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ADAPTING THE 15-MINUTE CITY MODEL IN CAIRO: MOBILITY CHALLENGES AND OPPORTUNITIES

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Abstract. The 15-minute city model, a visionary approach to urban planning, envisions neighbourhoods where residents can access all essential daily needs – work, education, healthcare, shopping, and leisure – within a 15-minute walk or bike ride. This study assesses the challenges and opportunities of implementing the 15-minute city model in Downtown Cairo, Egypt. The study examines the current state of public spaces, transportation, and walkability in the area through ethnographic research, including extensive field observations and frequent attendance at design workshops with developers, as well as numerous site visits and in-depth semi-structured interviews with diverse stakeholders. Stakeholders included the developer of the Cairo House project, the Cairo Bike project manager, urban researchers, tourists, residents and business owners within the study area. Data were analysed using thematic coding to identify recurring patterns and conflicting perspectives. The findings reveal significant challenges, including traffic congestion, limited public spaces, and inadequate pedestrian and cycling infrastructure. The study explores potential solutions, including enhancing public transportation, creating safe and accessible environments for pedestrians and cyclists, promoting mixed-use development, and developing vibrant and accessible public spaces. The main findings underscore the significance of community engagement and participatory planning in ensuring the successful and equitable implementation of the 15-minute city model within this unique and historic urban context.

Keywords: bike-ability, proximity, urban form, street network, urban planning and design, x-minute city.

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1. Introduction

The 15-minute city, a model gaining global momentum, envisions urban areas where residents can access essential services such as work, shopping, education, leisure, and healthcare within a 15-minute walk or bike ride (Allam et al., 2024; Gaglione et al., 2021; Megahed et al., 2024; Pozoukidou & Chatziyiannaki, 2021). 15-minute cities have gained significant traction worldwide, with implementations under various terminologies and at different administrative scales. Other terms include "10-minute neighbourhood," "15-minute neighbourhood," and "20-minute city" (Allam et al., 2022, 2024; Caselli et al., 2022; Elshater, 2016; Logan et al., 2022a). Most initiatives are implemented at the city level, highlighting the focus on urban centres (Elshater & Abusaada, 2022b). However, there is also a significant presence at the neighbourhood, metropolitan, regional, and national levels, demonstrating the model's flexibility and adaptability across different administrative scales (Elshater & Abusaada, 2022a; Logan et al., 2022). While the C40 Cities Climate Leadership Group actively promotes sustainable urban planning, only 21% of the identified initiatives are associated with C40 cities (Allam et al., 2024).

While the "15-minute city" model holds immense potential, challenges like resistance from vested interests, regulatory hurdles, and financial constraints may hinder its implementation. Moreover, the rapid growth of the model has outpaced academic research, necessitating innovative methodologies to capture its nuances. Recent studies have delved into the theoretical and practical aspects of the 15-minute city. Research by Papadopoulos et al. (2023) explores measurement frameworks, while Lima and Costa (2023) examine computational approaches to achieving proximity. Wanget al. (2023) focus on spatial distribution and inequality issues in accessibility. However, a significant gap remains in understanding the specific challenges and opportunities associated with implementing the 15-minute city in megacities, particularly those with unique socio-cultural, economic, and political

landscapes, such as Cairo. While numerous studies have been conducted on urban development in Cairo, none comprehensively address the feasibility and contextual adaptation of the 15-minute city model within its unique urban fabric. Prior studies on Cairo's urban challenges often focus on infrastructure deficits, informal settlements, or traffic congestion. Still, they largely overlook how a human-centric, proximity-based urban model could mitigate these issues. This study directly addresses these limitations by examining the specific obstacles and enablers for the 15-minute city in Downtown Cairo, a historically significant yet complex urban area. It offers novel insights by moving beyond generalised global models to provide a Cairo-specific framework, integrating local cultural nuances, economic realities, and governance structures into the assessment of the concept's viability.

While the 15-minute city model has gained global traction as a framework for sustainable, equitable, and livable urbanism, its applicability in Global South contexts remains underexplored, particularly in dense, historic urban cores like Downtown Cairo, Egypt (Abusaada et al., 2023; Badawy et al., 2024; El-Husseiny, 2022). Initially developed in Western, often highly planned urban environments, the model assumes preconditions such as accessible public services, walkable infrastructure, strong public transport, and balanced land use–conditions that are frequently lacking or unevenly distributed in cities like Cairo. Downtown Cairo, despite its rich historical and cultural assets and central location, suffers from infrastructural fragmentation, poor walkability, traffic congestion, and a mismatch between residential needs and tourism-driven development (Allam et al., 2022; Eldaidamony et al., 2019a, 2019b; Hu, 2013; Plasencia-Lozano et al., 2024; Robertson, 1993; Speck, 2023). These challenges raise critical questions about how, and to what extent, the 15-minute city model can be adapted to fit the socio-spatial dynamics and institutional realities of Cairo's urban core. There is a pressing need to investigate both the opportunities and limitations of applying this global planning paradigm in a context shaped by informality, centralised governance, and uneven urban transformation.

This study **aims** to assess the challenges and opportunities of implementing the "15-minute city" model in Downtown Cairo, identifying factors that contribute to its success or failure, and considering the city's cultural, social, and economic context. Despite numerous studies addressing the challenges of Downtown Cairo, the area still lacks a comprehensive framework and clear vision for adapting the principles of 15-minute cities. There is a need to explore successful global models of 15-minute cities and apply them to the local context, especially considering the challenges large cities face. To assess the 15-minute city model, we utilised a qualitative research method to investigate the opportunities and challenges that can guide the development plan for a selected case study in Downtown Cairo, Egypt. This manuscript employed interviews with academics, practitioners, and experts involved in the development process within a case study chosen in Downtown Cairo, Egypt. As such, this study suggests that the 15-minute city model is gaining traction independently of specific organisations, reflecting a broader global shift towards sustainable urban development. This study proposes two questions:

- What challenges do decision-makers and stakeholders face in developing Downtown Cairo?
- What obstacles might arise in implementing the "15-minute city" model in this area?

