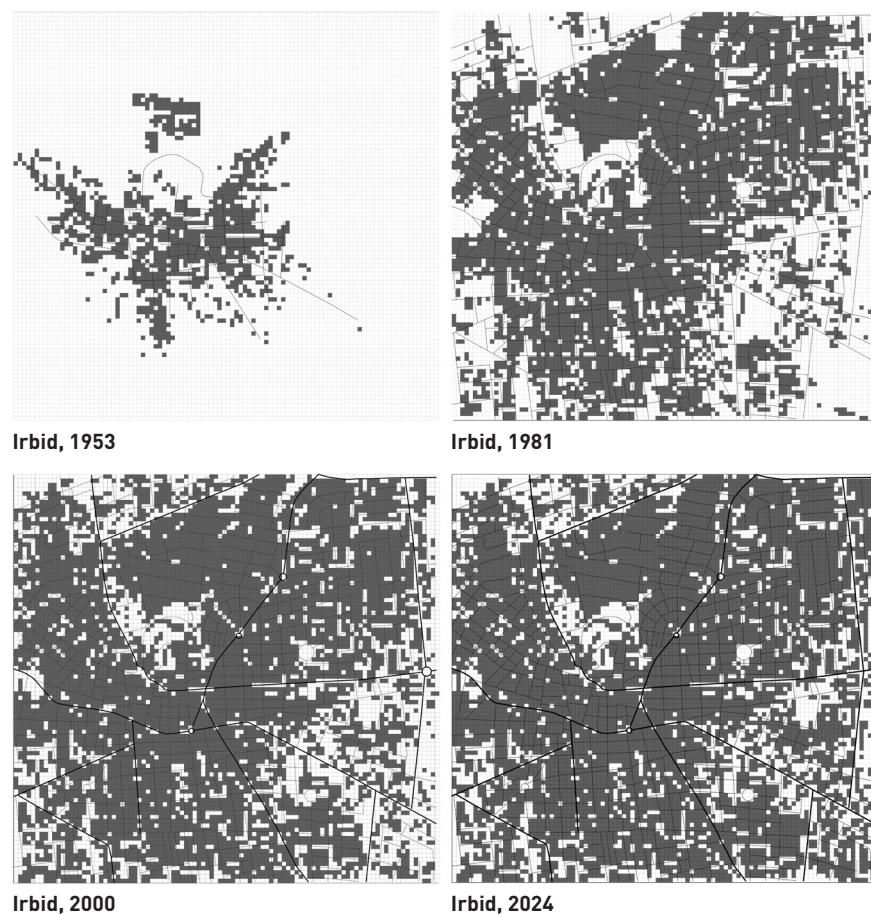
Fig. 4 The morphological evolution of built-up areas (1953–2024), Amman (source: Royal Geographic Center, Jordan).

and informal commercial services. By the 1980s, the city's proximity to Syria and its agricultural hinterland attracted rural migrants seeking employment, leading to unplanned residential sprawl along the city's eastern edges. Satellite imagery from this period reveals a patchwork of low-rise residential clusters encroaching on farmland, with minimal centralized planning.

The 1990s marked a turning point, as Jordan's economic liberalization policies and remittances from Jordanian workers in Gulf States fueled private investment in Irbid's downtown. Multi-story commercial buildings began replacing single-family homes, which evolved into a bustling corridor of shops and offices. This trend accelerated post-2000 with the expansion of Yarmouk University and Jordan University of Science and Technology, which drew students and faculty from across the region, spurring demand for student housing, cafes, and retail. By the 2010s, the refugee crisis compounded pressures on Irbid's infrastructure; the city's population and local houses expanded around the city.

Figure 5 shows the morphological expansion of built-up areas

Fig. 5 The morphological evolution of built-up areas (1953–2024), Irbid City (source: Royal Geographic Center, Jordan).



in the study area from 1953 to 2024, based on satellite images. These layers of change, from refugee resettlement to educational globalization, have reshaped Irbid's morphology into a dense, mixed-use core surrounded by fragmented residential peripheries.

5.2 Zone-Scale Typo-morphological Changes: Urban Architecture and Functions

Through interviews with residents and observation of various buildings in Amman's study area, it was found that the majority of building use in the 1950s was residential, with some commercial buildings on the main street of downtown, and even in the Citadel, there were many houses near the archaeological area. In the 1980s, Amman and the surrounding areas underwent considerable urban architecture expansion. In 1987, in particular, the surrounding municipalities and village communities were incorporated into the city of Amman, which led to a higher population density and increased traffic in the city. After 1990, the city experienced a significant influx of Jordanian emigrants returning from the Gulf States due to the First Gulf War. This return was characterized by economic growth and led to many residential areas being converted into commercial areas. At the same time, several infrastructure projects were carried out in Amman in the 1980s, including the construction of new roads, paths, and bridges. This infrastructural development led to a reassessment and restructuring of the residential areas along the major thoroughfares, resulting in their conversion into commercial areas.

Interviews with local communities also indicate that family structures and lifestyle preferences changed significantly during this period. These socio-demographic factors have had a discernible influence on the transformation of urban function and reflect the interplay between societal dynamics and urban zone planning. Over the 20th century, the migration of Iraqis to Jordan had a significant impact on the cityscape. This demographic shift confirms the impact of successive migrations on the built environment. Many residents of Amman City sought various professional licenses, including law firms, engineering firms, and clinics. During this time, the Amman Municipality introduced a classification system for office uses, which was a remarkable development. The municipality allowed property owners to change the use description, subject to paying a regulatory fee, mainly to reduce commercial pressure on the city center.

