University of Strathclyde

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CONTROLLING AND INTEGRATING THE GROWTH OF INFORMAL SETTLEMENTS INTO THE FORMAL PLANNING PROCESS

The Case of Greater Cairo, Egypt

By

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DECLARATION

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ABSTRACT

The urban informality phenomenon goes back to early 1900s in Egypt. Informal settlements are spontaneously developed areas in or near cities that house low- to middle-income groups of people. They result from rapid urbanisation, a lack of affordable housing, and increased rural-urban migration. With the increasing number of informal settlements, the pressure is on governments to find an appropriate intervention strategy to elevate the living standards of their residents. The quest to find a proper way to upgrade – ranging from the provision of services to comprehensive upgrading – the informal areas has resulted in different interventions; nevertheless, there are shortcomings to those upgrading strategies, which cannot be scaled up or apply it in other locations. Also, there is a knowledge gap in understanding the dynamics and complexity of the informal settlement.

The research has four objectives: investigate the different physical, social and economic characteristics, explore success factors of intervention strategies, cross-examine informal settlements with sustainable urban development concepts, and develop an intervention strategy to upgrade, integrate and control the informal settlements. The research has a qualitative approach and a multi-case study design. It started with a systematic literature review from which it developed the Characterisation of Informal Settlements Framework (CISF). The framework aims: to investigate the different characteristics and relationships between them, informal-formal relations and transformation factors, and cross-examine the informal settlements with various sustainable urban concepts.

The research investigated an exploratory case study of Belgrade, Serbia, and the two central case studies in Greater Cairo, Ezbet El Haggana and Ard El Lewa (each from the two main typologies in Egypt). The two cases were investigated by reviewing the literature and interviewing different experts. Plus, it tested and adapted the Characterisation of Informal Settlements Framework (CISF) to the context of Greater Cairo. Next, the research investigated factors of success from different studies on informal settlements in the Global South and Egypt and the interviews with the experts. In the

end, the research developed the Control & Integration Model; it is a model for urban integration and governing the growth of the informal settlements through continuing the informalisation process while improving the current conditions through the utilisation of vacant lands between the formal and the informal.

In sum, the research has three main contributions to knowledge. First, the Characterisation of Informal Settlements Framework (CISF) provides a better understanding of informal settlements' characteristics and the relations between them. Also, the spatial and non-spatial factors that influence informal expansion and compare the informal settlements to concepts of sustainable urban form. The second is a methodological approach for studying and analysing informal settlements for better designing comprehensive intervention strategies. Last, it contributed to the literature on sustainable urban development focusing on the Global South and developing countries.

PUBLICATIONS

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LIST OF ABBREVIATIONS

AFD	Agence Française de Développement
	French Development Agency
BNG	Breaking New Ground
CA	Cellular Automata
CAPMAS	Central Agency for Public Mobilisation and Statistics
CBD	Central Business District
CBO	Community Based Organisations
CDC	Community Development Committee
CDR	Conceptually Driven Research
CIAM	Congrès Internationaux d'Architecture Moderne
	International Congresses of Modern Architecture
CISF	Characterisation of Informal Settlements Framework
CNU	Congress for New Urbanism
DIY	Do-it-Yourself
EGP	Egyptian Pound
GIS	Geographic information system
IDP	Internally Displaced person
IDT	Independent Development Trust
IHGM	Informal Housing Growth Model
IISF	Improvement of Informal Settlements Framework
ILO	International Labour Organisation
IMP	Ismailia Master Plan
ISDF	Informal Settlement Development Fund
KENSUP	Kenya Slum Upgrading Project
KISIP	Kenya Informal Settlement Improvement Programme
P2KP	Urban Poverty Alleviation Programme
NGO	Non-Governmental Organisation
NTD	Neo-traditional Development
NUSSP	Neighbourhood Upgrading and Shelter Sector Programme
PNA	Participatory needs assessment
PNPM	Program Nasional Pemberdayaan Masyarakat
	National Community Empowerment Program
PRIMED	Programa Integral de Mejoramiento de Barrios Subnormales en Medellín
	Comprehensive Program for the Improvement of Subnormal Neighbourhoods in Medellín

PUD	Planned Unit Developments
RDP	Reconstruction and Development Programme
SDG	Sustainable Development Goal
TOKI	Turkish Housing Development Administration
TOR	Technically Oriented Research
UFISD	Urban Foundation Informal Settlements Division
UGB	Urban Growth Boundary
UN	United Nations
UN-Habitat	United Nations for Human Settlements

GLOSSARY

Al Awqaf	A term refers to Ministry of Al Endowments. It oversees the religious endowments.
Ahwah	An Arabic name means coffee. It is used to refer to a small coffeeshop where men can meet and socialise.
Ashwa'eyat	An Arabic word means random haphazard or spontaneous, it is commonly used to refer to informal settlements.
Awayed'	An Arabic word means revenues. It is a form of taxes payable to the state by the people for using a piece of land.
Feddan	A unit of area used in Egypt for measuring land areas. 1 Feddan equals to 24 Kirat, with 1 Kirat equal to 175 m^2.
Global South	It is a phrase commonly used to refer to African, Latin American, Asian and Oceania regions. It is mainly for areas outside North America and Europe.
Khalaw ragl	An Arabic term means key money. It is payable sum of money at beginning of tenancy by the tenant to the owner.
Tuk-tuks	A name refers to auto rickshaws. Mostly have 3 wheels and used for transportation inside informal areas.

Chapter 1. INTRODUCTION

1.1 INTRODUCTION

In the 1950s, informal settlements were a phenomenon that housed the urban poor in the Global South – a term used for Latin America, Africa, Asia and Oceania regions (Dados & Connell, 2012). As years passed, it became an integral part of urban areas in the cities in the Global South that houses around billion urban residents globally. With the increase of its population and trying to meet the SDG goals, states cannot ignore them and their residents' rights to find shelter. With that attracted attention, many studies and approaches were made to theorise and understand them in order to develop the appropriate strategies to elevate their living standards. In Egypt, it is no different. The current cabinet announced that the country would be clear of informal settlements by 2030 (Hassan, 2021). Informal settlements in Egypt have been developing for decades despite various efforts to limit their growth. Almost 60 years later, the country announced that Egypt would be clear of unsafe areas by the end of 2021 and unplanned areas by 2030 (Hassan, 2021). The announcement generated curiosity about the approach of the current cabinet compared with those of previous cabinets. Also, this raises a series of questions such as what is the problem with informal settlements, what is the magnitude of the problem, what is the best strategy to address it, and are these efforts in the people's best interest? However, it is essential to define informal settlements and understand the reasons for their emergence and best practices in dealing with them.