To address the research aim, this study employed an ethnographic approach, combining immersive field observations in Downtown Cairo with semi-structured interviews involving developers who had previously participated in local urban development projects. This methodology was chosen to gain a nuanced understanding of the complex dynamics that shape mobility and urban life in the study area. Ethnographic observation enabled the researcher to engage directly with the built environment and social practices, capturing patterns of pedestrian movement, public space usage, and informal interactions that are often overlooked in conventional planning analyses. By walking the streets and observing activity at various times of day, the study captured temporal and spatial variations in mobility behaviour.

Complementing this, the interviews with key stakeholders–particularly urban developers–provided critical insights into the institutional, economic, and regulatory dimensions of development in Downtown Cairo. These conversations helped contextualise the observed conditions within broader planning discourses and exposed the challenges and intentions behind implemented or proposed interventions. Together, these methods enabled a grounded, multi-perspective assessment of the feasibility and implications of applying the 15-minute city model in Cairo. The ethnographic strategy thus not only illuminated local realities but also served as a tool for critical reflection on how global urban models interact with situated practices and urban morphologies.

This study **contributes** to the growing discourse on the 15-minute city by examining its applicability within the context of a dense, historic urban environment in the Global South–Downtown Cairo. Employing an ethnographic approach that combines field observations with stakeholder interviews, the research identifies key mobility challenges, including infrastructural fragmentation, limited options for active transport, and socio-spatial inequalities. At the same time, it uncovers local opportunities to support proximity-based urban living, such as latent walkability, underutilised public spaces, and community-led adaptations. By situating the 15-minute city model within Cairo's unique urban conditions, the study extends the model beyond its typical Eurocentric framing. It demonstrates the need for more context-sensitive and flexible planning strategies. It also provides a critical understanding of mobility patterns concerning urban form, socio-economic dynamics, and institutional planning practices. The findings provide practical insights for urban policymakers and planners aiming to retrofit historic city centres with inclusive, human-scale

mobility systems. Ultimately, the study bridges theoretical models with grounded urban realities, contributing to both academic debates and applied strategies for urban transformation in similarly complex megacities.

2. Background on 15-minute cities

Several cities worldwide have embraced the 10-, 15- or 20-minute city models and are actively implementing strategies to achieve this vision (Croci & Rossi, 2014; Newman & Burnett, 2013). Cities such as Paris, Portland, Melbourne, Milan, Cairo, and Bogotá have adopted these models, each with its unique urban form (Abusaada et al., 2023; Gaglione et al., 2021; Papadopoulos et al., 2023; Rhoads et al., 2023). This manuscript focused on the 15-minute cities that are best appreciated in cities of the Global South (Allam et al., 2023). The 15-minute city model, which aims to ensure that all essential services are accessible within a 15-minute walk or bike ride from any residence, has garnered significant attention during the COVID-19 pandemic (Abusaada & Elshater, 2020). However, its implementation in the Global South presents unique challenges and opportunities (Allam et al., 2023; Isaac, 2024).

Key principles of the 15-minute city include mixed-use development, compact urban form, and efficient transportation networks. By fostering walkable, bikeable, and transit-oriented communities, this approach reduces reliance on cars, lowers carbon emissions and improves air quality. Additionally, it promotes social equity and inclusion by ensuring equitable access to essential services for all residents (Moreno et al., 2014). A total of 77 "15-minute city" initiatives were identified globally. These initiatives, ranging from city-level projects to national policies, demonstrate the growing interest in this urban planning model. Western Europe leads with 48% of the initiatives, particularly in France (26%) and the United Kingdom (10%). North America (26%) and Oceania (9%) follow closely, with the United States and Australia as major contributors, respectively. Asia (8%) and Latin America (5%) have emerging initiatives, primarily in South Korea and Uruguay (Abd Elaziz et al., 2014; Allam et al., 2022, 2024).

The uneven implementation of the 15-minute city model, particularly in cities of the Global South, cannot be attributed solely to historical, geographical, or financial constraints. Instead, deeper systemic factors often shape these disparities. One of the most significant influences is the legacy of colonial urban planning, particularly in African and certain Asian cities. Many of these urban environments were designed for segregation and resource extraction rather than inclusive, human-centric liveability. The inherited urban forms, characterised by sprawling and car-dependent infrastructure, indeed contrast sharply with the principles of the 15-minute city model. This model emphasises compact, mixed-use zoning and integrated public transport networks, aiming to ensure that all essential services and amenities are accessible within a 15-minute walk or bike ride from home (Khavarian-Garmsir et al., 2023; Parekh, 2024).

In addition, rapid urbanisation has produced widespread informal settlements that present planning challenges fundamentally different from those faced by cities in the Global North. Unlike established formal urban districts that can be retrofitted, these informal areas often lack basic services, legal tenure, and physical infrastructure (Chen et al., 2019). Furthermore, the successful realisation of proximity-based urban living requires robust governance systems and significant financial investment–resources often limited in many low- and middle-income countries (Moos et al., 2018).

A particularly complex challenge is the issue of scalability. The 15-minute city model promotes local accessibility, ensuring equitable access to high-quality services, such as healthcare and education. This model provides diverse employment opportunities within each 15-minute zone and is particularly daunting in low-income, rapidly growing cities. If not carefully managed, this can risk reinforcing spatial inequalities by enhancing already-serviced neighbourhoods while leaving others behind (Allam et al., 2024). In the context of Cairo, these global critiques take on specific local expressions. The city's rapid population growth, deep historical layering, and high prevalence of informal settlements position it uniquely within debates on urban proximity. Unlike cities such as Paris or Melbourne, Downtown Cairo and its adjacent areas often lack the planned infrastructure, reliable public services, and provision of green spaces that support the 15-minute model. In many ways, these conditions mirror those of informal settlements, and addressing them requires a paradigm shift in planning–from densification strategies to holistic urban integration that includes equitable service provision and infrastructural development (Eldaidamony et al., 2019a, 2019b).

Mobility and infrastructure also pose significant constraints. Downtown Cairo remains heavily car-dependent, with chronic traffic congestion and limited pedestrian-friendly infrastructure (Forciniti & Eboli, 2023; Robertson, 1993). While cities like Milan have demonstrated the potential of bike-sharing and active mobility systems, such solutions require significant adaptation in Cairo due to its hot climate, roadway design, and prevailing social norms around transportation. Investments in public transport infrastructure, such as a Bus Rapid Transit system modelled after Bogotá's, may be more impactful in the short term; however, such projects require substantial political commitment and financial resources.

