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FACULTY OF ENGINEERING – SOHAG UNIVERSITY

Sohag Engineering Journal (SEJ) Vol. 5, No. 2, September 2025

Countering Negative Contextual Influences on Egyptian Balconies: A Non-Participant Observational Study

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Abstract

Balconies serve as important architectural elements, linking the indoor and outdoor building environments. Studies point out that their function and design is greatly influenced by the local context; hence, this study examines the contextual influences on Egyptian balconies. The study starts by identifying the physical and functional characteristics of balconies through literature. Subsequently, structured face-to-face and online interviews with thirty-six architectural experts offer insights into the impact of local context on these characteristics. To affirm expert opinions, a non-participant observational survey was conducted across seven Egyptian cities over a thirteen-month period, viewing more than 3500 balconies. The survey assessed various factors influencing balcony design and use in light of the prevailing culture. The findings highlight the significant role of the local context in shaping balcony characteristics. It underscores the influence of the surrounding environment on balcony design. The outlined recommendations aim to optimize balconies, serving as a valuable guideline for architects to enhance current and future balcony designs in the region.

 DOI: 10.21608/sej.2025.403957.1081.

Keywords: Balconies; Egyptian context; Non-participant observations; Field surveys; Contextual influences.

1. INTRODUCTION

Balconies are more than just decorative elements in architecture; throughout history, they have been integral to the social structure of many different societies [1, 2]. Their development demonstrates how they have evolved to satisfy the changing social and functional requirements of society while continuing to be essential to architectural beauty [3, 2, 4, 5]. Balconies have a longstanding history that can be traced back to ancient civilizations. Such elements were integral components of architecture and played a vital role in society [6]. The earliest concept of balconies was produced out of functionality [6, 7]; Early balconies, which are said to have been constructed in Ancient Greece more than 2,000 years ago, were constructed to improve natural light and air circulation in houses [8]. In this civilization, builders started constructing extended cut-outs from the flooring of buildings, which eventually became independent spaces of their own [7]. In Persia and Egypt, the balcony had a specific ceremonial function similar to that of a podium, allowing monarchs to address the crowds below [7]. In the Middle East and during the Middle Ages, the Mashrabiya, a type of projecting oriel window enclosed with carved wood latticework, had prevailed [6, 9]. It was traditionally used to catch the wind and promote natural cooling through the placement of basins of water to induce evaporative cooling [6]. It is worth noting that despite it falling into disuse through the 19th and 20th centuries, sustainable architecture has led to its revival as a feature of vernacular architecture, where they have become an essential component of a region's architectural environment as their form and function are influenced by regional customs, building materials, and weather patterns [4–6, 10]. In fact, the global balcony construction market was estimated at $15.6 billion in 2024 and expected to grow to $24.3 or more by 2033 [11], which demonstrates the importance of such an element and the need for optimizing it.

In the modern age, balconies have evolved from mere architectural elements to significant spaces that contribute to the quality of life in urban environments and serve as a bridge between the private and public realms [1, 12]. The design and functionality of balconies have also evolved, with architects and designers exploring innovative ways to maximize their utility and aesthetic appeal [13, 14]. For instance, the use of glass balustrades has become increasingly popular, providing unobstructed views while ensuring safety [12, 15]. As such, balconies can have an impact on the indoor environment [1, 3]. Furthermore, they provide a platform to capture visually pleasant views of the proximate landscape or greenery [15, 16]. Also, they can convey a sense of depth and perforation to the building, which consequently increases the aesthetic value of the building's façade [17–19] and evokes a sense of relation and bonding

to the community [20]. From the architectural expression perspective, the rich architectural features associated with balconies allow designers to utilize them to convey their architectural schemes; balconies can further promote any required architectural trend of a building due to a variety of materials, forms, and designs [12, 21, 22].

Balconies have been also recognized for their potential to improve the thermal performance of buildings. By acting as a buffer zone, they can reduce heat gain during summer and heat loss during winter, thereby contributing to energy efficiency [1, 3]. They can reduce summer cooling energy consumption by up to 12.3% and reduce heating energy in cold climates by up to 46% [23]. These capabilities are due to specific physical characteristics such as the overhanging effect, the greenhouse effect, and the acoustic shielding capabilities, hence benefiting the building's interior environment [3, 21]; studies have shown that balconies influences natural ventilation [24, 25], air flow [26–28], and thermal balance [24, 29, 30]. Balconies with a width equal to 40% of the façade can improve indoor air quality by 18–26%, while a 20% depth configuration enhanced it by 9–10% through increased air changes and speed [31]. Balconies also potentially positively influence noise mitigation [3, 12, 24, 32], exposure to pollutants [33], and management of natural lighting [34, 35]. As a fundamental element of residential dwellings, balconies have also become an integral part of urban living as they provide a suitable area for conducting many social, leisurely, and functional activities [36–38]. Such activities positively aid the mental health and the overall livability of the dwelling [39]. Activities such as talking, relaxation, storage, and cloth drying can be carried out on the balcony [5, 40]. This is aided by the fact that balconies are considered a vital element of natural air ventilation [41]. Similarly, the integration of greenery on balconies, through potted plants or vertical gardens, contributes to the residents' well-being, endorsing self-sufficiency, and encouraging biodiversity [16, 42, 43]. In fact, children exposure to nature, facilitated by balconies, can result in 55% lower risk of developing psychiatric disorders [44, 45].