Between 2000 and 2008, Jordan experienced a significant economic boom, which also impacted the cityscape of Amman and Irbid. These strategic shifts were driven by investment factors, favorable economic conditions, and political stability. These

factors brought Amman to a prominent position in the Arab world, encouraging an increase in tourist activity in the region and the citadel, resulting in the conversion of many residential buildings to various commercial uses. At the same time, there was a significant increase in land acquisition, which made Amman and Irbid hotspots of heavy commercial activity and contributed to the rising land prices across Jordan during this time.

According to interviews with residents, technology has had a strong impact on population dynamics and building-use transformation. In particular, the rapid expansion of online rental and tourism platforms enabled residents to convert their apartments and houses into short-term rental units targeting foreign visitors and expatriates. This created a new functional category within the existing residential building stock—units that are physically unchanged but operationally commercial—accelerating the de facto transition from residential to commercial use without requiring formal demolition or reconstruction. In several blocks of downtown Amman, field observations confirmed that entire residential floors had been informally repurposed into short-term rental accommodation, effectively removing them from the permanent residential stock and contributing to the broader residential-to-commercial shift documented in this section.

Figure 6 shows the change in building use patterns over the different periods and years.

According to an interview with Irbid Municipality, the city’s first organizational plan was drawn in 1971. This plan represented an important change during which it designated most of the land in Irbid downtown for commercial use, though residential buildings remained. Commercial use has evolved to the present day, taking over most of the land around the downtown, resulting in many residential buildings being converted to other uses. The specific buildings were identified through site observation and interviews with residents to highlight the transitional phase that has gradually changed the cityscape towards greater commercial status.

The transition from residential to commercial use in the city has increased over time, and one of the biggest challenges in the downtown is the lack of parking spaces. In an interview with the director of the planning department of Irbid Municipality, it was noted that the commercial streets in the downtown were laid out in 1971. At that time, no parking spaces were taken into account in the planning considerations, reflecting the traffic landscape at the time.

In 2003, the establishment of the Greater Municipality of Irbid led to a strong intensification of commercial activities in the downtown. At the same time, economic reforms in Jordan led to

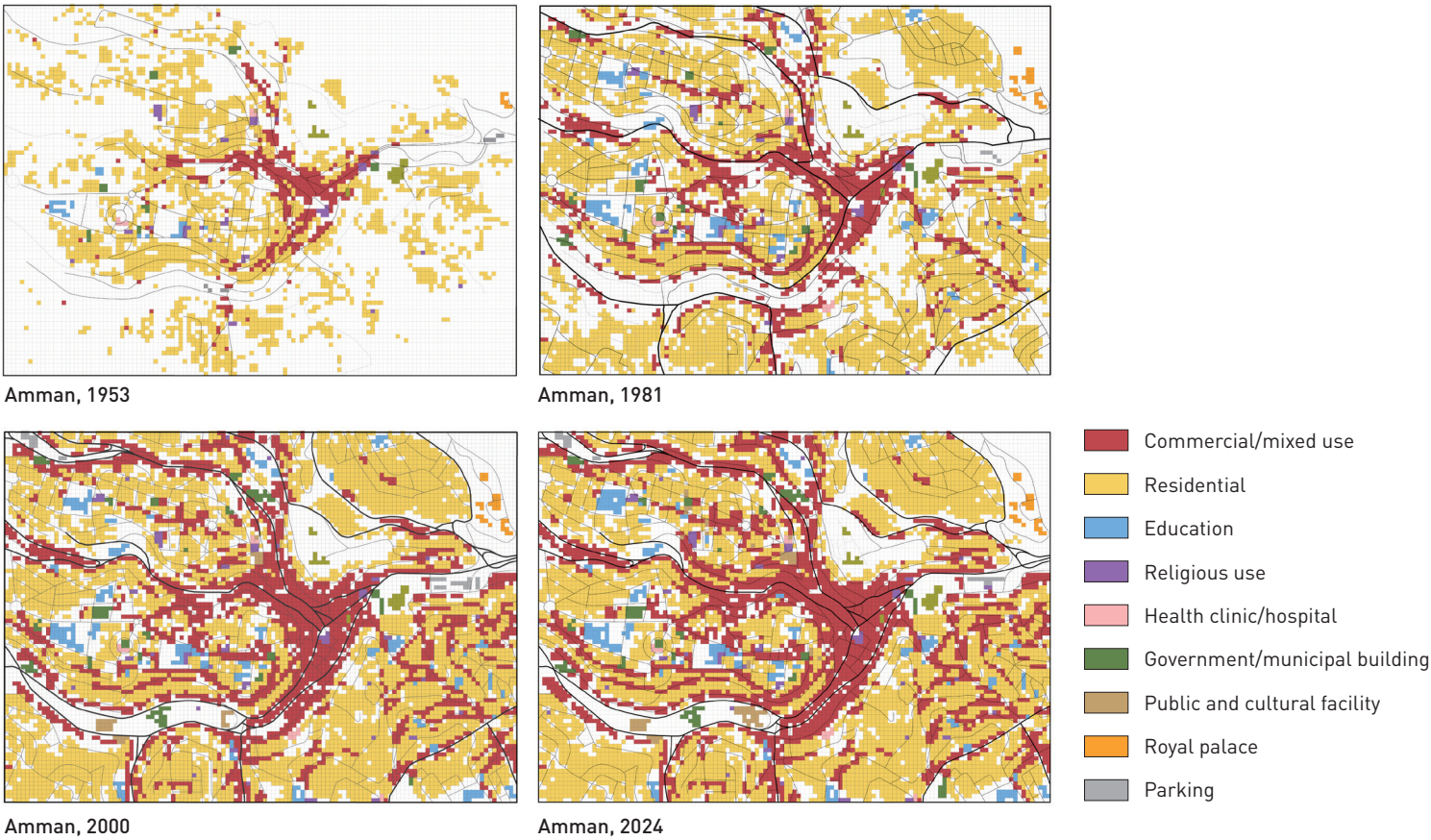


Fig. 6 Building use changes in Amman (1953–2024) [source: Royal Geographic Center, Jordan].

a significant economic boom, especially in the real estate sector, which was characterized by improved investment opportunities, an increase in land purchases and a growing tendency of the population to live around the downtown. Later, in 2011, the city of Irbid, like all Jordanian cities, witnessed the effects of the Syrian Civil War, leading to an increased influx of refugees. This demographic shift has led to an increase in commercial activity and highlights the impact of globalization on the interaction between geopolitical events, local economic dynamics, and changes in land use.