Moreover, the risk of gentrification emerges as a serious concern in Downtown Cairo. As a historically rich and socioeconomically diverse area, efforts to upgrade services, enhance walkability, and improve the public realm could unintentionally drive up property values, pushing out long-time residents and small businesses (Eldaidamony et al., 2019a, 2019b). As seen in other global contexts, urban improvement without protective measures can lead to displacement and social exclusion, counteracting the inclusive ethos of the 15-minute city. While the 15-minute

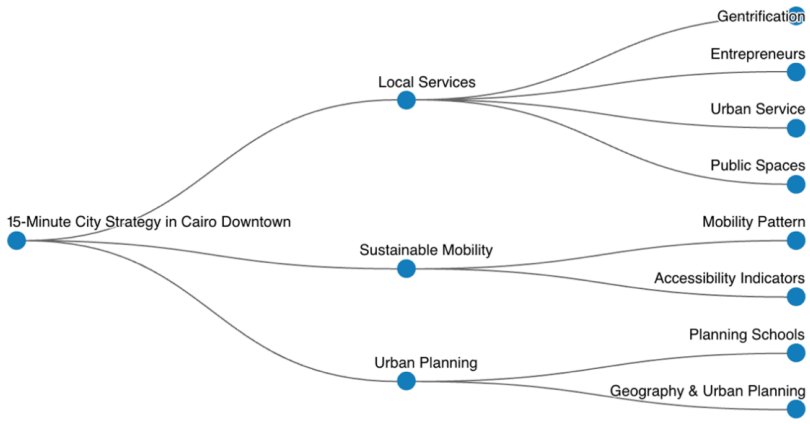

Figure 1. Concept map about the 15-minute city model in Cairo, concerning the Global x-minute cities (source: the authors based their analysis on data from Scopus AI as on June 2025)

city model holds promise for enhancing urban living, its implementation in the Global South requires significant adaptations to address economic, social, and infrastructural challenges. By integrating informal systems, prioritising community involvement, and focusing on sustainable urban development, the concept can be tailored to meet the unique needs of developing cities. As such, the concept map on the 15-minute city model in Cairo, as well as the Global x-minute cities, reflects key challenges based on data retrieved from Scopus AI (Figure 1).

3. Materials and methods

This study employs a mixed-methods qualitative approach, integrating spatial analysis with an ethnographic and participatory study to assess the feasibility of the "15-minute city" model in Downtown Cairo. This comprehensive methodology allows for a deep understanding of the built environment, human behaviour, and stakeholder perspectives within the selected case study area.

3.1. Spatial context of the research

This study focuses on a selected 15-minute walking district within Downtown Cairo, strategically identified for its historical significance, multifunctional urban fabric, and high potential for transformation. The area extends from the Egyptian Museum, passes through Tahrir Square, and reaches the site of the former Ministry of Interior, encompassing prominent public spaces and commercial corridors such as Talaat Harb Square. The district was delineated based on an estimated 15-minute pedestrian radius, intended to represent the spatial extent within which essential daily services and amenities are reasonably accessible on foot.

Figures 2 and 3 illustrate the geographical boundaries and key landmarks of the study area, offering a visual reference for the ethnographic fieldwork and stakeholder interviews that follow. The mapped area also incorporates the locations of various modes of transportation, including existing bike stations, offering insight into the current state of active mobility infrastructure. Figure 4 provides a broader map of Downtown Cairo. Its primary purpose is to illustrate the walking accessibility from Mogamaa El Tahrir

Figure 2. Case study map highlighting public transportation and bike stations in the study area, Cairo, Egypt (source: the authors based on Google Earth maps)

Figure 3. Case study area: a – Egyptian Museum and Tahrir underground parking; b – Talaat Harb Square; c – Tahrir Square; d – Ministry of Interior (source: the authors)

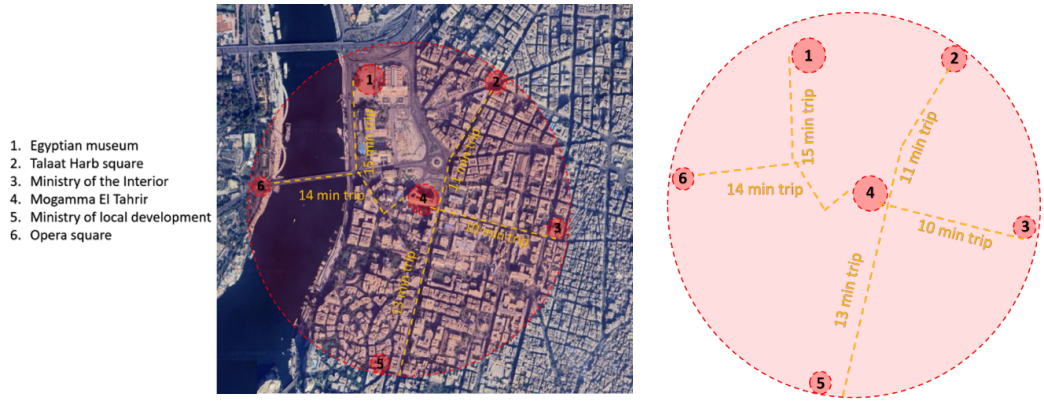

Figure 4. Map of Downtown Cairo showing key landmarks and their walking travel times from the central (source: the authors based on Google Earth)

to various key landmarks, likely showing walking radii (e.g., how far one can walk in a certain amount of time). This helps visualise the pedestrian connectivity of the area.

3.2. Ethnographic and participatory study

This study adopted an ethnographic approach, incorporating field observation and in-depth interviews (Abusaada & Elshater, 2022). The ethnographic research centred around Tahrir Square and its significant sites surrounding it, including the Egyptian Museum, Talaat Harb Square and the Ministry of Interior. This study received full Institutional Review Board (IRB) approval from the authors affiliated institution, identified here with a code: IRB-ASU-25-013 in 2025.

The field observations were conducted during a series of design workshops with the developers of the "Cairo House" project, as well as walking surveys of downtown streets. The authors of this manuscript documented and reviewed the observations of the built environment and associated human activities. These were carried out over several non-consecutive visits in January 2025, each lasting approximately two hours during both peak (e.g., morning rush hour, evening leisure) and off-peak periods. Observations were systematically recorded through detailed field notes, focusing on elements such as pedestrian movement patterns (e.g., density, flow, and congestion points), types and intensity of commercial activity, and public space usage (e.g., seating, gathering points, and neglected areas). The author also participated in regular design workshops,

which provided insights into the developers' planning processes, perspectives, and challenges. This participant observation added a valuable contextual layer to the fieldwork.