Despite their numerous benefits, the design and utilization of balconies in the modern age are not without challenges as the surrounding circumstances can impart a significant influence on design and performance [5, 12]. Environmental conditions, for instance, can call for the use of extensive shading devices in hot bright regions, whereas, the use of large glazed walls and railings is more suitable in colder areas [24, 46–48]. Similarly, regulations, which influence architecture in general, affect balconies [49–51]. Certain legislative limitations affect the area of balconies as the law regulates the extent of protrusions and overhangs of buildings; For instance, designers could resort to designing balconies as large social gathering spaces in areas where building setbacks allow for the relative freedom of protrusion. Contrarily, denser locations with highly controlled regulations could result in slimmer balconies. Likewise, economics is an important factor in architecture [52, 53] which can play a role in determining the design of balconies as there is a direct correlation between the dwelling's area and the area of balconies. Economics also affects the prevailing architectural trends which in turn affect balconies. This is true for the type and quality of materials used within the balcony's design. Social norms can play a big role in balcony designs; Privacy, for example, can dictate certain railing and screen designs in order to provide a more privacy in conservative areas, whereas the social norms in other areas can allow for the use of revealing rail designs as not much privacy is required [1, 12, 54–56]. This is also true for the use of curtains, screens, or excessive plantation. Moreover, balconies' actual use can differ from the intended use, with many being used for storage or left unused.

It is evident that the local context plays a significant role in influencing the design and function of balconies. This underscores the importance of adopting a user-centric approach when designing balconies, which carefully considers the specific local and regional requirements and desires of the residents. Despite its significance, this particular aspect has been disregarded in research, often being overshadowed by other more prominent factors.

2. RESEARCH PROBLEM AND GAP

In recent years, balconies in major Egyptian cities have transformed from pleasant architectural elements to haphazard interventions; It is common to see balconies converted into storage areas and mechanical utility points rather than pleasant open-air retreats. It is reasonable to argue that these interventions, driven by individual whims, economic constraints, and a lack of cohesive planning, have eroded the functionality and aesthetic essence of these outdoor spaces. Homeowners customizing balconies without considering the building facade can result in a clash of colors and forms, disrupting the urban fabric and posing safety concerns. It seems that these changes are necessary due to specific conditions or situations that are unique to the local area. Hence, effective action must take place to mitigate such deficiencies and restore the intended function of balconies within the region. Despite extensive research on balcony design and related issues, to the authors' knowledge, minimal attention has been given to the impact of the local context on balconies and how it may detrimentally affect their functionality and aesthetics. Hence, the present study attempts to explore this area of research to reinstate balconies in the area to their original purpose.

3. AIM AND NOVELTY

While architectural standards dictate the general design and function of balconies, the local context can significantly impact them. Observations indicate that this influence often negatively affects balcony functionality and aesthetics. The study accordingly aims to propose an effective approach to counter the negative influence imparted on balconies through devising a practical and applicable scheme that can be utilized by architects and other stakeholders to both enhance the condition of existing balconies and upgrade the designs of future balconies. Therefore, the study intends to understand the manner in which the local context impacts both function and aesthetics within the study area and attempts to analyze the personal motives and the surrounding conditions that drive residents to undertake balcony alterations. Such comprehension is novel as a) the proposed scheme provides unique practical guidelines based on experts' opinions; b) the study provides an updated field-based perspective on the condition of balconies within the study area, which is representative of other similar areas in the region. The study is significant as its findings shed light on the contextual influences on design in general and balconies in particular. Furthermore, the proposed scheme allows architectural designers to better evaluate the requirements of residents, which in turn allows for the optimization of architectural design.

4. METHODOLOGY

A mixed-methods approach was employed in this study, incorporating both qualitative and quantitative techniques. These included a literature review, expert interviews, and a non-participant observational survey. The methodological process is illustrated in Figure 1. The study began with a comprehensive review of existing literature on balconies to identify their physical and functional characteristics, forming the foundation for the subsequent investigation. Following this, structured interviews, both face-to-face and online, were conducted with thirty-six architectural experts selected for their specialized knowledge and experience in Egyptian architecture. These interviews aimed to gather professional insights into the influence of the local context on balcony design and use. To validate and expand upon the experts' opinions, a non-participant survey of balconies was implemented, covering seven major cities across Egypt. The survey focused on factors influencing balcony design and use, including aesthetics, function, maintenance, cultural significance, and the surrounding environment. The survey was aimed at: a) verifying the opinions of the experts; and b) detecting additional contextual influences on balconies. Based on a rational analysis of the acquired information, the study is able to highlight the influence of the local context. Accordingly, the identified deficiencies and drawbacks resulting from local conditions are analyzed to develop a comprehensive scheme to counter their effects on balconies. The scheme identifies the role of stakeholders involved in balcony optimization and, as such, may be used as an effective guideline for enhancing current and future balconies within the region.