Irbid camp is closely linked to the downtown, as it was established in 1951, which remains one of the most important factors of globalization in Jordan today. The establishment of camps in different governorates not only had an impact on the urban aspect but also important social and economic consequences. In the interview with some academics and architects in the field of camps and their urban impact, they explained that the most important factor of globalization that distinguishes Jordan from other countries in the Global South is “displacement.” The camp in Irbid is a special case in that, unlike other camps in Jordan, it was established in the center of the city due to political and administrative reasons.

During the urban development, over time, the camp became random with unorganized houses. However, important urban planning reforms are needed, especially about land use regulation. The camp’s plots are currently located in areas that are “out of regulation” according to the official land use plan of Irbid city, which has led to the proliferation of slums within the camp. Interviews with a group of camp residents confirm that the camp requires significant support from the state to address many urban challenges. These challenges include overlapping residential and commercial buildings, lack of parking spaces, and significant infrastructure problems, which together require comprehensive solutions to improve the overall living conditions in the camp. Figure 7 shows some photos of Irbid camp.

The area identified in 1953 as a refugee camp exhibits a temporary, informal topology typical of emergency settlements, with limited infrastructure and non-permanent structures. By 1981, the area had transitioned into a more stable, formalized refugee housing typology, characterized by permanent buildings and urban integration. However, the area remains spatially disorganized with weak infrastructure and inadequate planning even today. This shift reflects both morphological and functional changes in response to long-term displacement, urban pressure, and national policy responses, but also highlights ongoing structural neglect and marginalization.

As the downtown has evolved into a commercial center over



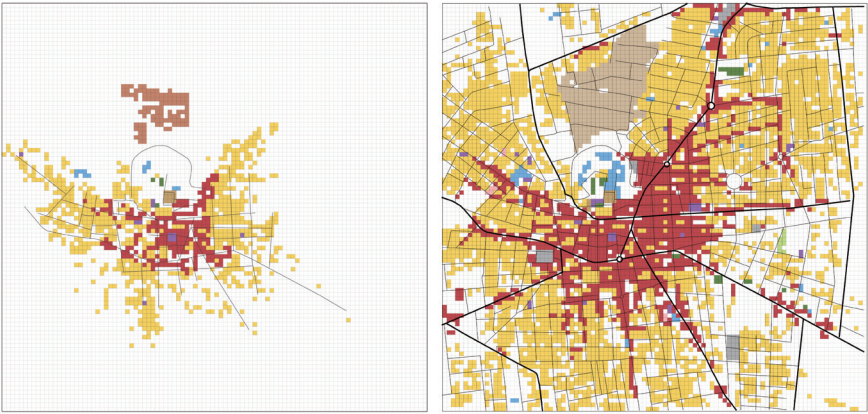
Fig. 7 Irbid camp (taken in 2023).

time, the need to improve infrastructure has become increasingly important. However, the development and improvement of infrastructure in Irbid City are hindered by numerous problems, with ownership proving to be a major obstacle, as land is predominantly owned by residents, rather than the state or the municipality. This made many infrastructure renewal proposals hardly implemented due to poor capability to cope with the proposed changes and associated financial gaps. The structural vulnerability of older buildings in the downtown has, in practice, accelerated their functional replacement: field observations and interviews confirm that several traditional structures were demolished and subsequently replaced by multi-story commercial buildings or mixed-use blocks. Their land use shifted predominantly from residential to commercial, contributing to the broader residential-to-commercial transition pattern documented in this section. Figure 8 shows the change in building use patterns in Irbid downtown over different time periods.

5.3 Plot-Scale Transformation: Adaptive Reuse of Traditional Houses

Figure 9 shows the percentage of building function change for Amman and Irbid between 1953 and 2024, displaying distinct trajectories of functional transformation across residential, commercial, institutional, and cultural land uses.

With the change in building use, some houses that reflect the architectural identity of the city of Amman have been converted into various commercial uses such as cafes and offices, while some



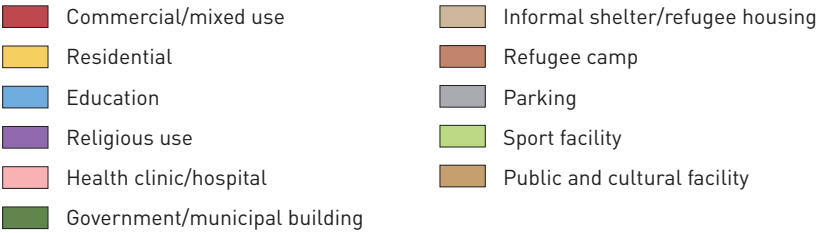
Irbid, 1953

Irbid, 1981



Irbid, 2000

Irbid, 2024



were converted for cultural and artistic purposes. The adaptive reuse of heritage buildings illustrates strategic efforts to balance architectural preservation with contemporary urban demands. In Amman, structures like Ya'ish House, a traditional limestone villa originally built for residential use, were transformed into cultural spaces (e.g., cafes, galleries), while retaining their historic facades and spatial character. Similarly, Darat al-Funun, once a private residence, now functions as an arts foundation, leveraging its courtyards and arched interiors to host exhibitions. These conversions highlight a deliberate shift toward cultural valorization amid commercial pressures.