1.2 INFORMAL SETTLEMENTS: BACKGROUND

Slums, favelas, squatter settlements, and bidonvilles are different terms used to denote informal settlements in the literature. They emerged in low- to middle-income countries of the Global South. UN-Habitat (2015) defines informal settlements as residential areas with no security of tenure, inadequate or lacking basic services, and houses which do not follow formal planning and building regulations. Moreover, slum households can be defined as a group of people living under the same roof who lack

adequate access to one or more facilities, water, sanitation and other basic infrastructure and services. These households can be defined as comprising poorly structured buildings made of make-shift materials and frequently include overcrowding and insecure tenure.

Informal settlements started to develop alongside industrialisation and globalisation processes. Also, rapid urbanisation, a lack of affordable housing, rural-urban migration and population growth have caused the appearance of informal settlements. They emerged through the migration of individuals to urban areas who were looking for job opportunities and better social and public facilities and services (Tsenkova, 2009). Rapid urbanisation created a shortage of affordable houses. In some contexts, for example, Egypt, Kenya and Iran, building regulations and standards were unfeasible for low- and middle-income populations; for example, plot sizes were relatively big, rendering them too expensive to own and build on (Nabutola, 2005). In addition, low income and poverty prompted people to create low-cost houses for shelter because all other options were only affordable to middle- or high-income groups. In addition to the shortage of social housing, the lack of governmental support for affordable housing, poor access to serviceable lands and housing units, and challenging requirements from mortgage programmes excluded those in the low-income group. Moreover, the formal market has high prices relative to the average income, which makes the informal market more affordable (Fernandes, 2011). Also, displacement factors, such as natural disasters and conflict, have led to the formation of informal settlements (UN-Habitat, 2015).

In 2018, the United Nations estimated that around 55% of the world's population lived in urban areas and that this proportion would reach 68% by 2030 (United Nations, 2018). They noted that this would be coupled with a continuing rapid increase in urban populations and a low supply of affordable housing for low- and middle-income populations in countries in the Global South. As such, they predicted that people would continue to squat on unclaimed or unused lands and build homes themselves, consequently continuing to create and expand the informal settlements and slums, which have become a global urban phenomenon (UN-Habitat, 2015). This

phenomenon has different forms and typologies and occupies different locations. Table 1.1 summarises the problems informal settlements and their residents must contend with (Alder, 1995; Ferguson, 1996; Nguluma, 2003; Opoko et al., 2015; Richards et al., 2007; Tsenkova, 2009; Wekesa et al., 2011).

TABLE 1.1: INFORMAL SETTLEMENTS: GENERAL PROBLEMS

Physical	Social	Economic	Environmental
Unplanned Located in areas prone to natural disasters Low-quality housing Poor urban services Poor public spaces Poor infrastructure	Un-skilled labour Literacy Lack of health services Poor quality of life Lack of security	Low-income Dead capital Investment outside the formal economy	Poor sanitation Poor waste disposal Very dense urban fabric reduces natural light and air

The continuous growth of informal settlements has created different social, economic, legal, and environmental burdens. Socially, such communities are deprived of regular access to public facilities and services, and sometimes, public authorities consider them minor citizens. Economically, they are excluded from taxes because of their informal and unplanned nature, and any regularisation programmes could cost up to threefold the costs of formal urban development. Politically, they can be manipulated by politicians who may make false promises to help them. Environmentally, they offer poor living conditions, health and safety hazards, pollution, environmental degradation, a lack of sanitation, narrow and difficult street access, and overpopulation. Legally, the lack of secure tenure to occupy the place means the ongoing risk of eviction, a lack of basic rights to access banking systems, or proof they live in the city (Fernandes, 2011).

1.3 RESEARCH SIGNIFICANCE

1.3.1 RESEARCH PROBLEM

Statistics show that the world is becoming more urbanised, especially in the Global South. UN-Habitat (2015) estimated that 90% of urban growth occurs in the developing world, with 70 million new urban dwellers per year. Between 2000 and 2018, cities with over one million inhabitants increased from 371 to 548, and the UN estimated that this would reach 706 by 2030. Also, of the world's 33 megacities, 27 are

in the Global South (Figure 1.1) (United Nations, Department of Economics and Social Affairs, 2018). The urbanisation process in the Global South is mainly informal (Figure 1.2), meaning that residents experience spatial, social, and economic marginalisation. In fact, 61.7% of the African urban population lives in informal settlements and slums which is predicted to increase from 400 million to 1.2 billion by 2050. While in Asia, Latin America and the Caribbean, 30% and 24% of their urban populations dwell in slums, respectively (UN-Habitat, 2015). By 2050, the world could record 6.7 billion urban dwellers, including 3 billion in informal settlements and slums (Brelsford et al., 2018; UN-Habitat, 2003).
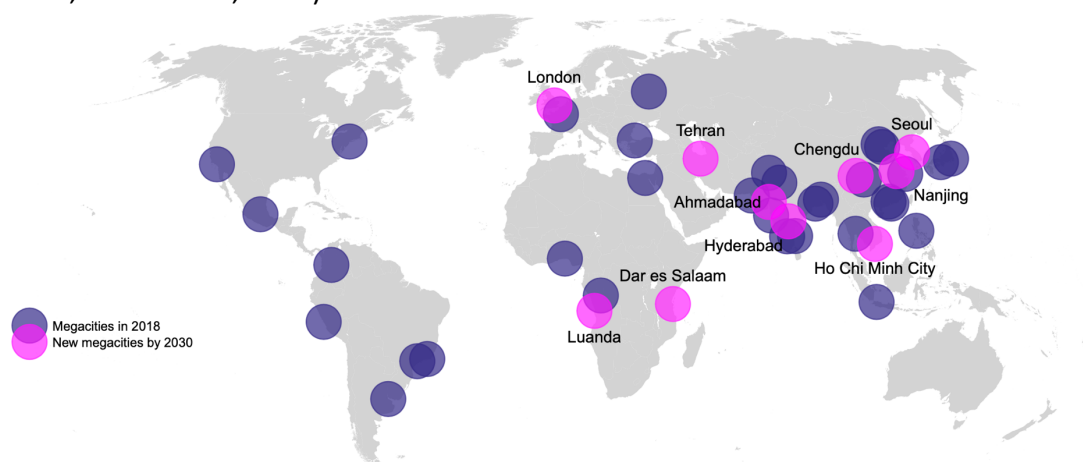
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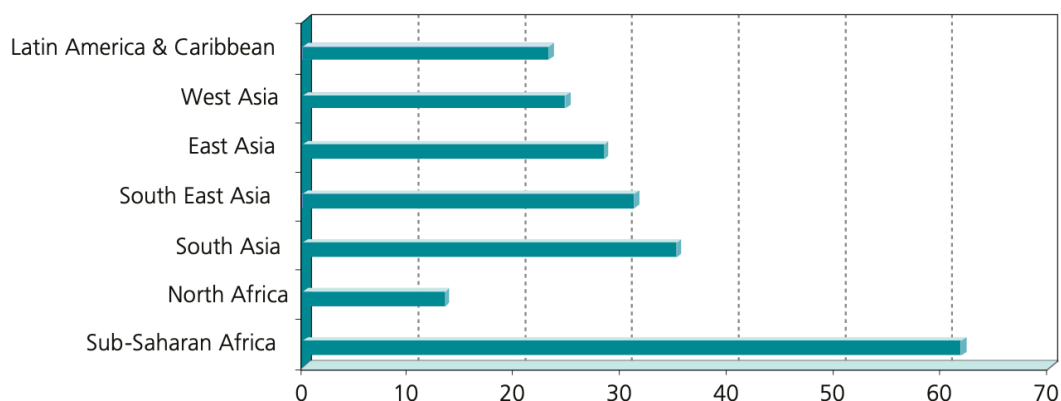
FIGURE 1.2: SLUM POPULATION PERCENTAGE FROM ALL URBAN POPULATIONS (UN-HABITAT, 2012)