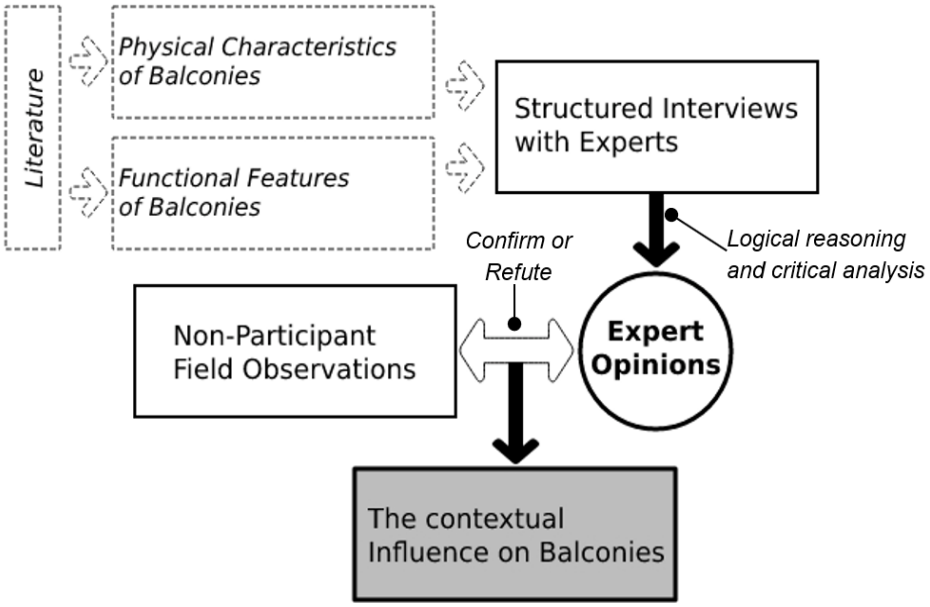

Figure 1: The methodological process of the study.

5. LIMITATION AND SCOPE

While the non-participant survey method is a widely recognized and reliable tool for the survey of large numbers of elements [5, 57, 58], it is limited to observable physical features and may overlook user involvements and personal circumstances. To counter this, the study incorporated expert interviews as a compensatory measure. However, future research should directly engage residents to capture their experiences and patterns. Additionally, as the study represents a single temporal view, it may not reflect the continuously evolving urban policies, or socio-economic shifts. Supporting studies are recommended to better understand these dynamic factors over time. The study focuses on balconies located in typical urban settings (i.e. major urban cities) and excludes settings with distinct or exceptional architectural character (e.g. new cities, rural villages, desert areas, touristic zones, etc.).

6. PHYSICAL CHARACTERISTICS OF BALCONIES

As typical of all architectural elements of buildings, balconies share certain generic physical features. Naturally, these affect the manner in which the balcony is used, the type of activities carried out within, and the perception of balconies. Based on literature [13, 5, 12, 59], studies outlined in section 1, and the authors' knowledge, such features are outlined in Table 1 and their influence over residents are described.

TABLE 1: THE GENERIC PHYSICAL CHARACTERISTICS OF BALCONIES.

Characteristic	Influence
Area	There is a correlation between the area of the balcony and the apartment; Naturally, Small residential apartments will encompass smaller balconies and vice versa. Smaller balconies allow for limited social and functional activities compared to large balconies.
Dimensions	The dimension of the balcony affects its ratios. Balconies range from slim strip-like areas to square-ratioed areas. Slim balconies are optimal for activities such as landscape observation, while square-ratioed balconies allow for better social gatherings and group activities.
Orientation	The interaction between the balcony and its natural surroundings is affected by orientation. Natural lighting and ventilation are examples of aspects associated with it.
Location	The street overseen by the balcony influences its function as it affects aspects such as privacy, noise, and pollution.
Railing	Railing designs vary between opaque, perforated, transparent, and mixed. Similarly, utilized materials largely vary. The railing type affects the ability to connect to the building's exterior, privacy, and other important aspects.
Shading devices	Shading devices are used to limit the direct sunlight affecting adjacent spaces, especially in bright hot areas. This can also influence thermal comfort, ventilation, and noise exposure.
Furnishing	Depending on the desired function, many furnishing items can be placed on the balcony to aid social activities. Such include seating, tables, and fans.
Architectural design	The balcony's design must convey the architectural style intended by the building's designer. Hence, designers consider many criteria such as facade patterns, balcony location, openings, and lighting direction.
Aesthetic qualities	The finishing materials and utilized color have a significant effect on the appearance of the balcony. Thus, it must be considered to complement the building's design.

7. FUNCTIONAL ROLE OF BALCONIES

Balconies serve as transitional spaces between the interior and exterior of buildings, offering functional, social, and psychological benefits that enhance residents' living experience. The functions outlined below are drawn from existing literature and were used to methodologically guide both the expert interviews and the non-participant observational surveys conducted in this study:

7.1. Interior natural lighting

Balconies inherently allow for the penetration and distribution of natural light into adjacent spaces [47, 35]. Hence, they can reduce reliance on artificial lighting systems in the daytime and contribute to the overall health of residents [47, 60, 61]. However, the presence of horizontal slabs and railings can affect the degree of penetrating light, thus, such aspects must be considered to achieve optimal lighting [62, 12, 34, 63].

7.2. Natural ventilation and protection from pollutants

Balconies can significantly contribute to the natural airflow inside residential areas [14, 64, 65]. Studies emphasize that certain balcony designs can induce additional airflow and reduce humidity levels [25, 66–69]. This advantageous effect can be manipulated by characteristics such as balcony size, depth, and orientation [12, 13]. Contrarily, balconies can create a shielding effect from undesirable wind flow, thus protecting the building from wind overloads, dust, and contaminants [64, 70].

7.3. Social and personal activities

Surveys indicate that the intimate nature balcony area aids performing many human activities [12, 71]. For instance, balconies offer privacy despite being outdoor spaces, making them suitable for private conversations, phone calls, relaxing, dining, and meditation [5, 40]. Privacy can be enhanced through sets of partitions, louvres, curtains, and semi-transparent screens. Also, studies show that balconies can induce a feeling of belonging and connection to the outdoors; During regular daily activities, balconies allow perceiving exterior landscapes without requiring much physical movement, especially in well-oriented balconies [12]. Other balcony activities include storage, dining, and clothes drying [5, 12, 71].