The extended engagement enabled the identification of temporal variations in pedestrian traffic, commercial activity, and public space use. These observations supplied empirical data that supported the interpretation of interview findings and enriched the localised understanding necessary for comparative analysis. Although quantitative spatial analysis techniques (e.g., space syntax or behavioural mapping) were not employed, the data were systematically categorised to identify qualitative interaction patterns between users and the built environment. These served as rich, descriptive inputs for thematic analysis.

The observation of the physical elements covered features such as sidewalks, street furniture, building facades, traffic flow, and the presence of green spaces or obstacles. Activities associated with people focus on how people interact with the street environment and different modes of transportation. The observation of the physical environment also included pedestrian traffic patterns, social interactions, and how people use public spaces, as well as any signs of discomfort or conflict. By analysing physical and behavioural elements, the authors gained a comprehensive understanding of how the street functions and how it could be improved. Following the initial observations, a structured coding protocol was developed to guide subsequent fieldwork. This protocol facilitated the systematic organisation of field notes, enabling more objective categorisation and partial quantification of observed phenomena, such as types of street furniture, estimated pedestrian density, and recurring physical obstacles. Supplemented by detailed photographic documentation, this approach enhanced both the reliability and consistency of the observational data.

To reduce potential subjectivity associated with single-observer fieldwork, a structured coding protocol was developed following the initial round of observations. This protocol provided predefined categories for documenting key elements, such as pedestrian density, types of street furniture, and patterns of public space usage. It was consistently applied throughout subsequent visits to ensure uniformity in data recording. Additionally, detailed photographic documentation accompanied the field notes, supporting the objectivity and reproducibility of the observational data. While the fieldwork was conducted by the first author and reviewed by all co-authors, the use of systematic observation tools and the triangulation of findings with stakeholder interviews helped to enhance the reliability and validity of the qualitative insights.

This study also incorporated semi-structured interviews with a diverse group of stakeholders. A purposive sampling strategy was used to ensure broad representation from individuals directly involved in or impacted by Downtown Cairo's development. Semi-structured interviews were systematically conducted with a diverse group of stakeholders to gather rich, qualitative data. To ensure accessibility and convenience, the majority of these interviews were conducted online. For a more immersive and contextual understanding, a subset of interviews was also undertaken on site, where participants actively walked through the study area. Each interview was designed to last approximately 30 minutes, ensuring comprehensive coverage of topics while respecting participants' time. To facilitate rigorous analysis, all interviews were recorded with prior consent, and the audio was subsequently transcribed. The resulting transcripts then underwent a thorough thematic coding process, enabling the identification of key patterns, recurring themes, and unique insights relevant to the research objectives. The sample included: The developer of the "Cairo House" project (representing large-scale urban development). The manager of the "Cairo Bike" project (representing active mobility initiatives), urban researchers (specialising in Cairo's urban dynamics), a tourist, residents and business owners (providing insights into daily lived experiences), as shown in Table 1.

A purposive sampling strategy was employed to ensure representation across key stakeholder groups relevant to the development of Downtown Cairo. Participants were selected based on their direct involvement in or lived experience with mobility and urban development in the study area. This approach ensured a diversity of perspectives aligned with the study's aim, rather than statistical representativeness, which is not typically the objective in qualitative research. This clarification has now been added to the manuscript. Each interview lasted approximately 30 minutes. The primary aim was to assess the feasibility and potential impact of implementing the "15-minute city" model in Downtown Cairo. Additionally, the study examined the challenges and opportunities associated with applying this model in the local context, as well as how different stakeholders might respond to and address these challenges.

Table 1. The interview participants' profile

	Gender		Nationality		Age		Role*				
Discretion	Male	Female	Egyptians	Non-Egyptians	35–45	45–55	D	UR	T	R	BO
Number	7	3	8	2	6	4	3	3	1	1	2
Total	10 participants										

Note: *Letters in the tables refer to D – developer, UR – urban researcher, T – tourist, R – resident, and BO – business owner.

The interview questions were crafted to elicit valuable insights. The interviews provided a crucial opportunity to understand how the streets and public spaces are utilised, identifying specific preferences, concerns, and community needs. These discussions offered valuable insights into the lived experiences within these spaces, ensuring that future redevelopment plans are responsive to the needs and preferences of those who utilise these spaces most frequently. The following questions were designed to investigate the participants' viewpoints. Interview questions included the following:

- What are the key challenges/potential benefits of implementing a 15-minute city model in downtown Cairo?
- What's your assessment of the current state of public spaces, transportation, and walkability?
- What transportation and infrastructure improvements and land use changes are needed to support a 15-minute city model?
- How could pedestrian and bike lane safety be improved to fit into a 15-minute city model?
- How can the 15-minute city model be implemented in a way that is equitable for both residents and tourists?

All interviewees were planned to be invited either through a phone call or approached in person (in the case of tourists, residents and business owners) to participate in the study. Interviews were also scheduled to be conducted on-site or at a mutually agreed-upon location convenient for the participants. Before the interviews, the scope of the study, the interview questions, and the informed consent form were clearly explained to each participant. Participation commenced only after obtaining their voluntary and informed consent.

The study aimed to recruit the maximum number of participants that could be managed within the available resources. A sample of 10 to 15 participants was targeted, guided by the principle of data saturation, where no substantially new themes or insights are expected to emerge after a certain point, typically around the tenth interview. This approach aligns with established qualitative research practices, which prioritise in-depth understanding over statistical generalizability. Accordingly, interviews were conducted with ten participants selected from relevant stakeholder groups, following methodological guidance from Creswell and Poth (2028), Creswell (2003), and Mackiewicz (2018). The purposive sampling strategy ensured that participants provided rich, context-specific perspectives, which were suitable for exploring the study's complex themes.

Participants were included in the study if they had direct involvement in or lived experience with mobility and urban development in the study area. This included individuals such as residents, local planners, community leaders, or professionals engaged in relevant projects. Those who had no direct experience, knowledge, or engagement in mobility or urban development within the specified area were excluded from the study. Although the research does not explicitly detail significant foreseeable risks to participants, its overall approach is designed to make a meaningful contribution to society and the academic field.