Between 2000 and 2014 (UN-Habitat, 2016; United Nations, 2019), the progress in improving informal settlements has resulted in a 20% decrease in the informal dwellers (from 39% to 30% of the urban population in developing countries and 28% to 23% of the world population (Figure 1.3)). However, between 2014 and 2018, the UN reported that the number of slum residents surpassed 1 billion increasing the

proportion from 23% to 24% (Figure 1.4 & 1.5) of the total global urban population (United Nations, 2021). This increase places pressure on countries and their governments to develop new types of intervention to elevate the standard of living for informal dwellers. Also, there is a hope to achieve Sustainable Development Goal 11.1, which stipulates that *"by 2030, ensue access for all to adequate, safe and affordable housing and basic services and upgrade slums"* (UN-Habitat, 2016, p. 2).
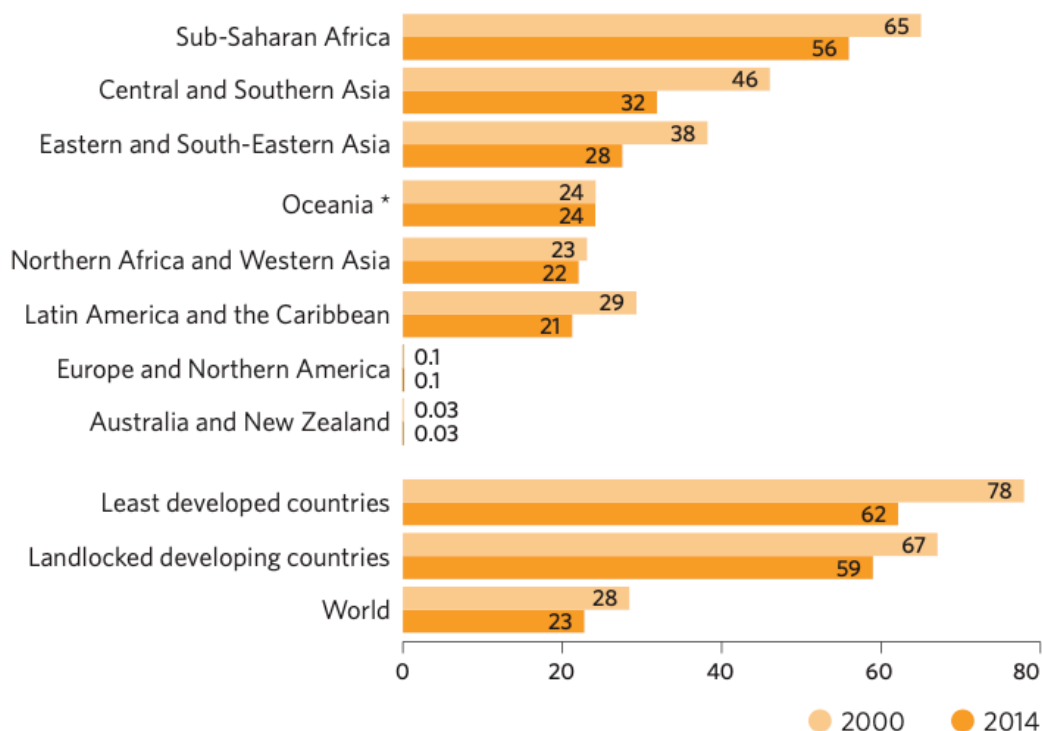
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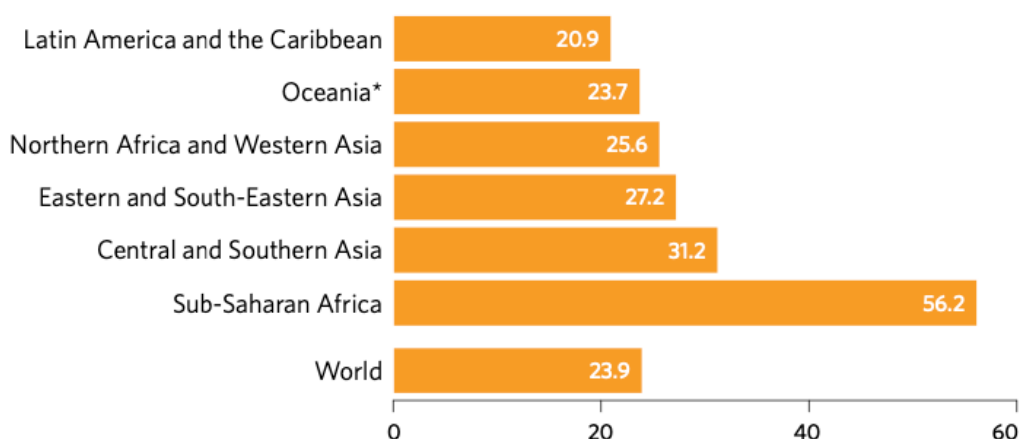
* Excluding Australia and New Zealand.