7.4. Thermal comfort

Certain aspects such as balconies' designs and orientation can passively enhance thermal comfort, reducing reliance on HVAC systems and limiting energy consumption [25]; In hot sunny climates, design features such as depth, glazing, vegetation, window-to-wall ratio, and shading elements can manipulate solar radiation, hence reducing solar loads [25, 62, 72]. Studies affirm that balconies have the capacity to lower heat transfer through building facades and reduce direct solar radiation affecting interior spaces [12]. This positive effect is also true in the case of cold climates; Under certain design considerations, balconies can contribute to increasing solar gains by acting as a solar glass house affecting proximate spaces [24, 73].

7.5. Mitigation of acoustic nuisance

The additional area created between interior spaces and the exterior perimeter due to the presence of balconies acts as a sound-mitigating buffer zone, resulting in relatively lower noise nuisance [12, 74]. Similarly, balcony slabs deflect direct sound waves additionally reducing noise. Furthermore, specific features such as railing designs, finishing materials, door air-tightness, and custom acoustic fittings significantly influence the acoustic properties of balconies [12, 75, 76].

7.6. Contributing to the eco-system

The balcony area provides an optimal location for growing certain species of plants as they provide sufficient protection from excessive wind and sunlight [12, 16]. Studies show that balcony planting could potentially reduce the urban heat island effect, filter pollutants, enhance the visual properties of buildings, and mitigate noise [77, 78]. Furthermore, plants serve as an additional layer of insulation, thus reducing heat transfer in summer and winter [16].

8. INTERVIEWS

The interview process is intended to provide a professional insight into the manner in which the local context could affect balcony design and function. As such, the interview process targeted experts with both academic and industrial knowledge. While the experts were asked to freely express their opinions, they were offered carefully planned discussion topics (in the form of questions) to assist the experts in focusing on the intended goals. A total of 36 experts were interviewed, face-to-face or online based on the interviewee's preference. Each interview consisted of two main parts as follows:

- Part 1: aimed at affirming the presence of tangible influences from the local context on balconies from the perspective of experts and identifying the affected balcony features.
- Part 2: aimed at discovering the dynamics of these influences and the causes behind them.

Table 2 Shows examples of these questions and topics, and examples of the potential influential factors associated to them. It should be noted that these topics were compiled by the authors, based on the balconies' features, characteristics, and role, which are in the literature presented in sections 1,6, and 7.

TABLE 2: EXAMPLES OF DISCUSSION TOPICS WITH THE EXPERT AND POTENTIAL ASSOCIATED FACTORS.

Examples of questions / discussion topics	Interview part 1	Interview part 2	Potential influential factors: Regulations	Fiscal considerations	Proximate land usage	The real-estate market	Designer proficiency	User preferences	Public awareness	Public taste	Social class / strata	Social norms	Personal requirements	The environment
Does the local context affect the architectural features of balconies?	√		●	●	●	●	●			●				●
Does the local context affect the functional features of balconies?	√						●	●	●	●		●	●	
Which balcony features are generic or independent of geographical location?	√		●	●	●	●		●	●	●	●	●	●	●
Within the study area, are balconies a prominent element of buildings' aesthetics?	√			●			●	●		●	●			
Within the study area, do balconies contribute to the overall visual cognition?	√	√			●		●						●	
Within the study area, do balconies provide privacy to users?	√	√			●		●		●		●	●		
Within the study area, do balconies provide Safety to users?	√	√	●				●		●			●		
Within the study area, do balconies evoke a sense of relation / belonging?	√	√			●		●			●		●		●
How does the local context affect the area and design (shape) of the balcony?		√	●	●		●	●	●		●		●	●	
How does the local context affect finishing colors, railings, opening designs, etc.?		√	●	●	●	●	●	●		●	●		●	●
Within the study area, do balconies maximize social bonding?		√		●	●			●		●	●	●		
Within the study area, do balconies assist in the completion of daily activities?	√	√			●			●				●	●	●
Within the study area, do balconies serve their purpose as intended?	√	√	●	●	●	●	●	●				●	●	●
How should balconies be designed to fulfill the needs of local residents?	√	√	●	●	●	●	●	●	●	●	●	●	●	●

9. SURVEY OF BALCONIES

A non-participant survey was conducted to detect local influences on balconies. The authors resorted to this method, as an academically accepted reliable tool [5, 57, 58], because it does not require legal consent from residents, as balconies are considered within the public domain; This allows for surveying a substantial number of balconies in a short time, avoiding possible complications. The observations were carried out in seven cities of Egypt (Cairo, Giza, 6th of October, Alexandria, Mansoura, Assuit, Sohag) to fully represent the entire diverse geographical and socio-cultural contexts of the country, while considering accessibility for the authors. It is noteworthy that the selected cities were somewhat concentrated in the Nile Delta area in response to the higher population density in this region. The location of the selected cities is shown in Figure 2. Within each city, the observations were conducted in several areas, with different residential typologies in mind (economic housing, luxury apartments, multi-story flats, etc.). This variation is to allow rfor the including various social and financial classes, thus accurately representing the entire social structure. The surveys were conducted during the period of approximately thirteen months (June 2024 to July 2025) and were carried out during the daytime (8:00 am to 5:00 pm) to allow better visual observations. In total, a number of over 3500 balconies were visually surveyed, as guided by similar studies [5]. For analysis purposes, photographic images of selected balconies were captured. Example photographs showing the current condition, modifications, and recurring similarities of balcony design are provided in Appendix A. The survey was directed towards capturing the following:

- The physical characteristics of balconies, as mentioned in Table 1.
- Alterations to the balconies' appearance and attempts to optimize their characteristics.
- Balcony-related human activities and social interactions, based on the literature mentioned in section 7.
- Surrounding conditions that potentially affect the balconies' ability to address their functions.