Participants may have experienced mild discomfort when discussing personal experiences. However, the study posed minimal risk, and all necessary measures were taken to safeguard their comfort, privacy, and autonomy. Data were stored securely on a password-protected device and accessed only by the research team. Confidentiality was strictly maintained, and all responses were anonymised. There were no anticipated physical, legal, or economic risks. To minimise disruption, interviews were conducted outside working hours or on weekends. Participation was voluntary, and individuals were informed of their right to withdraw at any time without penalty or consequence. They were also advised that they could pause or discontinue the interview at any point. Given the low-risk nature of the study, intensive or post-study monitoring was not required. Nonetheless, the researcher remained attentive to signs of participant discomfort and offered support or referrals if needed. Contact information was provided in case any concerns arose following participation.

While there were no direct personal benefits to participants, the study's findings were expected to contribute to urban planning knowledge and support improvements in community wellbeing. The societal benefits were anticipated to outweigh the minimal risks. Conducting interviews with a researcher familiar with the study context may have facilitated stronger local engagement, aligning with the principles of the 15-minute city model.

The study adhered to the ethical guidelines established by the institution's Institutional Review Board (IRB) at the authors' affiliated university. Participation was entirely voluntary, and informed consent was obtained from all participants before their involvement. The consent process included a clear explanation of the study's purpose, procedures, duration, potential risks and benefits, the voluntary nature of participation, and the participants' right to withdraw at any time without penalty. All participants were provided with a written informed consent form, which they signed before the interviews. Participants were informed that the interviews would be audio-recorded (where applicable) and that their identities would be kept anonymous in all transcripts and publications. No identifying information was linked to their responses.

All qualitative data, from interview transcripts to detailed field notes, underwent rigorous thematic coding. Crucially, the analysis incorporated conflicting viewpoints, presenting them as distinct sub-themes rather than seeking consensus, thereby providing a nuanced understanding of stakeholder opinions on urban development. A cornerstone of the research was data triangulation, where insights from observations were cross-referenced with interview data. This meant that observations of "what" was happening on the ground were validated and enriched by interviewees' explanations of "why," significantly boosting

the validity and depth of the findings. While this brought a deep understanding of local nuances, conscious efforts were made through reflexivity and systematic coding to minimise bias and ensure an objective interpretation of the rich, diverse data collected.

4. Results

4.1. Downtown Cairo's context and redevelopment initiatives–field observation

Downtown Cairo, a significant cultural and historical landscape with a distinctive blend of architectural styles, is undergoing a comprehensive revitalisation program. Despite recent neglect, the area retains inherent charm and potential. The Egyptian government's initiative aims to transform it into a vibrant and sustainable urban centre, prioritising pedestrian-friendly spaces, cultural preservation, and sustainable transportation. Key initiatives observed include the removal of street vendors, regulation of vehicular traffic, and establishment of the Tahrir parking lot to improve pedestrian safety and traffic flow (Raslan et al., 2019). The relocation of government offices to the New Capital presents an opportunity to reimagine the area's function, shifting focus towards cultural and tourism-related activities.

Redevelopment encompasses various interventions: building facades are being restored, and streets are being redesigned to prioritise pedestrian movement and cycling. The "Cairo Bike" bike-sharing program, with 26 stations and 250 bikes, offers a sustainable transport option. The integration of electric vehicles into the public transportation system is also being explored to reduce reliance on private cars and improve air quality. Beyond physical infrastructure, the project aims to revitalise cultural and social life through expanded green spaces and restored public areas, such as the Tahrir parking rooftop. Repurposing former government buildings seeks to create spaces for cultural activities, businesses, and community gatherings, reflecting a renewed government commitment to cultural preservation and fostering a sustainable urban environment.

Beyond physical infrastructure, the project aims to revitalise the area's cultural and social life. Green spaces are being expanded, and public spaces are undergoing restoration. Figure 5 shows the Tahrir parking rooftop between the Egyptian Museum and Tahrir Square. Repurposing former government buildings will create spaces for cultural activities, businesses, and community gatherings. This multifaceted approach demonstrates a renewed government commitment to preserving Cairo's rich cultural heritage while fostering a sustainable and vibrant urban environment for future generations.

The Mogamaa Al-Tahrir project, transforming former government headquarters into a mixed-use development, exemplifies this commitment to adaptive reuse, incorporating hotels, dining, and entertainment (Hassan et al., 2020). This project, along with the redevelopment of the former Interior Ministry headquarters, aligns with the broader government strategy, driven by the Sovereign Fund of Egypt (SFE), to stimulate economic growth through tourism and business while preserving the country's heritage. Field observations also indicated minimal usage of street furniture during the morning hours, primarily due to the limited availability of shaded areas and high summer temperatures.

The "Cairo Bike" project, while promising for addressing traffic and environmental issues, faces significant hurdles. Heavy traffic congestion makes it difficult to implement and maintain safe bike lanes, as cars often encroach on designated spaces–a lack of dedicated infrastructure forces cyclists into shared roads with high-speed vehicles. Existing bike lanes are usually poorly maintained (potholes, uneven surfaces, debris), and discontinuous lanes (particularly around squares) lead to confusion and danger by forcing cyclists to merge with traffic. Furthermore, a lack of awareness and enforcement of traffic regulations exacerbates the situation. Many drivers are unaware of the rules, and enforcement is limited, notably between Tahrir Square and Talaat Harb Square, where violations are rampant.

Cars, motorcycles, and vendors frequently park in bike lanes, and double parking further obstructs them, thereby increasing the risk of collisions. Poorly designed infrastructure, including narrow roads and a lack of physical

Figure 5. The Tahrir parking is located between the Egyptian Museum and Tahrir Square (source: the authors)

Figure 6. Bike lane' violations (source: the authors)

separation from vehicle traffic, also contributes to cyclists feeling unsafe, as illustrated in Figure 6. Beyond practical challenges, cultural norms also play a role; cycling is not widely accepted, and this perception, coupled with safety concerns (such as aggressive drivers, pollution, and poor lighting), discourages its adoption.