FIGURE 1.4: PROPORTION OF THE URBAN POPULATION LIVING IN SLUMS IN SELECTED REGIONS, 2018 (PERCENTAGE) (UNITED NATIONS, 2021)

Northern Africa and Western Asia: -1.0 / 3.6
Sub-Saharan Africa: -9.0 / 0.2
Latin America and the Caribbean: -8.0 / -0.1
Oceania*: -0.3
Central and Southern Asia: -14.0 / -0.8
Eastern and South-Eastern Asia: -10.0 / -0.8
World: -5.0 / 0.9

-15   -10   -5   0   5
● 2000 to 2014   ● 2014 to 2018

* Excluding Australia and New Zealand.
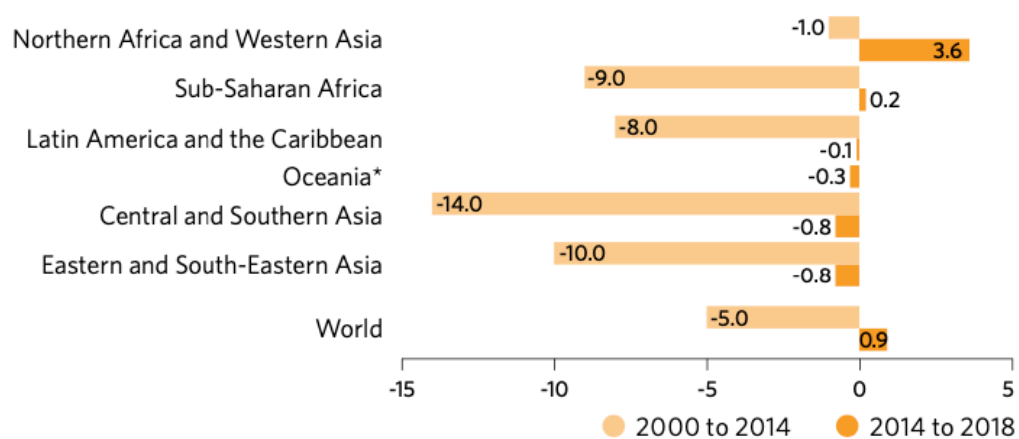
FIGURE 1.5: CHANGES IN THE PROPORTION OF THE URBAN POPULATION LIVING IN SLUMS IN DEVELOPING COUNTRIES, 2000 TO 2014 AND 2014 TO 2018 (PERCENTAGE) (UNITED NATIONS, 2020)

Informality has become the main mode of urbanisation in cities within the Global South, generating pressure to intervene to elevate the standard of living in informal settlements. Interventions in such developments have gone through different phases throughout history, starting with eviction and demolition, the increased supply of public housing to site-and-services, and aided self-help. These strategies failed for many reasons, and the preferred method is now to upgrade.

The upgrading of informal settlements ranges from the provision of infrastructure to comprehensive urban upgrading strategies which address physical, social, economic, and legal challenges. Still, the comprehensive upgrading of settlements is challenging because of the high degree of informality and dynamic nature. Different cases illustrate the process of upgrading in different countries with varying degrees of success. They range from single-sector to multi-sectoral upgrading programmes. Still, the main aim of any intervention is the sustainable development of informal settlements and their integration within the formal city. Interventions toward a single sector, such as housing improvements, infrastructure provision or land titling, meet residents' expectations. Nevertheless, comprehensive upgrading programmes that incorporate the built environment and elevate socio-economic conditions should be implemented to resolve the challenges associated with informal settlements successfully. Different comprehensive upgrading programmes exist, such as Favela-Barrio in Brazil (Fiori & Brandão, 2009), KENSUP in Kenya (Anderson & Mwelu, 2013), and PRIMED in Columbia (PRIMED, 1996). However, the overarching objective of sustainable

informal settlement upgrading its degree of success varies from one case to another, and nowadays, most promote community participation in the upgrading process. Yet, such initiatives have their shortcomings; for example, the PNPM programme in Indonesia only encouraged community participation in the early stages of the programme (Roitman, 2016), while the KENSUP programme in Kenya experienced weak community participation compared to what was publicised (Anderson & Mwelu, 2013). Also, the Favela-Barrio programme lacked community participation because of mistrust between the community and the government (Fiori et al., 2001).

The problem with upgrading is that initiatives aim to improve the infrastructure and the physical environment without giving enough attention to the social and economic aspects. Furthermore, they neglect the continuous expansion of informal settlements, which eventually accommodate future generations looking for affordable housing. Another problem with upgrading strategies is that planners and governments want to formalise and impose formal rules, laws, and regulations. However, such rules are why people turn to informal housing. This demonstrates the need for flexible and adaptable upgrading schemes that follow the rules of the community rather than those of more formal entities. Finally, all intervention strategies should react to current conditions and try to improve them. Interventions must consider the current situation and adopt a more active approach toward managing and integrating future expansion.

1.3.2 SIGNIFICANCE OF INFORMAL SETTLEMENTS

Informal urbanisation and informal settlements are important for two reasons: First, inhabitants are the primary stakeholder and have the same 'right to the city' as any other inhabitant. Informal settlements became an integral part of and helped narrow the gap between the supply and demand of affordable housing. Urban researchers and planners are other important stakeholders. They must elevate subpar living standards for informal settlers. In the cities of the Global South, the informal economy is critically important as it accounts for over 40% of the country's economy, with most of the labour-power living in informal settlements (Soliman, 1996, cited in

Soliman, 2007). Integrating informal settlements will help decrease formal and informal segregation and provide urban services to all the urban population.

Second, in the past few decades, cities of the Global South have had a high growth rate which has not shown any sign of slowing down. AlSayyad (2004) argues that theories from the Chicago School of Urban Sociology or the Los Angeles School of Urban Geography do not represent the future of urbanism. Chicago School theorised the concentric zone model of city development; the city grows from a central core outward, opposing the multiple nuclei model of Los Angeles School, where there is no central area but different nodes for different activities. Instead, the future lies in cities of the Global South, where informality has become the main mode of urbanisation.