It is important to note that in this study, the observed physical features of the balconies are discussed and analyzed in conjunction with expert feedback to provide contextual support, as detailed in sectionError! Reference source not found..

Figure 2: Location of selected cities within Egypt (image from Google Earth, edited by the authors).

10. RESULTS AND DISCUSSION

The interviewed experts were able to provide detailed responses on the condition of balconies within the study area, and the effect of the local context on their design and utilization. These opinions were, to a good extent, in agreement with the inspected features observed through the non-observational survey. The experts felt that there are no explicit architectural characteristics that are subjective only to the study area; namely, there are no traditional, ethnic, or artisan features strongly linked to balconies within the area. However, the experts highlighted that certain aspects of the local context (such as economics, aesthetics, etc.) can greatly affect balconies in terms of both design and frequency of use. Table 3 presents examples of the experts' comments and their associated contextual aspects. Based on an analysis of the experts' opinions and the authors' examination through observational survey, significant factors that affect balconies can be described in the following:

10.1. Economics

Experts highlight that the high cost of owning or leasing residential units relative to average incomes leads to smaller apartment sizes, often resulting in reduced balcony areas or their complete elimination. From a cultural perspective, many residents consider balconies a waste of space, preferring units with small or no balconies. Consequently, balconies in the study area are typically narrow and limited in functionality. Residents frequently conjoin the balcony space into adjacent interiors by installing custom windows, fittings, or railings, even when balcony size is sufficient. This practice has become so widespread that some designers position balconies to facilitate post-occupancy alterations. Real estate developers, seeking to maximize profits by increasing the number of units per building, further contribute to shrinking apartment sizes, reinforcing owners' tendency to integrate balconies into living areas. It should be noted that, while these changes limit opportunities for recreation or relaxation, they may provide benefits such as reducing exposure to pollution and thermal loads. Economic constraints also influence material selection, with many balconies finished using low-cost, visually unappealing materials, or unmaintained facades that further diminish their aesthetic and functional value, such as in Figure 3(A).

10.2. Aesthetics

In general, experts find that the functional aspects of balconies acquire greater attention than the aesthetic; Balconies in the region can be subjected to neglect and minimal maintenance. Undesirable qualities such as peeling paint, cracked tiles, rusty railings, and accumulated debris can be commonly observed, as the example shown in Figure

3(A). This is due to building owners often prioritizing utilitarian aspects, which include the over-use of signs as shown in Figure 3(B), leaving the visual aspects unattended. Other factors can also contribute to an aesthetic decline of balconies as follows:

- The extensive unauthorized alterations or additions create a haphazard appearance
- Designers selecting unsightly inexpensive materials to reduce costs.
- Exposure to elevated levels of air pollution (e.g. vehicle emissions, sandstorms, and industrial waste), particularly in densely populated areas, resulting in dirt and discoloration on balcony surfaces.

Unsightly balconies can detract from the urban landscape, lowering quality of life for residents and visitors, reducing property values, and hindering revitalization efforts. Such spaces are often underutilized for recreation, relaxation, or socializing. Conversely, residents sometimes over-decorate balconies according to personal preferences, disregarding the overall architectural character, such as the example in Figure 3(C). While this is in accordance with the prevailing architectural taste in these regions, over decorating can also result in an undesirable random architectural theme.

(A) (B) (C)

Figure 3: Aesthetic issues: (A) Poor maintenance; (B) Signage overuse; (C) Individual decorations.

10.3. Privacy

Although the concept of privacy is important, especially in a Middle Eastern region, experts see balconies as areas of diminished privacy; while architectural designers consider main streets to be optimal locations for placing balconies, residents may perceive them to be disadvantageous as they can result in a sense of lost privacy. Residents accordingly use specialized curtains, blinds, or partitions to address privacy issues, such as shown in Figure 4(A). Similarly, railing designs are important as they can increase privacy, which is why it is common to see opaque or solid railings in the study area. Also, balcony doors fitted with French-style blinds are typically used to increase privacy without reducing ventilation.

10.4. Design

In general, most experts feel that balconies do not receive much attention in terms of architectural design; Designers sometimes perceive balconies as insignificant complementary elements rather than places suitable for gathering or relaxation. Accordingly, balconies in the study area are typically small, narrow, and poor in architectural features, as the example shown in Figure 3(C). Also, plan-wise, circular, curved, and arc-shaped perimeters are avoided as they require more space compared to polygonal-shaped perimeters. Furthermore, residents feel that balconies are unimportant as designers can neglect orienting balconies to overlook pleasant exterior views, which conflicts with one of its main factions as a place for relaxation and enjoyment. Of course, this is also because many neighborhoods in the study area lack pleasant views.