4.2. Stakeholder perceptions on opportunities and challenges

Field observations and interview responses consistently emphasised Downtown Cairo's significant potential for revitalisation, rooted in its rich historical and cultural heritage, as well as the ongoing governmental redevelopment efforts. Many participants viewed the area as uniquely positioned to become a vibrant, inclusive urban centre. Urban researchers described Downtown Cairo as a "fascinating case study" with "incredible potential – a blend of historical significance, vibrant commercial activity, and a growing tourism sector." Similarly, developers and the Cairo Bike Project Manager highlighted its strategic potential for enhancing environmental quality, reducing congestion, and improving accessibility to cultural assets, thereby attracting more sustainable investment and tourism.

However, these aspirations were accompanied by persistent concerns. Severe traffic congestion, poor walkability, and a lack of accessible, well-maintained public spaces were dominant themes across interviews. Residents and urban researchers noted the challenges posed by overcrowded parks and the absence of basic amenities. The dominance of private vehicles was widely seen as a significant barrier, contributing to air pollution, noise, and chaotic street conditions. Public transport was described as unreliable and overcrowded, limiting its effectiveness as an alternative mode of mobility.

Poor walkability emerged as a recurring issue. Participants described sidewalks as narrow, obstructed, or entirely missing, often blocked by vendors or informal activities. Accessibility features were notably lacking. A tourist vividly described navigating downtown streets as an "obstacle course" filled with construction, parked cars, and informal stalls, and characterised street crossing as "a bit of a free-for-all." Public spaces were frequently perceived as uninviting– "just concrete squares with little shade or greenery"–with limited opportunities for rest, recreation, or social interaction.

Business owners expressed cautious optimism about the increased foot traffic that revitalisation might bring. However, they also voiced concerns about access for deliveries and customers who rely on private vehicles. They emphasised the need for inclusive planning that incorporates the voices of small business owners operating in historically significant locations. Residents raised critical concerns about the neighbourhood's shifting identity. Several described a growing imbalance between residential needs and commercial expansion, fearing that Downtown was "turning into a giant touristic destination." Essential services, such as grocery stores, pharmacies, and schools, were reportedly declining, replaced by hotels, restaurants, and souvenir shops. This shift, they noted, was leading to "constant noise and crowds," and a lack of "quiet streets to relax."

Stakeholders across all groups proposed a series of strategies to address Cairo's mobility and urban challenges in Downtown Cairo. The Cairo Bike Project Manager emphasized the urgent need for protected bike lanes, clear wayfinding, and physical barriers to ensure cyclist safety. Residents and urban researchers echoed this view, calling for comprehensive cycling networks, wider and accessible sidewalks, and investment in high-quality public transport–including metro expansion, improved bus services, and a bus rapid transit (BRT) system. Tourists stressed the importance of clear signage and multilingual information to improve navigation.

Safety was another primary concern. Residents and researchers called for better enforcement of traffic laws, particularly those addressing speeding and illegal parking. Urban researchers further recommended integrating safety features into urban design, including protected bike lanes, raised crosswalks, and traffic calming measures. These measures would serve not only to reduce accidents but also to enhance the comfort of pedestrians and cyclists. Developers emphasised the opportunity to revitalise underutilised buildings, such as Mogamaa Al-Tahrir, by converting them into mixed-use spaces, including urban

hotels. Such adaptive reuse projects were viewed as a means to stimulate economic activity while preserving the area's architectural heritage.

A strong theme across all interviews was the need for meaningful community engagement. Residents, researchers, and developers agreed that sustainable urban change in Downtown Cairo requires consistent dialogue with local communities. They advocated for regular public consultations, participatory planning workshops, transparent communication regarding project progress, and the use of data-driven approaches to ensure equitable outcomes. A developer stressed the importance of "gathering input from Egyptian residents through numerous community meetings," highlighting the value of local knowledge in shaping effective and inclusive urban policies.

Stakeholders offered a range of consistent recommendations to improve mobility and urban liveability in Downtown Cairo. A significant focus was placed on mobility infrastructure. The Cairo Bike Project Manager emphasised the urgent need for dedicated, protected bike lanes and wider, more accessible sidewalks to encourage active transport. Residents, urban researchers, and developers similarly advocated for substantial investment in high-quality, frequent, and affordable public transportation, including metro expansion, bus rapid transit (BRT), and improved bus services. They also called for a comprehensive network of bike lanes supported by clear safety measures. Tourists, meanwhile, highlighted the importance of efficient and easy-to-navigate public transport, underscoring the need for clear signage and multilingual information. One developer notably proposed the concept of "complete streets" that accommodate diverse user needs while balancing traffic and liveability, citing Chicago as an example of best practice.

Multiple participants also emphasised safety and enforcement. The Cairo Bike Project Manager stressed the importance of clear wayfinding and physical barriers to ensure safety for cyclists. Residents and urban researchers urged stricter enforcement of traffic laws, particularly regarding speeding and illegal parking, which were seen as major contributors to unsafe pedestrian conditions. One urban researcher further recommended integrating safety features into street design, such as protected bike lanes, raised crosswalks, and traffic-calming measures, to enhance overall user comfort and safety.

In terms of land use, developers emphasised the value of reactivating underutilised buildings for mixed-use purposes. Mogamaa Al-Tahrir's transformation into an "urban hotel" was mentioned as a key example of adaptive reuse that could bring economic vitality while preserving the district's architectural heritage. Community engagement was identified by all stakeholder groups as essential for the successful implementation of any revitalisation strategy. Residents, researchers, and developers alike called for regular public consultations, participatory workshops, and transparent communication throughout the planning process. They emphasised the importance of community-based planning and data-driven decision-making to ensure that the needs of all residents are addressed. One developer specifically stressed the value of "gathering input from Egyptian residents through numerous community meetings," reflecting a broader consensus on the critical role of inclusive, bottom-up engagement in shaping sustainable urban transformation.

5. Discussion

While our qualitative research using interviews faced limitations, such as a sample size of only 10 participants and security reasons preventing interviews with foreign users, we acknowledge that a comprehensive understanding of the 15-minute city model requires diverse stakeholder perspectives, including business owners, residents, tourists, researchers, and developers, to ensure successful and equitable implementation.

Our findings, drawn from participant responses and field observations in Downtown Cairo, suggest several strategies for implementing the 15-minute city model. These align with global 15-minute city principles but are distinctly tailored to Cairo's unique urban fabric and socio-economic context, differentiating our approach from purely Western-centric models.