> *"We have learned that urban informality does not simply consist of the activities of the poor, or a particular status of labour, or marginality. Rather, it is an organising logic which emerges under a paradigm of liberalisation"* (AlSayyad, 2004, p. 26).

Although many studies have addressed the informality that prevails across the Global South, this is not a manifestation of the urban poor or minor residents in urban areas, but rather cities within cities built by people for their own needs and aspirations. They create such settlements to feel part of cities in a way that fits their social and economic conditions and because the state's provision is incompatible with their lives.

Finally, *the* quest for sustainable urban development has generated a lot of debate in which new concepts have emerged, such as the compact city, smart growth, new urbanism, transit-oriented development, and sustainable urbanism. All these concepts follow the Sustainable Urban Development Guidelines stated by the UN-Habitat (2009), which has defined a neighbourhood as having: a defined centre and edge, compactness, completeness, and connectedness, and an ability to enhance the quality of life and encouraging participation amongst all stakeholders in development decisions. In line with these guidelines, Khalil (2010) argues that informal settlements

have the same attributes of sustainable urban development and compares informal settlements to four sustainable urban forms, neo-traditional development, compact city, urban containment and eco-city. According to the literature, and as shown in Table 1.2, Jabareen (2006) developed a 'sustainable urban form matrix' where he graded each urban form concept against each typology (1 is a low level of sustainability, 2 is a moderate level of sustainability & 3 is a high level of sustainability). When assuming that informal settlements are one of the urban form concepts, they tend to have a highly compact form because of their high population density, mixed land use, and diversity in housing units and tenure options, producing walkable districts that only lack green areas. This demonstrates that informal settlements score close compared to other sustainable urban forms. Thus, informality could represent the future of urbanism and a sustainable urban form whereby upgrading to elevate the standard of living will enable the development of sustainable urban forms.

TABLE 1.2: SUSTAINABLE URBAN FORM MATRIX: INFORMAL SETTLEMENTS VS SUSTAINABLE URBAN CONCEPTS

Design Concept	Neotraditional Development	Compact City	Urban Containment	Eco-City	Informal Settlements
Density	1. Low **2. Moderate** 3. High	1. Low 2. Moderate **3. High**	1. Low **2. Moderate** 3. High	1. Low **2. Moderate** 3. High	1. Low 2. Moderate **3. High**
Diversity	1. Low 2. Moderate **3. High**	1. Low 2. Moderate **3. High**	1. Low **2. Moderate** 3. High	1. Low **2. Moderate** 3. High	1. Low 2. Moderate **3. High**
Mixed-land use	1. Low 2. Moderate **3. High**	1. Low 2. Moderate **3. High**	1. Low **2. Moderate** 3. High	1. Low **2. Moderate** 3. High	1. Low 2. Moderate **3. High**
Compactness	1. Low **2. Moderate** 3. High	1. Low 2. Moderate **3. High**	1. Low **2. Moderate** 3. High	**1. Low** 2. Moderate 3. High	1. Low 2. Moderate **3. High**
Sustainable transportation	1. Low **2. Moderate** 3. High	1. Low 2. Moderate **3. High**	1. Low **2. Moderate** 3. High	1. Low 2. Moderate **3. High**	1. Low **2. Moderate** 3. High
Passive solar design	**1. Low** 2. Moderate 3. High	**1. Low** 2. Moderate 3. High	**1. Low** 2. Moderate 3. High	1. Low 2. Moderate **3. High**	**1. Low** 2. Moderate 3. High
Greening	1. Low **2. Moderate** 3. High	**1. Low** 2. Moderate 3. High	**1. Low** 2. Moderate 3. High	1. Low 2. Moderate **3. High**	**1. Low** 2. Moderate 3. High
Total Score	15 points	17 points	12 points	16 points	16 points

Note. Adapted from "Sustainable Urban Forms: Their Typologies, Models, and Concepts", by Y. Jabareen, 2006, *Journal of Planning Education and Research*, 26(1), p. 47. The highlighted column has been added by the author.

1.3.3 RESEARCH CONTEXT: GREATER CAIRO, EGYPT

In Greater Cairo, with a population of over 20 million (around 20% of the country's total population) (United Nations, Department of Economics and Social Affairs, 2018), 65% of its inhabitants live in informal settlements (Magdi, 2018). In Cairo, informal settlements emerge on privately owned agricultural land and squatter

settlements on public lands, while the unique typology of 'cities of the dead' houses around 300,000 inhabitants (Hegazy, 2016).

The development of the underground metro network, ring road and new towns guided Greater Cairo's informal and formal urban expansion, which later fragmented the city's urban fabric. While informal settlements currently house 65% of the population, more exclusive, wealthy gated communities started to develop in the 1990s among private developers (Mekawy & Yousry, 2012), indicating the wide gap between living conditions. Informal settlers in Cairo cannot be generalised as poor, as evidenced by conditions in their living areas. Previous studies have shown that informal households' average income is close to Greater Cairo's average (Hendawy & Madi, 2016). The formal expansion of the city is moving towards gated communities, which only serve the high-income group, while informal settlements serve low- and middle-income groups. They prefer informal settlements because they are self-sufficient, as most contain shops, workshops and markets that fulfil their needs. Other appealing characteristics include their work-home proximity and walkability due to their compact form, where walking is the preferred mode of transportation. Inhabitants also value their social networks and participation, where streets act as an extension of homes, and a sense of safety is felt (Séjourné et al., 2009). Formal urban developments are far fewer and thus have not responded to people's needs as the country needs over 300,000 low-income housing annually (Nadim et al., 2014).

NGOs and the government now have diverse projects on different scales. The latest initiative is the establishment of ISDF (Informal Settlements Development Fund) by the government, categorising informal settlements as 'unplanned areas' and 'unsafe areas' (Soliman, 2012). However, this has several problems: first, there is little to no interaction between the ISDF and the community, and the leading strategies include the total redevelopment or eradication and moving of informal residents in unsafe areas to social houses, mainly on the periphery of the city (Magdi, 2018). Furthermore, the government upgraded some areas in different projects through infrastructure provision. Thus, the country needs to stop the total redevelopment of informal areas following the obsolete model of mono-zone land uses, wide streets and

acceptance of the nature of informal settlement and instead move toward comprehensive upgrading, not only focusing on the physical aspects but the social and economic ones. Second, the main strategy is the eviction of unsafe areas or the physical upgrade of unplanned areas, considered more beautification projects. Until now, no comprehensive model or framework has been used to upgrade or integrate informal settlements and informal urbanisation processes into the city's urban planning. Finally, the maintenance of upgraded areas is almost non-existence either by the government or the NGOs (Hussien et al., 2020).