10.5. Restricted views

Many residents regard balconies as spaces for relaxation and for enjoying surrounding views; however, this role is often undermined when nearby buildings or other structures obstruct sightlines. Experts note that such obstructions can substantially diminish the visual appeal of balconies and limit their usage. The problem extends beyond aesthetics, as blocked views can also reduce access to natural light and fresh air, resulting in darker, less inviting spaces. Field surveys indicate that this issue is common in Egypt, especially in densely populated urban areas, where close building proximity is a frequent occurrence, as shown in Figure 4(B). Addressing restricted views requires interventions at both

the urban and architectural scales; Urban planners should prioritize maintaining open spaces within the urban fabric to the environmental quality of existing balconies. On the architectural level, designers can adopt measures such as adjustable screening systems, strategic window placement, or vertical gardens to enhance visual privacy and mitigate the negative impact of obstructed views, thereby restoring both the functional and aesthetic value of balconies.

(A) (B)

Figure 4: Surveyed balconies: (A) Customized curtains; (B) Buildings' Proximity.

10.6. Laws and regulations

The interviewed experts pointed out that national and regional building laws and regulations affect balconies, especially the plan design; the allowed building lines, limits, and percentages influence the area that designers dedicate to balconies. For example, balconies are commonly larger in areas where the allowed built-land ratio is high due to the availability of a relatively larger building area, compared to areas with reduced built-land ratios. Furthermore, in locations where buildings are legally required to be directly adjacent to each other (with only one or two sides overseeing the street), designers are forced to orient balconies to face the streets' direction. Contrarily, in stand-alone style neighborhoods, balconies are oriented to more desirable directions. Experts also mention that regulations affect the color and appearance of balconies, especially in newly developed areas. Such aesthetic regulations are advantageous in certain cases are they produce a harmonious appearance for the entire area. However, these regulations can also hinder creativity or impose the use of inappropriate colors or materials.

10.7. Function

Experts concur that balconies within the study area predominantly serve utilitarian purposes rather than providing spaces for relaxation or recreational activities. The primary functions of balconies typically include facilitating cloth-drying (Figure 5(A)), storage solutions, or serving as mounting points for mechanical or electronic installations. Nevertheless, in tranquil or sparsely populated locales, balconies may occasionally be utilized for unwinding and enjoying views of the surrounding environment. It is noteworthy that engaging in activities such as gardening or dining on balconies is relatively uncommon. This trend can be attributed to various factors, including the prevailing hot climate, which tends to discourage recreational pursuits in outdoor spaces. Additionally, concerns related to pollution and noise disturbances further contribute to the limited utilization of balconies for leisure activities. Therefore, while balconies offer potential for relaxation and observation in select environments, their predominant role remains focused on practical functions within the study area.

10.8. Climate conditions

The temperate climate of Egypt, compared to other Middle Eastern countries, allow for good utilization of balconies during certain seasons. However, seasonal weather changes that result in extreme heat or lack of shade may discourage people from spending time outside on their balconies. Additionally, factors like dust storms or high humidity levels can further limit the usability and maintenance of balconies. Hence, experts infer that it is essential to consider the climatic effect in the design of balconies by incorporating the use of shading devices as a regular element in balcony design. The survey reveals that the use of such devices is scarce, as residents typically introduce them to the balcony rather than the designer. While some resident self-incorporate shading devices or custom-fitted windows, such as in Figure 5(B&C), other building owners eliminate balconies altogether by converting them into indoor spaces for administrative or commercial use, as illustrated in Figure 5(D). In this context, legislators should update regulations

and building codes to mandate the inclusion of shading devices in balcony designs. It is worth noting that the use of shading devices introduced by the designer are advantages as they ensure design theme consistency and guarantee efficient shading as they are typically better designed to counter climatic conditions.

(A) (B) (C) (D)

Figure 5: Climate issues: (A) Cloth drying; (B) Self-incorporated shades; (C) Custom-fitted windows; (D) Elimination of balconies.

10.9. Noise and pollution

The experts indicate that the elevated levels of noise nuisance results in less appealing balconies. This poses significant challenges to the enjoyment and usability of balconies as peaceful retreats. To mitigate the adverse effects of noise pollution, architects and designers should prioritize incorporating soundproofing measures into the design of balconies. Utilizing noise-absorbing materials, such as acoustic panels or double-glazed windows, can significantly reduce the intrusion of external noise and create a more serene environment. Additionally, the strategic placement of balconies far from major roadways further enhances the calm ambience. Similarly, air pollution, resulting from vehicle emissions or dust, can negatively impact the experience of using balconies for relaxation or recreation. Experts accordingly suggest the use of green infrastructure, such as vertical gardens, rooftop planters, or potted plants, which can play a vital role to attenuate air pollution through filtering and purifying the surrounding air. At legislative perspective, encouraging cleaner transportation options, implementing stricter emission standards for vehicles, and promoting sustainable industrial practices can significantly enhance the air quality in cities.

10.10. Safety and security

Surveys reveal that safety measures, such as proper railings and barriers, are often lacking, posing serious risks. Therefore, enforcing strict building codes that require durable, well-designed railings and barriers is essential. Municipal authorities must also mandate regular inspections to detect and address damage or deterioration in such elements. Experts highlight balconies as potential security vulnerabilities if not properly secured, particularly in ground-floor apartments, where they can serve as easy entry points or observation posts for burglars. As a result, many residents have installed steel reinforcements, which, while improving security, compromise balcony aesthetics and reduce their recreational use. Experts thus recommend integrating effective yet visually appropriate security measures. Additional measures like surveillance cameras, motion-sensor lights, and alarms can further deter intruders and enhance overall security.