In Irbid city, until the 1970s, most of the building use in Irbid was used for residential purposes, and many houses still reflecting the city identity (Arab-Islamic architectural style) are still standing today, such as the Arar House (in Arabic: رارع تيب), Nabulsi House (in Arabic: نابلس تيب) and Al-Sharayri House (in Arabic: شراري تيب). These houses were later converted for various purposes. For instance, the house of Arar (a Jordanian poet) was transformed into a venue for cultural seminars and art exhibitions in the city. During the 1970s, the Nabulsi House was converted into the offices of Irbid Municipality and the Ministry of Culture, cementing its position as a major tourist destination in the city; the Municipality has converted the Al-Sharayri House into a public library to enrich the cultural scene of Irbid City. However, both buildings were later vacated and have since fallen into disuse, and today survive only as architectural ruins. Also, many houses were converted to commercial use downtown. In an interview with a local scholar, he explained that during this period, many residents

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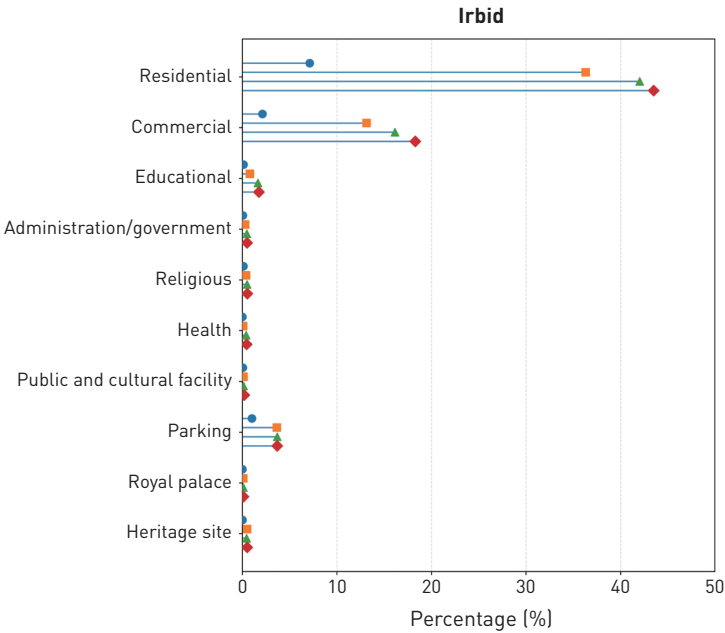
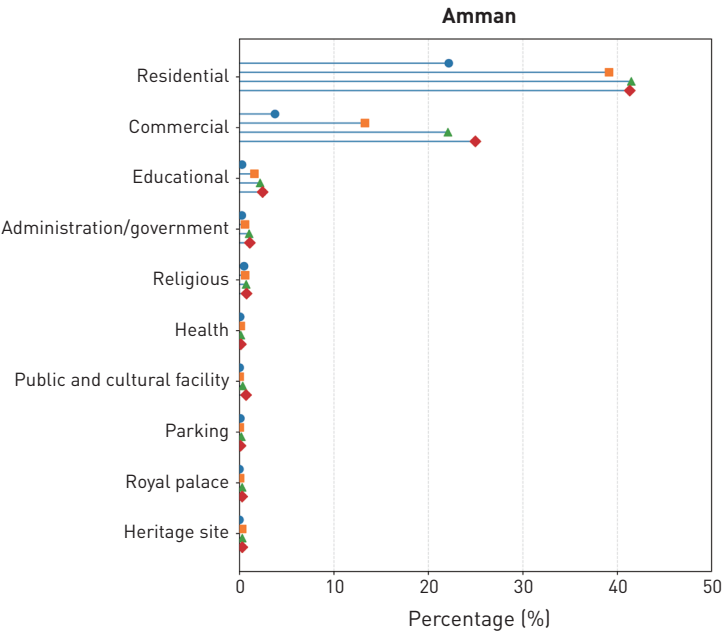


Fig. 8 Building use changes in Irbid (1953–2024) (source: Royal Geographic Center, Jordan). **Fig. 9** Building function change percentage of Amman and Irbid cities.

chose to demolish their houses, such as Al-Mesiri House, which contains many components of traditional architecture, to build a commercial complex in its place. Table 1 shows the alternative uses of some representative traditional houses in Amman and Irbid.

Under the impact of globalization on the use change of buildings, many of the traditional components that reflect the city identity, such as courtyards and functional behavior within the houses, disappeared and were influenced by modern architectural trends in design and construction. According to discussions with the municipality and some architects, the new urban laws and legislation, e.g., The National Building and Organization System for Cities and Villages for 2022, address the division of land and its different uses, the construction or demolition of buildings, and details related to buildings and obtaining building permits, contributing to the trend towards modern architecture influenced by globalization. Having examined urban transformation at three spatial scales—city, zone, and plot—the next section synthesizes these findings through heatmap analysis, linking building-use transitions to Jordan’s three globalization stages.

The plot scale functions as a critical mediator between global forces and localized morphological outcomes, revealing how building-use change operates as both a symptom and driver of broader urban transformation. While the city scale captures overall morphological growth and the zone scale tracks functional change across uniform spatial grids, the plot scale documents the typological adaptation of individual buildings, thereby illuminating the mechanisms through which globalization factors—conflict-driven migration, refugee-camp evolution, regional wars, and economic boom—physically manifest in the built environment. This approach demonstrates that typo-morphology, as conceptualized in this study, treats building typology and urban morphology as a single co-evolving system, where functional layering at the plot scale directly reflects the influence of global economic, social, and political forces. The quantified AHP rankings reveal that conflict-driven migration and the 2000–2008 economic boom emerged as the most significant factors, yet their spatial expression varies considerably across plots, suggesting that globalization operates unevenly rather than uniformly across the urban fabric. Critically, the plot-scale analysis challenges the notion that cities passively absorb global influences; instead, it demonstrates how specific building conversions—residential to commercial, heritage adaptive reuse, and camp-to-permanent transitions—represent active morphological negotiations between global market demands and local spatial constraints.