1.3.4 KNOWLEDGE GAP

With the increasing number of informal inhabitants, informal settlements and slums have become the focus of many studies across different disciplines. The notion of informality is currently being researched and has already produced in-depth studies involving different discourses. From an economic perspective, this shows how vital such settlements are to the national economy of developing countries (Soliman, 2007). Also, it is often perceived as a marginal sector where the urban poor live to survive but could be seen as an essential part of modern economies with connections to the formal sector (AlSayyad, 2004). Legally, Hernando de Soto (1986) interpreted the informal economy as a creative solution allowing people to integrate with the formal economy and result from the state's incapacity to regulate the economy. In sociological studies, there are five models of politics for the urban poor: passive poor, survival strategy, urban territorial movement, everyday resistance and quiet encroachment. These represent interventions by the social science community to investigate increasing urban marginality and urban poor (Bayat, 2000). Another angle, as illustrated in the study by Ezeh et al. (2017), has discussed slums as unhealthy places because of the increased degree to which the physical and social environments are shared.

Furthermore, various studies on the built environment have investigated the history and causes of the emergence of informal settlements and slums in cities of the Global South (Ali & Sulaiman, 2006; Fernandes, 2011; Nabutola, 2005; Potsiou, 2014; Soliman, 2002). Further studies have explored the factors and processes that

influence the growth of informal settlements and slums (Dovey & King, 2011; McCartney & Krishnamurthy, 2018; Roy et al., 2014), while others are interested in understanding the different physical, social, economic and environmental characteristics of informal settlements (Devi et al., 2017; Hunter & Posel, 2012; Rojas Rivera, 2020; Wekesa et al., 2011). A different direction of study concerns the different typologies of settlements, and these propose different frameworks to classify such settlements. These frameworks could be based on location and formal/informal conditions (Davis, 2006), the physical characteristics of settlements (Chenal et al., 2016), the process of informal growth (Dovey & King, 2011) or a spectrum of characteristics (Tsenkova, 2009).

Despite numerous studies in different disciplines, there is still a gap in knowledge in understanding *"the complexities of informality remain under-researched and under-theorised at micro-spatial scales"* (Dovey, 2012, p. 373; Soliman, 2010) and its urban form and architecture (Pojani, 2019b). The dynamism of informal settlements is not the same in every settlement around the globe but differs from country to country, city to city, and settlement to settlement. This creates a challenge when upgrading and integrating settlements within formal urban planning frameworks. Although there are some successful projects, they cannot easily be scaled up nor applied in other locations (Dovey, 2017, p.13), *"The challenge of upgrading is to reduce the poverty without disempowering residents. All too often upgrading preserves the poverty while stripping residents of their assets, jobs and capacities for adaptation"*.

1.4 RESEARCH QUESTIONS & OBJECTIVES

The formal models of master planning and urban design are less prevalent across countries of the Global South (Dovey, 2017). Instead, informal settlements are present in many countries around the globe, in the Global South and Cairo, Egypt. In Egypt, urban development is fragmented between formal planning only accessible to a fraction of the country's population and informal urbanisation, which has become the norm. Different government cabinets have attempted to formalise it through the total redevelopment of informal areas, but their efforts have not produced significant

results. Informal urbanisation in the Global South and Egypt is still the only form of affordable housing for low- and middle-income groups. The current cabinet's priority is to end informal areas, and it has set 2030 as the target year that the country will be clear of informal settlements. Despite the knowledge gap in understanding the dynamism and complexities of informal settlements, most research deals with problems associated with the subpar built environments, marginality and the uncontrolled expansion of settlements. Thus, there is a need to develop an intervention strategy to elevate current conditions, integrate in-formal settlements within the formal city and manage spontaneous expansion. Therefore, the following questions and objectives have been developed to guide the research:

1.4.1 QUESTIONS	1.4.2 OBJECTIVES
What are the different characteristics that shape the informal built environment?	*To investigate the physical, social, and economic characteristics of informal settlements and the relationships between them.*
What are the factors that contribute to the success of intervention strategies?	*To explore the factors of success within intervention strategies.*
What is the relationship between informal settlements and sustainable urban development in Greater Cairo?	*To cross-examine informal settlements with the concepts of sustainable urban development.*
What are the different strategies to upgrade Greater Cairo's informal settlements and integrate them within the formal urban planning process?	*To develop a strategy to integrate the informal settlements with the formal city and manage its growth.*

1.4.3 METHODOLOGICAL APPROACH

The research aimed to develop an intervention strategy to integrate informal settlements with the formal city and control informal growth. Research questions guided the research process and are therefore open-ended and oriented towards a qualitative methodology. In the first two objectives, the inductive process guided the investigation and comprised the review of different studies, documents and interviews with experts. In contrast, later, the investigation explored two case studies. As the research and analysis proceeded, the research evolved and developed different

themes and areas that guided the rest of the empirical investigation. Later, the third objective process changed the research process to deductive. To meet that objective, the research generated different themes to investigate within the case studies. Finally, the last objective adopted a deductive approach by developing an intervention strategy; experts subsequently validated this through interviews. The following section outlines the approach of each method in detail.

I. Literature Review

The research started with a literature review on the history of informality; this was designed to understand its origins, the reasons for its emergence and continuous development. The process here was inductive because it needed to form an understanding of informality, different typologies, and the reasons for its development. Next, the research focused on informal settlements' physical, social and economic characteristics and produced the Characterisation of Informal Settlements Framework, which later became part of the Control & Integration Model. Later, the process shifted the focus to Egypt and Greater Cairo, namely the location of the case studies. Also, the literature review contributed to an understanding of the different intervention strategies and enabled an understanding of the factors of success.

Another element of the literature review focused on different sustainable urban development concepts. The study of various concepts was important to understand the most prevailing concepts and their principles, which later contributed to developing the third tier of the Characterisation of Informal Settlements Framework. This development later helped identify the list of indicators used to cross-examine case studies with sustainable urban development.