TABLE 3: EXAMPLES OF EXPERTS' COMMENTS DURING INTERVIEWS (TRANSLATED TO ENGLISH BY AUTHOR), CATEGORIZED TO THE PERTAINING INFLUENCE SCOPE.

Aspect	Comments
Economics	*"The high prices of residential units makes residents prefer small apartments without balconies."* *"The economic factor results in designing narrow elongated balconies."* *"Residents resort to adding the balcony area to the adjacent space, even when this is unnecessary."* *"The desire of real-estate companies and developers to increase their profit results in small apartments. This encourages owners to transform the balcony into additional interior spaces."*
Aesthetics	*"Focus is usually given to function rather than aesthetic features."* *"Some tend to not finish the balcony's exterior, as it does not affect the appearance of the interior of their home."* *"Many people prefer to save money by not addressing aesthetic issues or by using low-quality materials."*

Privacy	*"Balcony orientation and adjacent street widths commonly result in privacy issues."* *"Privacy issues can impose restrictions on balconies usage, especially for women, being a middle eastern area."* *"Most railings are constructed using bricks to increase privacy. Glass railings are rarely used. Also, balconies are fitted with French blinds to ensure privacy with no effect on air flow."*
Design	*"Balconies lack sufficient designer attention."* *"Curved shapes require larger areas than polygonal, hence they are commonly avoided."* *"Balconies are usually unsuitably too small for sitting or relaxing."* *"The lack of nice views contributes to residents feeling that balconies are insignificant."*
Building laws and regulations	*"Regulations have profound control on balconies."* *"In areas with a 100% building ratio, orientation is limited to the main street only."* "*Having a setback of 3 meter, for example, will allow designers to manage balconies more freely to better comply with architectural standards."* *"Regulations can affect balcony colors, especially in new areas."*
Function	*"Balconies in this area are commonly known to be used for drying cloth and storage only."* *"In calm areas, balconies can be used for relaxation."* "*Balconies in Egypt are used only in a practical capacity to facilitate home tasks."*

10Section 10 identified the negative local contextual impacts. Accordingly, Table 4 classifies balconies by the most notable impacts, outlining common causes and providing surveyed examples, as highlighted by the experts.

TABLE 4: CLASSIFICATION OF BALCONIES BASED ON THE MOST NOTABLE NEGATIVE CONTEXTUAL IMPACTS.

Category	Description	Negative Impact	Common Causes	Surveyed Example
Underutilized	Narrow or awkwardly shaped; insufficient depth	Limits recreational, social, and relaxation uses	High housing costs leading to reduced unit sizes; low priority	Balcony too narrow to place a chair, only used for storage
Integrated	Fully enclosed and merged into adjacent interior	Outdoor space loss; reduced ventilation and connection	Desire to increase usable space; profit-driven designs	Living room extended into balcony, custom glazing
Visually Compromised	Low-quality finishing materials; poor decoration	Reduces building aesthetics; degrades streetscape quality	Use of cheap, unsightly finishes due to economic constraints	Rusted railings and unpainted concrete balcony edges
Obstructed-View	Adjacent buildings block sightlines, light, or airflow	Diminished visual appeal, daylight, and natural ventilation	Dense fabric; unregulated proximity between buildings	Balcony view facing a blank wall 2 meters away
Over-Decorated	Excessive or stylistically inconsistent alterations	Creates visual clutter; disrupts architectural harmony	Individual preferences overriding coordinated designs	Balcony with bright plastic panels, and neon lights.

11. OPTIMIZATION OF BALCONIES

Drawing on expert interviews and firsthand observations of balconies in various cities, the authors identified numerous inadequacies in their current state. These range from functional to aesthetic flaws that prevent balconies from fulfilling their intended roles and diminish their potential value for buildings and occupants. In response, the authors developed a comprehensive guideline scheme to address the identified issues. As Table 5 presents, the guidelines are intended as a complementary tool alongside systematic architectural standards for designing balconies. While architects and designers bear primary responsibility for balcony design, other stakeholders, including developers and municipalities, play crucial roles. Regulations, laws, and public awareness also significantly impact this process. Accordingly, Table 5 highlights the role of the previously mentioned in addition to showing the appropriate phase of intervention, whether during the design phase or post-construction.

TABLE 5: PROPOSED SCHEME FOR THE OPTIMIZATION OF BALCONIES.