Table 1: The previous and current uses of traditional houses

House name	Previous use	Current use	Preservation outcome	Photo
Darat al-Funun, Amman	Residential	Art center	Full architectural restoration, cultural reuse	
Jadawel Hawa Café, Amman	Residential	Commercial	Traditional features restored, economic priority	
Ya'ish House, Amman	Residential	Culture place	Facade retained, interior adapted for public use	
Nabulsi House, Irbid	Residential	Ancient ruins	Structural integrity maintained, tourist draw	
Arar House, Irbid	Residential	Art center	Courtyards preserved, functional repurposing	
Al-Sharayri House, Irbid	Residential	Public library	Traditional features restored, community access	
Al-Mesiri House, Irbid	Residential	Commercial	Economic priority leading to the local architectural elements disappearing	Demolished

NOTE
 Site photos were taken by the authors, 2023.

By linking seven decades of satellite imagery with field evidence at the plot level, this study advances a quantifiable framework that bridges descriptive typo-morphological interpretation with empirical assessment, thereby providing spatial precision to

understanding how global forces reshape individual building functions and contribute to the broader urban restructuring observed at larger scales.

5.4 Driving Factors and Their AHP-Based Weighting

Based on our findings and interviews with local residents, architects, and municipal officials, we identified six key factors driving the typo-morphological transformations in Amman and Irbid from 1953 to 2024.

First, conflict-driven migration and large inflows of refugees and other migrants have led to rapid, often informal, urban expansion on the city edges. Second, refugee camp evolution shows how temporary settlements gradually become permanent neighborhoods with distinct street patterns and building types. Third, regional wars create underlying pressure on land and resources, pushing people and investment into new areas. Fourth, the economic boom from 2000 to 2008 resulted in significant real estate investment in different districts in Amman and Irbid, reshaping the skylines and land use layouts. Fifth, technological development, ranging from GIS in planning to digital service platforms, has slowly influenced the change of building use. Finally, the 2009 global economic crisis briefly slowed construction and real estate markets, serving as a short-term factor rather than a long-term driver for change. To

quantify their relative importance, we applied the AHP, in which each pairwise judgment reflects how consistently and strongly a specific driver shaped urban transformation in both cities.

Each comparison in the matrix reflects how strongly and consistently a specific driver has influenced typo-morphological changes in Amman and Irbid (Table 2). Successive migrations (weight = 0.3727) is the most influential factor. Demographic influxes quickly translate into increased housing demand, often in informal settings, leading to rapid sprawl and densification^[38]. The 2016 Jordan report by the United Nations Refugee Agency (UNHCR) notes that 79% of Syrian refugees were living in non-camp settings (urban, semi-urban, rural)^[39], and this influx reshaped entire peripheral neighborhoods within months, affecting both the city edge and the inner core—a scope and speed that no other single factor matched.

The 2000–2008 economic boom (weight = 0.2246) is the second most influential factor. Investment in Jordan’s property sector during this period funded large-scale mixed-use developments—including the Abdali central district and Jordan Gate towers—reshaping skylines and land-use patterns city-wide. Its broad spatial reach distinguishes it from the more localized effects of refugee camps and the short-term dampening of the 2009 crisis.

Refugee camp evolution (weight = 0.1895) ranks third. Unlike

Table 2: The factors that influence typo-morphological changes in Jordan

Factor	Description	Impact	AHP weight
Successive migrations	Initial establishment of Jordan and ongoing migrations due to regional instability	Influenced demographic composition	0.3727
2000–2008 economic boom	Period of significant economic growth in real estate and urban development, particularly in Amman and Irbid	Boosted urban growth and land	0.2246
Refugee camp evolution	Establishment of camps, such as the one in Irbid in 1951, evolving from temporary shelters to permanent housing	Changed land use and urban layout	0.1895
Middle East wars	Series of conflicts including the 1948 Nakba, the 1967 and 1973 Yom Kippur Wars, the Gulf Wars, the 2003 Iraq War, and the 2011 Syrian Civil War	Increased refugee influx	0.0994
Technological development	Recent advancements in technology facilitate new forms of real estate marketing and housing rentals, particularly aimed at foreigners through social media	Transformed housing and building uses	0.0713
2009 global economic crisis	The recession that impacted global markets also affected Jordan’s economic landscape, particularly in real estate	Caused a downturn in land prices	0.0425

NOTE
CR = 0.0543 (< 0.10), so the judgments are acceptably consistent.

migration flows, which can transform entire cities, refugee camps primarily influence the immediate area within their boundaries. Camps shift from temporary, informal layouts to permanent, crowded neighborhoods with mixed residential–commercial uses, producing long-term spatial effects even where infrastructure remains weak. Irbid camp, established in 1951 in the city center, exemplifies this trajectory. While their morphological impact is localized rather than city-wide, camps produce lasting structural changes that outlast the crises that created them.

Middle East wars (weight = 0.0994) are the structural catalysts for migration and humanitarian responses. However, conflicts shape urban form indirectly, by triggering demographic movement, rather than acting on built fabric themselves. This explains their lower rank relative to migration and investment, despite their historical centrality.