II. Contemporary Research on Greater Cairo

The latest research on the importance of informal settlements in Greater Cairo reflected an understanding of intervention strategies and success factors. The process entailed a review of the latest PhD theses to investigate different aspects related to one of the themes in this research. The studies were divided into three themes: informal settlement characteristics, informal settlements' growth, and intervention

strategies. The review helped form more updated, detailed knowledge of the current situation in Egypt. These studies contributed to the development of the Characterisation of Informal Settlements Framework, the success factors within the intervention strategies and the development of the Control & Integration Model.

III. ANALYSIS OF THE CHARACTERISTICS OF INFORMAL SETTLEMENTS

Informal settlement characteristics were investigated from different cases in cities in the Global South, and Belgrade, Serbia, formed an exploratory case study. It started with cases from different cities in the Global South. Then, the focus shifted to Egypt and the two case studies in Greater Cairo. Also, the research explored the characteristics through different case studies in Greater Cairo, the literature review and interviews with experts. The study found relationships between the different characteristics, which have contributed to the development of informal settlements as they are now. This resulted in the development of the Characterisation of Informal Settlements Framework. Later, the case studies in Greater Cairo tested the framework and adapted it to the context.

IV. ANALYSIS OF INTERVENTION STRATEGIES AND FACTORS OF SUCCESS

To understand the factors of success, the investigation started by analysing different intervention strategies through case studies. It explored different types of intervention and their history. Next, the research investigated different cases where a strategy was implemented by understanding the intervention's aim, implementation strategy and result. This was applied to various cases in the Global South, Belgrade and Egypt. Each case was analysed to understand its success and failure, which later formed the intervention strategies' factors of success. Lastly, this was enhanced by interviews with experts, during which interviewees were asked about the success factors within intervention strategies. Finally, the analysis of intervention strategies and success factors contributed to developing the Control & Integration Model.

1.5 THESIS STRUCTURE

Chapter one was the introductory chapter of the research. It introduced the topic, defined it, and summarised the problems associated with informal settlements. The chapter also presented the aim of the research and its significance. Also, the research questions and objectives were outlined, which emerged from identifying the gap in knowledge and the main contribution of the research.

Chapter two identifies theories from the reviewed literature and previous studies of informal settlements. It has three sections: theories on informality, sustainable urban development concepts and contemporary research on Cairo's informal settlements, forming the theoretical base of the research used to investigate the case studies.

Chapter three outlines the research methodology; the first part presents the research strategy and approach and the research's philosophical position. The chapter presents the methods and tools used for the data collection and analysis processes and the justification behind their selection. Also, it presents the research context, the selection criteria for the case studies, and finally, the identification of the data needed. The second part of the chapter presents the development of the framework from different informal and urban theories and the relationship and adaptation of urban concepts to the context of informal settlements. The chapter presents the investigation framework based on the theoretical base presented in chapter two.

Chapter four investigates the main reasons for developing informal settlements, including different typologies and characteristics. The chapter explores different intervention strategies through case studies and identifies key issues. Also, it presents the various factors of success resulting from the investigation of Global South cases.

Chapter five is the exploratory case study of Belgrade, Serbia, which follows the same investigation process as the Global South. The investigation is conducted through a literature review of various studies and documents. It includes fieldwork and interviews with experts in Belgrade.

Chapter six continues the investigation by following the same aspects explored in the previous chapter but focusing on Egypt. The chapter forms an understanding of the Egyptian context, the different typologies, and the causes for the emergence and informal characteristics. Also, it explores the various intervention strategies implemented in Egypt. The investigation is conducted through a literature review and interviews with different experts. Chapters four, five and six contribute to the *investigation of the physical, social and economic conditions of informal settlements and explore the factors of success within intervention strategies*.

Chapter seven explores the two case studies and follows the investigation framework developed in chapter three. It explores the cases' physical, social and economic characteristics and analyses the data collected. It then presents the discussion from the first phase of interviews, which discussed the different characteristics, current strategies for interventions and factors of success. Finally, it tests the framework developed to characterise informal settlements in the two case studies. The chapter continues the *investigation of the physical, social and economic conditions of informal settlements* and *cross-examines informal settlements with the concepts of sustainable urban development*.

Chapter eight details the development of a new concept based on the investigation of the characteristics of informal settlements, the factors of success from intervention strategies, and sustainable urban development concepts. This chapter *develops an intervention strategy to integrate informal settlements into urban planning and manage their growth.*

Chapter nine presents the research conclusion and findings, including how the research met its objectives and answered the questions concerning the upgrade and integration of existing informal settlements and how to control their future growth. It also notes recommendations for future research areas and the shortcomings of this research.

Chapter 2.   Informality, Sustainable Urban Forms & Contemporary Research on Greater Cairo.

2.1   Introduction

At the start, research needs to develop a foundation; therefore, this chapter explores three topics: first, the origins of informality and the informal built environment; second, different sustainable urban development concepts; and finally, contemporary research on Greater Cairo. All of the research's theoretical base informs the study's methodology.

The investigation starts by looking into three different areas. First, it focuses on understanding the concept of informality and how it differs between the Global South and Global North. Furthermore, it explores the informal built environment and the factors of transformation that influence informal expansion. Understanding the built environment and what influences its development; therefore, this section helps develop the investigation framework. Next, the chapter explores sustainable urban form concepts as the rate of urbanisation across the Global South is very high. Thus, it is essential to focus on sustainable urban development and adapt it to the Global South context. These concepts form the basis from which the indicators are developed to cross-examine informal settlements with sustainable urban forms. Finally, the last section reviews the research conducted on Greater Cairo informal settlements to understand the issues and latest findings in relation to this research area. The three routes of investigation lay the foundation for the methodology that corresponds to the research objectives and answers the research questions.

2.2   Theories on Informality

Informal settlements have their logic, qualities and physical, economic and social characteristics; they are considered a city within a city. Previous studies proved that informal areas have their informal economy, which is important to the formal economy.   Moreover, they are important for establishing social networks within

inhabitants' everyday lives, and their participation is crucial when upgrading settlements, particularly within vulnerable and marginalised areas of cities.