For instance, direct comparisons to European cities reveal critical divergences. Unlike the highly formalised car-free zones standard in cities like Paris, where pedestrianisation can be a relatively straightforward process, Downtown Cairo presents significant complexities. Our observations highlight that Cairo's informal vendors and many local businesses heavily rely on vehicular access for deliveries and customer reach, complicating direct pedestrianisation efforts. This necessitates more nuanced solutions that balance enhanced walkability with economic realities, a specific challenge that enriches the localised 15-minute city model for contexts with strong informal economies. Similarly, while Milan's success with bike-sharing strategies is inspiring, Cairo's hot climate, existing road infrastructure, and deeply ingrained cultural norms around transportation demand substantial adaptation and investment to make cycling a viable daily option, distinguishing it from Eurocentric bike promotion models.

Our suggested strategies for Downtown Cairo include:

1. Enhancing Walkability and Bike-ability: This involves constructing wider sidewalks, dedicated bike lanes, and protected intersections. Safety improvements would include traffic calming measures (e.g., speed bumps, narrower roads), enhanced street lighting, and removal of sidewalk obstructions. Promoting cycling culture through public awareness, accessible bike-sharing programs, and enforcing traffic laws is essential.
2. Strengthening Public Transportation: Critical investments are needed in high-quality, efficient public transportation, including expanding and improving metro lines and bus services (like Bus Rapid Transit). Increasing service frequency and reliability, alongside enhancing accessibility for individuals with disabilities

and providing clear, informative signage, will significantly improve the public transport experience.

3. Fostering Mixed-Use Development: Encouraging mixed-use zoning integrates residential, commercial, and community spaces to create vibrant, self-sufficient neighbourhoods. Repurposing underutilised buildings fosters a dynamic, interconnected urban environment. Supporting local businesses through cooperative frameworks and addressing logistical concerns, such as traffic and delivery access, strengthens the local economy. This approach aligns with global mixed-use principles but emphasises flexible zoning and support for existing informal economic activities.
4. Enhancing Public Spaces and Community Engagement: Developing vibrant and accessible public spaces is vital for well-being. Enhancing parks, plazas, and community gardens with sufficient lighting and security makes them more inviting. Promoting their use for community events strengthens social interaction and a sense of belonging.
5. Prioritising Community Engagement is essential for successful urban planning initiatives. Regular public consultations and participatory planning gather valuable input from residents, businesses, and stakeholders, ensuring community ownership and addressing concerns. Transparent communication about project progress builds trust and shared responsibility, especially crucial in a dense, culturally rich urban environment like Downtown Cairo.

By focusing on these strategies and ensuring ongoing community engagement, Downtown Cairo can transform into a vibrant and equitable 15-minute city, offering a high quality of life for all its residents and visitors. Our findings make a unique contribution to the global discourse on the 15-minute city by providing a localised framework tailored to the specific socio-economic and cultural realities of a complex urban environment in the Global South, thereby moving beyond direct replications of models from the Global North.

Our findings from Downtown Cairo reflect several key themes that resonate with and diverge from international experiences of implementing the 15-minute city model. One of the central themes is the role of governance and political will in driving urban transformation. In our study, residents and stakeholders expressed concern about the top-down nature of development initiatives, particularly fears of gentrification and the prioritisation of tourism over local needs. This mirrors findings from Paris, where politically driven strategies under Mayor Anne Hidalgo have led to significant investments in car-free zones, bike lanes, and public transport (Allam et al., 2022) but have also faced criticism for intensifying gentrification pressures (Gonzalez-Urango et al., 2020). In both contexts, the enhancement of public amenities without adequate social safeguards risks displacing vulnerable communities, pointing to the importance of inclusive governance mechanisms in adapting the 15-minute city to historic urban cores.

Another key issue is accessibility and multimodal connectivity. Participants in our study highlighted poor walkability, narrow sidewalks, and the lack of safe cycling infrastructure as significant barriers to adopting more sustainable modes of transport. These concerns parallel the strategies adopted in Portland, Oregon, where long-term planning has prioritised walkability, mixed-use development, and integrated public transport systems to reduce car dependency (McNeil, 2011). While the vision expressed by Cairo stakeholders aligns with these global best practices, Cairo continues to suffer from fragmented infrastructure and inconsistent implementation, underscoring the need for systemic coordination and enforcement capacity.

Sustainability and the quality of public spaces also emerged as important themes. Cairo residents and tourists described public spaces as overcrowded, poorly maintained, and uninviting, characterised by a lack of shade, greenery, and seating areas. These findings contrast with initiatives like Melbourne's "20-minute neighbourhoods," which emphasise local green space access, walkability, and a strong sense of place (Rao et al., 2024). In Cairo, while aspirations for more liveable, pedestrian-oriented spaces are evident, they remain largely unmet due to competing development priorities and limited municipal investment in public realm improvements.

Equity in urban mobility was another theme highlighted by both the literature and our study. Participants consistently emphasised the need for affordable, reliable public transport and safe conditions for non-motorised mobility. These concerns strongly resonate with the case of Bogotá, where the city has used public investment in Bus Rapid Transit (BRT) systems and an extensive network of Ciclorrutas to promote equitable access to mobility, particularly in underserved communities (Teixeira et al., 2024). In contrast, Cairo's current transport system was described as overcrowded, unreliable, and fragmented. While the Cairo Bike Project reflects a positive step toward more equitable active mobility, its reach remains limited. It would require a more integrated and inclusive approach to match Bogotá's socially driven model.

Technological integration in support of mobility goals is another area of comparison that is relevant. Some participants in Cairo emphasised the need for improved signage, user-friendly transportation systems, and more innovative navigation tools. These findings align with Milan's experience, where the integration of bike-sharing apps, digital public transport platforms, and real-time mobility data has facilitated a more user-friendly urban experience (Croci & Rossi, 2014). While Cairo has begun to map out bike stations and pilot smart mobility elements, implementation remains fragmented. It lacks widespread public adoption, which limits its potential to enhance user experience and bridge accessibility gaps.