Technological development (weight = 0.0713) acts as an enabling layer—through GIS-based planning, digital rental platforms, and online municipal workflows—rather than a primary driver of physical redevelopment. Its influence on zoning and permit issuance in the Greater Amman Municipality is real but gradual, and its morphological impact remains indirect compared with population pressures and investment cycles.

Finally, the 2009 global economic crisis (weight = 0.0425) is the least influential factor. It slowed construction activity and delayed major projects—Jordan Gate Towers stalled from 2008 to 2023—but did not redirect urban development. Its role was a temporary brake on growth rather than a structural driver of new

morphological patterns.

Together, the three top factors account for nearly 80% of the total weight, highlighting that demographic and financial factors dominate over more gradual or event-bound forces. Table 3 reports the AHP weights of the six typo-morphological factors for Irbid and Amman cities.

6 Discussion

Globalization theory, in the context of urban studies, explores how global forces—economic, political, and cultural—reshape local urban environments^[3]. While urban morphology traditionally examines the physical form and structure of cities, this study integrates globalization theory to explore how these global forces impact the evolution of urban landscapes in specific locales like Amman and Irbid. This approach builds upon existing research in globalization theory, such as the works of Saskia Sassen on global cities^[24]. Different scholars highlight how global economic trends, migration, and cultural exchanges influence urban development. However, much of the existing research has primarily focused on the changes of urban morphology in different context, without addressing how globalization affects typo-morphology changes at the level of building types and spatial organization.

6.1 Globalization and Urban Form

Three globalization stages identified—pre-globalization, early-globalization, and fast-globalization—can be directly linked to the

Table 3: Pairwise comparison matrix of factors influencing typo-morphological changes in Jordan

Criteria/factor	Successive migrations	2000–2008 economic boom	Refugee camp evolution	Middle East wars	Technological development	2009 global economic crisis
Successive migrations	—	2	3	5	4	6
2000–2008 economic boom	1/2	—	2	3	3	4
Refugee camp evolution	1/3	1/2	—	4	3	5
Middle East wars	1/5	1/3	1/4	—	2	4
Technological development	1/4	1/3	1/3	1/2	—	2
2009 global economic crisis	1/6	1/4	1/5	1/4	1/2	—

NOTE

In AHP, each factor is compared against every other factor in pairs, using Saaty’s 1–9 scale, to judge their relative importance. This produces the pairwise comparison matrix (PCM). The weights (priority vector) are then calculated from PCM through eigenvector computation (or normalization method), followed by a consistency check ($CR \leq 0.10$) to confirm the judgments are logically coherent.

six AHP-derived factors. In the pre-globalization stage, limited migration and local craftsmanship maintained traditional courtyard typologies, aligning with the lowest globalization influence. The early-globalization stage corresponds with rising regional wars and conflict-driven migration, reflected in the dominant AHP weights of “successive migrations” and “refugee-camp evolution.” These forces triggered densification and hybrid morphologies in both Amman and Irbid. The fast-globalization phase coincides with the 2000–2008 economic boom and technological development, producing high-rise complexes, gated communities, and digitalized land-use transformation. This integration demonstrates that the quantitative AHP outcomes reinforce the qualitative periodization, providing a causal explanation of how globalization reshaped Jordan’s urban fabric over time.

The evolution of Amman and Irbid demonstrates how the influence of globalization unfolded through distinct historical phases, each shaped by different dominant factors. During the pre-globalization phase, limited migration and locally driven construction sustained traditional courtyard houses and low-rise stone structures. The early-globalization phase corresponds with intensified regional wars, successive migrations, and the emergence of refugee camps—factors that redefined neighborhood density and land-use mix. In the fast-globalization phase, the 2000–2008 economic boom and rapid technological advancement triggered the rise of mixed-use towers, gated compounds, and the adaptive reuse of heritage buildings for commercial and cultural functions. Across these stages, globalization operated through demographic, economic, and technological channels that collectively transformed Jordan’s urban typo-morphology. This periodization is reinforced by the building-use transition analysis, the residential-to-commercial pathway that dominates in Amman and the residential-to-educational pathway that dominates in Irbid both sharpen markedly in the fast-globalization phase, showing that the same globalization process produced two distinct, locally mediated morphological trajectories rather than a single uniform outcome. Table 4 shows globalization phases linked with dominant factors and morphological outcomes.

The transition-pathway evidence indicates that migration- and investment-related factors (successive migrations, refugee-camp evolution, and the 2000–2008 economic boom, jointly accounting for nearly 80% of the total AHP weight) operate through two distinct spatial logics. In Amman, these forces are absorbed mainly through land-market mechanisms—rising land values along arterials and heritage-adjacent streets incentivize residential-to-commercial conversion. In Irbid, the same forces are channeled

Table 4: Globalization stages, dominant factors, and morphological characteristics

Globalization stage	Dominant factor	Morphological findings in Amman and Irbid
Pre-globalization (1930s–1950s)	• Successive migrations • Refugee-camp evolution	Traditional courtyard villas and stone houses; organic low-density growth; minimal external influence
Early-globalization (1960s–1980s)	• Successive migrations • Refugee camp evolution • Middle East wars	Rapid densification; shift from single-family to multi-story apartments; hybrid local-modern typologies; integration of camps into city fabric
Fast-globalization (1980s–present)	• 2000–2008 economic boom • Technological development • 2009 global economic crisis	High-rise and mixed-use complexes; commercial corridor growth; adaptive reuse of heritage houses; spatial fragmentation and new skyline identity

through institutional expansion, particularly university growth, producing a residential-to-educational and service-oriented transition instead. This distinction refines the periodization above: globalization factors are structurally consistent across the two cities, but the pathway through which they reshape typo-morphology is mediated by each city’s dominant economic function—commercial-capital formation in Amman and educational-service provision in Irbid.