Proposed direction	Phase	
	Design	Post construction
Designers		
Designers must view balconies as integral elements rather than trivial additions. Hence, they should be given more attention and thought during design, prioritizing practical aspects. Accordingly, designers should attempt to: - Allocate larger areas for balconies whenever possible, to allow for a usable area. - Eliminate balconies with unrealistically small areas. - Avoid area-wasting balcony profiles. - Consider the balconies' dimensional ratios to allow suitable seating. - Avoid the addition of unusable/unbeneficial elements, non-structural columns for example.	✓	
Designers must consider post-occupancy alteration through planning for potential future alterations by incorporating balcony configurations that allow for modification without compromising the structural integrity of the building. This is to accommodate residents' preferences while preserving the original design intent and complying with regulations.	✓	
Designers should consider the economic aspects that lead to the use of unsightly cheap finishing materials and promote the use of quality materials within affordable price ranges.	✓	✓
Designers must attempt to enhance the balcony experience by utilizing pleasant views, avoiding obstructed orientations, incorporating greenery, and using attractive architectural elements.	✓	✓
Designers should encourage developers to consider the needs and expectations of residents when determining land areas and the number of units per building.	✓	
Designers must respect local culture by incorporating features that prioritize privacy without compromising functionality. This includes placing balconies in strategic locations and utilizing improved railing designs, the addition of balcony curtains, blinds, or partitions, and French-style blinds on balcony doors.	✓	✓
To address residents' needs, assistive elements should be considered within the design process, such as adequate space for cloth drying, built-in storage solutions, and secure mounting options for mechanical or electronic equipment.	✓	✓
Given the influence of the hot climate on limiting recreational activities on balconies, designers must explore methods of heat mitigation and promote proper insulation for balconies. Similarly, measures to mitigate noise and pollution must be taken through elements such as noise-reducing screens or barriers, the implementation of green spaces, or encouraging residents to use air purifying plants to improve air quality.	✓	✓
Vulnerabilities and poorly secured balconies must be addressed through the implementation of appropriate security measures. This can include strengthening balcony doors and windows, using robust locks, and reinforcing railings.	✓	✓
Authorities and municipalities		
To prevent changes that impair balconies' usability, designers and municipal officials should encourage residents to maintain the balconies' original design, function, and purpose.		✓
Municipalities and regulatory bodies must enforce mandatory maintenance guidelines and standards for balconies, including regular inspections, repairs, painting, and cleaning.	✓	✓
Municipalities can, to an extent, provide incentives for building owners who consistently maintain and enhance the aesthetics of their balconies. The incentives can include monetary rewards or taxation rebates.		✓
Awareness		
To improve user appreciation for balconies, locals should be made aware of the potential advantages of balconies for leisure, recreation, and enhancing overall quality of life. Additionally, designers should foster a sense of accountability and community involvement in the locals.	✓	
The significance of routinely maintaining and cleaning balconies should be emphasized, as should the consequences of ignoring their visual features, which include peeling paint, broken tiles, rusting railings, and accumulated debris.	✓	✓
Designers and architects are advised to offer resources and support to building owners and residents to facilitate proper maintenance, including information on dependable contractors, renovations, and technicalities.		✓
Laws and Regulations		
Regulations pertaining to balconies should be reconsidered to provide more flexibility in design and orientation.	✓	
The aesthetic regulations imposed on balconies' color and appearance should be revised to aim for a balance between achieving a harmonious appearance for the entire area and allowing room for creativity and individual expression.	✓	✓
Establish communication between regulatory bodies, designers, and urban planners to help identify opportunities for improvement and address any unintended constraints or limitations.	✓	✓

12. CONCLUSIONS AND RECOMMENDATIONS

In the present study, the influence of the local context of Egypt on balcony design and overall condition has been investigated. Through face-to-face and online interviews with 36 experienced architects coupled with nonparticipant field surveys of balconies within seven major cities across Egypt, the study was able to conclude that the local context of Egypt does indeed affect balconies. Through a meticulous analysis of the collected data, the study established that the local context of Egypt undeniably exerts a significant influence on local balconies; Although the authors did not observe a distinct architectural style or specific trend exclusively associated with Egyptian balconies, it was evident that the local context played a pivotal role in shaping both the functional and aesthetic characteristics of balconies in the region.

The findings suggest that various factors associated with the local context, such as economics, prevailing culture, urban condition, the climate, and regulations, contribute to the unique influences observed in Egyptian balconies. Such influences were observed to potentially hinder the balconies' ability to serve as a valuable asset that links indoors with outdoors and acts as a relaxing recreational area for residents. Accordingly, the study successfully developed a comprehensive scheme to mitigate the negative impact of the local context on balconies, ultimately enabling them to fulfill their intended role more effectively through considering the specific challenges posed by the local context. The scheme aims to enhance the functionality and optimize the performance of balconies in the given environment by addressing architects, designers, developers, and lawmakers, in addition to improving awareness and maintenance plans. The study hence underscores the need for architects, designers, and urban planners to thoroughly understand and appreciate the local context and resident needs in order to create balconies that harmoniously blend with their surroundings while catering to the functional requirements and aesthetic preferences of the region.

The study therefore recommends that architects and designers integrate the proposed scheme as an integral component in both the architectural learning process and commercial practice design activities, in conjunction with the typical architectural norms and standards. By integrating such schemes into architectural curricula, students can gain practical experience and a deeper insight into the influence of culture and location. In commercial practice, architects can apply the scheme to real-world projects, ensuring their relevance and appropriateness in addition to eliminating potential post-construction costs resulting from future amendments of balconies and other elements. Furthermore, developers, lawmakers, and municipal authorities should be made aware of such schemes, as they play a crucial role in enhancing the condition of balconies within the country. The study also recommends that the aforementioned stakeholders develop an effective method of collaboration and communication to ensure the precise implementation of the suggested scheme. By continuously exploring and refining our understanding of this relationship, it becomes possible to develop innovative and contextually appropriate approaches to balcony design, ultimately contributing to the creation of more sustainable, culturally sensitive, and visually captivating urban spaces in Egypt and beyond. In this regard, the role of local workshops, seminars, and conferences is apparent in disseminating knowledge about such schemes and encouraging their adoption. Furthermore, the study highlights the dire need for additional future research that focuses on the customization of architectural standards for balconies and other construction elements to better suit the local context.

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APPENDIX A

EXAMPLES OF THE BALCONIES IN VARIOUS CITIES (CAIRO, ALEXANDRIA, AND MANSOURA)

-- Examples of balconies in residential buildings in the city of Cairo

-- Examples of balconies in residential buildings in the city of Alexandria

-- Examples of balconies in residential buildings in the city of Mansoura