The importance of culture and long-term planning emerged as a significant distinction between Cairo and cities like Copenhagen. In our study, cultural resistance to walking and cycling, along with the dominance of private cars, were frequently cited challenges. In contrast,

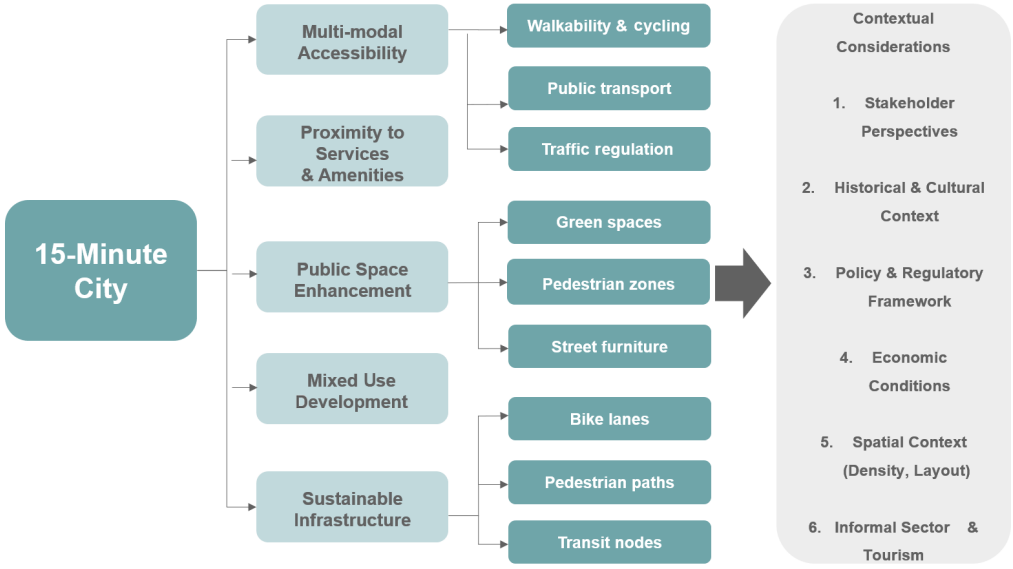

Figure 7. A framework for implementing the 15-minute city model in Cairo (source: the authors)

Copenhagen's success in promoting cycling and sustainable transport is deeply embedded in decades of consistent urban policy and a societal preference for active mobility (Gössling, 2013; Vedel et al., 2017). While some cultural shifts are beginning to emerge in Cairo–particularly among youth and tourists–these remain in their early stages and require both policy support and infrastructural transformation to foster widespread behavioural change.

Figure 7 displays a framework for understanding and implementing the 15-minute city model. This framework systematically breaks down the model of a "15-minute city" into two primary dimensions: its core pillars and essential contextual considerations. The core pillars outline the fundamental elements required to create an urban environment where basic services and amenities are accessible within a short walk or bike ride. These include fostering multimodal accessibility through improved walkability, cycling infrastructure, public transportation, and traffic regulation; ensuring proximity to services and amenities; enhancing public spaces with green areas, pedestrian zones, and street furniture; promoting mixed-use development; and building sustainable infrastructure, such as bike lanes, pedestrian paths, and transit nodes.

Beyond these foundational components, the framework emphasises that the successful implementation of a 15-Minute City is heavily dependent on understanding various contextual factors. These include integrating stakeholder perspectives, respecting the unique historical and cultural context of a place, navigating existing policy and regulatory frameworks, accounting for local economic conditions, adapting to the specific spatial context (density and layout), and considering the influence of the informal sector and tourism. This holistic approach ensures that the "15-Minute City" concept is not a one-size-fits-all solution but rather an adaptable model that can be tailored to the unique characteristics of any given urban setting.

In sum, while Downtown Cairo shares many of the goals and challenges observed in the global 15-minute city model, it faces unique limitations stemming from governance structure, infrastructure deficits, and socio-cultural dynamics. Nonetheless, international precedents offer valuable frameworks that, if adapted to Cairo's local context, could inform a more equitable and sustainable urban future.

6. Conclusions

This study explored the potential impacts of implementing the 15-minute city model in Downtown Cairo, Egypt. The study identified critical factors for success and potential challenges through qualitative research methods, including field observations and interviews with key stakeholders. The findings emphasise the importance of a human-centred approach, prioritising the needs and well-being of residents, tourists, and businesses. Key strategies for successful implementation include enhancing walkability and bike-ability, strengthening public transportation, fostering mixed-use development, enhancing public spaces, and ensuring robust community engagement. We also suggested a framework as a starting point for further research and implementation. Continuous monitoring and evaluation are crucial for assessing the effectiveness of implemented strategies and making necessary adjustments to ensure the 15-minute city model is realised.

While the 15-minute city model offers numerous benefits, its implementation in Cairo faces significant challenges. Addressing these challenges requires a multifaceted approach that considers the city's unique socio-economic, cultural, and infrastructural context. Policymakers should focus on enhancing public transit, integrating smart technologies, and fostering community engagement to make the 15-minute city a reality in Cairo.

This study acknowledges several limitations. The small sample size and the exclusion of foreign visitors from the interview pool may constrain the generalizability of the findings. Thematic analysis was conducted manually to identify recurring patterns and themes; however, the absence of qualitative data analysis software (e.g., NVivo) may have affected the consistency in code management and reduced the traceability of the coding process. Furthermore, while divergent perspectives were recognized and deliberated during analysis, the resolution of conflicting views primarily depended on the authors' interpretive judgment. This reliance may have introduced a degree of subjectivity, despite efforts to maintain analytical rigor and balanced representation.

Future research should address these limitations by expanding the sample size and incorporating interviews with a broader range of stakeholders, including foreign visitors. Despite these limitations, this study provides a valuable framework for implementing the 15-minute city model in Downtown Cairo. By focusing on these core strategies and addressing the identified challenges, Downtown Cairo can transform into a more liveable, sustainable, and equitable urban centre where residents and visitors can access essential services within a 15-minute walk or bike ride.

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Author contributions

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The authors declare no competing financial, professional, or personal interests from other parties.

Declaration

All authors of this manuscript confirm that ethical approval for the ethnographic study was obtained from the Institutional Review Board (IRB) at the Ain shams University in Cairo, under approval code [IRB-ASU-25-013], dated 24 June 2025. The IRB adheres to ethical guidelines in line with the Declaration of Helsinki. Verification of the approval code can be accessed at: https://eng.asu.edu.eg/irb/inquiry.

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