6.2 Theoretical Implications

Typo-morphology, as conceptualized in this study, treats building typology and urban morphology not as separate descriptive categories but as a single co-evolving system: building-function change is both a symptom and a driver of broader morphological transformation. This study adopts typo-morphology as a central framework to understand urban transformations under the influence of globalization. Typo-morphology examines how building types and urban forms evolve over time, influenced by social, economic, and political factors. This research integrates typo-morphology with theories of global urbanism and planetary urbanization. These theories suggest that urban forms are increasingly shaped by global forces, such as migration, economic

shifts, and technological advancements, rather than by purely local factors.

By integrating globalization with typo-morphology, this study introduces a more granular understanding of urban transformation, focusing on how global influences are reflected in specific typological changes, such as the conversion of residential areas to commercial zones or the adaptive reuse of heritage buildings. This methodological integration provides a novel theoretical contribution by linking global economic, social, and political forces with specific morphological changes in cities, something that traditional urban morphology has not fully explored.

The quantitative approach used in this study, which combines satellite imagery, GIS, and the AHP, allows us to assess the impact of globalization on urban morphology in a measurable way. By looking at Amman and Irbid across three stages of globalization, we offer a fresh perspective on how these cities have changed over time. This method complements existing theories by providing a data-driven analysis of urban form changes, highlighting the influence of global factors on the local urban fabric.

Through this approach, we demonstrate that globalization not only affects physical urban form but also shapes the social and cultural aspects of city life. The study extends current theories by showing that cities in the Middle East, like Amman and Irbid, do not just absorb global influences passively but adapt and transform their morphology to accommodate new global trends, while still maintaining aspects of their local identity.

This research frames “globalization” as both a driver and a lens for typo-morphological change. This approach addresses a gap in existing studies of land-use change in Amman^[40] and Irbid^[18], which focus on spatial expansion without exploring functional typologies. By overlaying building-use maps on a consistent 25 m × 25 m grid, we quantify the transformations occurring in residential-to-commercial conversions, the adaptive reuse of traditional houses, and the evolution of refugee camps into permanent communities. Through this analysis, we highlight how Jordan’s unique socio-political context characterized by successive migration waves and open-door investment policies creates distinct morphological patterns that both reflect and diverge from global typologies seen in Europe, South Asia, and the Gulf. Consequently, our study serves as a valuable reference for policymakers seeking heritage-sensitive development guidelines and for scholars aiming to understand how global forces shape local urban environments.

Methodologically, the research in Amman and Irbid utilizes multi-temporal GIS and satellite images alongside interviews,

aligning with established approaches. However, it extends the temporal scope significantly, covering the years 1953 to 2024, and explicitly addresses “globalization” as a driving force, including factors such as migrant inflows and global markets. Consistent with other studies, we observe densification and typological shifts, such as the decline of traditional courtyard housing in favor of mixed-use and commercial blocks driven by global pressures. Unlike studies that focus on heritage conservation, particularly in Amman’s historic core, our research emphasizes how Jordan’s cities adapt morphologically to globalization, providing local insights that complement global patterns. Overall, both the literature and our findings indicate that globalization tends to simplify urban fabrics and introduce new building types. Our GIS-interview approach also reveals unique, region-specific patterns in Amman and Irbid.

6.3 Practical Implications and Study Limitations

Having understood the discourse of transformation and the strategies used, these transformations reflect the major urban changes that the Arab world has experienced in recent years. Moreover, this research sheds light on the problem of camps that form unorganized urban communities that affect urban space within the city, especially in the Arabian countries that were exposed to the idea of “displacement” from Palestine and established camps in different countries, such as Jordan, Lebanon, and Syria. This leads us to further urban morphological studies in the Arab world affected by various globalization factors and explains the impact of political and economic changes on the urban landscape. The results provide practical tools for urban planners and policymakers in Jordan and the Middle East to balance heritage preservation with sustainable development. By identifying key factors of typo-morphological shifts, the GIS-based framework can inform zoning laws, adaptive reuse strategies, and heritage-sensitive urban guidelines. Additionally, insights into globalization’s impact on building-use transitions offer a model for other cities in Middle East to manage rapid urbanization while safeguarding cultural identity.

This study focuses on two Jordanian cities, Amman, the political and economic capital, and Irbid, a central hub for northern Jordan and an educational center. While they differ in their urban types, the trends observed in both cities reflect broader patterns in medium-sized Middle Eastern cities. Post-conflict cities such as Dara’a, Damascus, and Aleppo in Syria, as well as cities in Lebanon and Palestine, face similar challenges of migration and reconstruction, leading to significant transformation in urban

morphology. Gulf cities with rapid growth and heritage cities also experience typological shifts driven by local and global forces. Therefore, the findings of this study are most applicable to medium-sized, migration- and conflict-driven cities in the Middle East, rather than all cities in the region.

Future research could broaden the geographical scope to include cities like Riyadh, Cairo, or post-conflict Syrian urban centers such as Aleppo and Damascus, testing the typomorphological framework in varied political and economic contexts. Employing mixed-methods and resident perception surveys can help bridge data gaps, while integrating GIS with machine learning techniques may enhance pattern recognition. Further exploration of urban recovery in Syria post-2011, or hypermodernization trends in Gulf cities like Dubai and Doha, could offer deeper insights into how globalization interacts with local urban identities across the Middle East. Comparative studies that explicitly track building-use transition, would also help determine whether the commercial-versus-institutional divergence observed between Amman and Irbid is a general feature of capital-city/regional-hub pairs elsewhere in the region.

7 Conclusions

This paper seeks to explore the changing typomorphological characteristics in the Middle East through the cases of Amman and Irbid in Jordan, under the pressure of globalization. It is found that Jordan has experienced the stages of pre-globalization (the 1930s–1950s), early-globalization (the 1960s–1980s), and fast-globalization (the 1980s to present). The largest part of the urban building use spatial zones has been converted to commercial use within the cases of Jordan. Some residential houses and buildings have undergone a remarkable transformation and have been converted into cultural spaces to host artistic and public activities. This cultural interaction in the study area underscores the continued cultural and intellectual importance of Amman and Irbid cities amidst the overall urban transformation.

The unique urban landscape and architectural identity of Amman and Irbid remain distinctive amid expanding commercial development. The building-use maps presented in this study, spanning 1953 to 2024, visualize the evolving urban fabric of both cities and provide a basis for more informed future planning. However, this evolution did not follow a single path: Amman's transformation has been led by residential-to-commercial conversion concentrated along arterials and heritage-adjacent zones, while Irbid's has been led by residential-to-educational and

service-oriented conversion driven by university expansion—two distinct expressions of the same underlying globalization process.

Moreover, our GIS-based grid analysis mapped the transformation zones of building use types at a resolution of 25 m × 25 m. This analysis identified hotspots for commercial use and the adaptive reuse of traditional houses. Field interviews confirmed that successive waves of migration and the post-2000 real estate boom were key factors driving these morphological shifts. In our methodology, we also applied the AHP to translate these qualitative factors into quantitative weights, allowing us to systematically rank the influence of each driver on typomorphology.

This research identifies six factors that lead typomorphological changes under globalization: successive migrations, the 2000–2008 economic boom, refugee camp evolution, Middle East wars, technological development, and the 2009 global economic crisis, with successive migrations carrying the greatest weight. These findings provide a basis for legislators in Jordan to develop urban-planning strategies and city-friendly commercial spaces, and call on municipalities to prioritize both heritage sites and refugee camps in future planning. Methodologically, the study advances urban typomorphology research by combining historical imagery, GIS mapping, and AHP-based weighting within a single analytical framework, and demonstrates the value of applying Italian-school urban typomorphology methods to non-European, Middle Eastern contexts.

The understanding of major urban transformations in the Arab world confirms the need for further morphological studies in cities such as Cairo, Riyadh, Dubai, Abu Dhabi, and Doha. The findings provide valuable insights for Jordan's legislators and form a basis for innovative urban-planning strategies and city-friendly commercial spaces in the region. It calls for municipalities to prioritize attention to the heritage sites and refugee camps. Overall, this study highlights the importance of economic and social transformations for building-use change and the resilience of cultural heritage in these urban spaces despite various globalization factors. Methodologically, this research advances urban typomorphology studies by combining historical imagery, GIS mapping, and AHP-based weighting within a unified analytical framework, enabling the quantification of globalization's influence on urban evolution. Furthermore, it also proves the value of applying Italian urban typomorphology lessons to non-European contexts, especially in the Middle East and Arab world, to explore major urban and morphological transformations under diverse global influences.

This study shows that conflict-driven migration, the 2000–

2008 economic boom, and the gradual development of refugee camps are the three main forces behind seven decades of urban and architectural change in Amman and Irbid. These forces have shifted building use from residential to commercial and transformed traditional houses into mixed-use spaces. Successive waves of refugees from 1948 to 2011 were the primary driver of urban change, most clearly seen in Irbid camp's transition from temporary shelters to permanent housing. Based on these findings, urban planners should address migration-driven pressures and the lasting effects of the economic boom, while preserving historic urban fabric through typological zoning, adaptive reuse policies, and alignment with Sustainable Development Goal 11 (sustainable cities and communities) and UNESCO's Historic Urban Landscape framework. The combined GIS-AHP framework presented in this study offers a measurable and replicable method for understanding how globalization shapes urban form across the broader Arab world.

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全球化发展下中东地区的城市形态类型学演变研究： 以约旦安曼与伊尔比德为例

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摘要

全球化联结了不同的文化体与经济体，深刻影响着城市结构、土地利用及建筑功能特征。在全球化发展进程中，阿拉伯世界经历了显著变革，但目前学界对中东地区城市形态类型学的研究仍显不足。本文以约旦安曼与伊尔比德为例，探讨了全球化背景下城市形态类型特征的演变。研究利用卫星影像、访谈资料及基于GIS的空间分析方法，从城市、片区与地块3个空间尺度对1953年、1981年、2000年及2024年4个时间节点的建筑使用类型展开分析；同时引入层次分析法（AHP），对影响形态类型变化的因素进行量化与权重排序。研究结果表明，约旦经历了3个全球化阶段：前全球化时期（1930~1950年代）、早期全球化时期（1960~1980年代）和快速全球化时期（1980年代至今）。在此进程中，六大关键因素驱动了形态类型的变化，分别为持续移民潮、2000~2008年经济繁荣期、难民营的演变、中东地区战争、技术发展及2009年全球经济危机。其中，前三个因素是安曼与伊尔比德城市形态演变的核心驱动力。上述发现揭示了70余年来经济与社会力量塑造城市形态的过程，也表明形态类型学是理解全球化对城市转型影响的有效分析工具。本研究所构建的GIS-AHP分析框架，为城市形态类型学引入了可量化的维度，也为探讨全球化对中东城市的空间影响提供了新的研究路径。

关键词

全球化；中东；约旦；城市转型；形态类型学；建筑功能

文章亮点

- 综合构建了GIS-AHP框架，量化分析中东地区城市形态类型学的演变
- 运用城市形态类型学理论，探析全球化发展的空间特征
- 追溯约旦城市从传统到现代的三个全球化演进阶段
- 揭示地区冲突引发的移民浪潮是城市形态类型学演变的最重要动因
- 文化遗产的适应性再利用较好地调和了全球化发展趋势与地方身份认同

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