2.2.1 INFORMALITY

The world is growing fast, and rapid urbanisation is a common theme in developing countries. UN-Habitat (2003) estimated that half of the world's population lives in cities and urban growth rates are highest in cities of the Global South. Informal urbanisation became the normal form of urbanisation because of worldwide eco-nomic liberalisation (AlSayyad, 2004). The application of urban theory to cities of the global South is typically underdeveloped. "*They are sites at which capital accumulation and democratic governance happen under 'special circumstances'*" (Stren, 2001, cited in Roy, 2009, p. 820)*. "They are mega-cities, bursting at the seams, overtaken by their own fate of poverty, disease, violence, and toxicity. They constitute the 'planet of slums', with its 'surplus humanity' and 'twilight struggles'*" (Davis, 2004, cited in Roy, 2009, p. 820). The developed world is ignoring informality; they perceive it as an un-regulated and illegal activity that lies outside the state's control and a way for the poor and marginalised to survive.

Developing world theorists provide three important analytical frameworks for informal settlements. First, they lie inside - not outside - the scope of the state, meaning it is in the state's power to define what is informal and what is not. Also, the state itself can operate informally to gain territorialised flexibility even though the formal system does not allow this. Second, it is not only an economic sector but also a mode of production of space. It denotes the production of uneven geography of spatial value and produces an urban logic of creative destruction. "*Informality is a fully capitalized domain of property and is often a highly effective 'spatial fix' in the production of value and profits*" (Roy, 2009, p. 826). Third, it is internally differentiated. The differentiation of informal and formal urbanism occurs in a fractal way within the informalised production of space. Informality used to be on public lands and informal uses of public space. However now, it is an integral part of the urban form that is private and marketed on private lands that are informally subdivided on the peripheries of cities.

"These forms of informality are no more legal than squatter settlements and shantytowns. But they are expressions of class power and can thus command infrastructure, services, and legitimacy in a way that marks them as substantially different than the landscape of slums" (Roy, 2009, p. 826).

Thereby, the future of urbanism lies in cities of the Global South like Cairo, Mumbai, Rio de Janeiro, and Johannesburg rather than in the experiences of cities in the Global North like Chicago, Paris, New York and Los Angeles (Roy, 2009).

I. THE CONCEPT OF INFORMALITY

Urbanism studies started at the Chicago School of Urban Sociology. They examined the effect of the physical and social environment on the development of human behaviour. It has been shown in Writh's (1938) *"urbanism as a way of life"* that urbanism is not a process of linking people with a place but rather the outcome of a system of relations derived from variables that determine the urban condition as they interact with each other. Those relations are essential in understanding informality (Lutzoni, 2016).

By the 1960s, informality was established as an alternative to the functionalist urbanism of CIAM (Congrès Internationaux d'Architecture Moderne) because population growth and rapid urbanisation prompted informal spatial forms. Team X, which originated from CIAM, showed that the Modern Movement Functionalism ignored certain aspects like social requirements, spontaneousness, and self-organisation. Team X member Aldo van Eyck focused on informality through his research on Dogon Villages in Central Africa. His study showed that the most crucial aspect was residents who shared and shaped the landscape to satisfy their needs with no regulation of space structuring, thereby presenting a relationship between territory, space and practices. Aldo Van Eyck's connection to the concept of informality is visible in the 'The City as Playground' project. The project designed a system of playgrounds in the urban gaps of Amsterdam. It was an open space that could be perceived in different ways and aimed to motivate user creativity. The modular design created a different combination of elements that responded to the local context's requirements. Thus,

it made a relationship with the surrounding urban fabric and favoured a bottom-up approach. So, the project developed with the participation of the community and institutions and was not located in an area pre-located for that function (Lutzoni, 2016). Departing from here, informal settlements are built by the residents following their needs and desire. Also, they usually occupy areas easily connected to formal areas where they can find jobs, services, etc. Thus, creating an informal-formal relationship.

Informality was also present in the Situationism movement, which operated in political, social and artistic fields. It opposed the Functionalist Movement and was instead concerned with transforming urban space and architecture according to the desires of inhabitants. It linked the built environment with the context and conceived the space as a product of social activity. Situationists defined the practice of urban wandering as 'psychogeographical dérive'.

> "*This consisted of an exploration of the city aimed at understanding the effects of space on the individual and his behaviour, the separation of the social aspects of the topography and the effective dimension of built spaces, and at acknowledging the psychic effects of the urban context.*" (Lutzoni, 2016, p. 3).

In informal settlements where the individuals and their behaviours shape the informal built environment; the community occupy land, builds houses and shapes the urban space according to their desired uses. Sometimes the urban space uses the shift in time. For example, the streets occupied by street vendors and shops can extend their internal space to the outside in the morning, while, at night, their uses change to social activities.

Also, Andrea Branzi's (who was part of Archizoom Studio) work addressed changes in the understanding of urban complexity. Branzi moved from a functionalist approach, shifting from 'strong and concentrated' modernity to 'weak and widespread'. He focused on projects as a territory transformation process moving away from functionalist models. He followed repeated modular elements that are dispersed over territory rather than enclosed within a perimeter. His works formed part of those from

Archizoom Studio on the No-Stop City project, which represented the urban area as open, temporary and informal. They developed hybrid and complex systems that emphasised mixing uses and functions (Lutzoni, 2016).

In comparison, Jane Jacobs' (1961) studies of informal dynamics focused on traditional methods of urban development to understand urban phenomena. Her idea of space is not designed by architects but as a space of experiences and liveability. Her research focused on developing neighbourhood concepts and space sharing in the street and was based on informal uses in the contemporary city. Furthermore, John F.C. Turner (1968) studied the formation of informal settlements in Peru. He showed that informal settlements offered a solution to the housing problem and characterised the environment created through the poor's flexibility and their input in the decision-making process. These appeared as positive outcomes of social and spatial relations.

Like Turner, Rem Koolhaas studied informal urbanism in Lagos, stating that the self-organisation of the city was 'comfortably disorganised' and noted the creative capacity of inhabitants to survive and work. Also, he argued that systems perceived as informal or illegal could represent an opportunity if considered from different perspectives. Roy (2011) argued that such space created a gap between traditional city design and informal, spontaneous practices. In contrast, de Soto (2000) defined self-organisation and economies as having a 'heroic entrepreneurial spirit'. Entrepreneurs in developing countries have the talent and ambition to make a profit from nothing, including no formal recognition of property, which makes it impossible to convert to capital. He proposed the formalisation of informal properties and recognised the informal economy as a rebellion from the bottom that could fight the capitalist system (Lutzoni, 2016).

II. INFORMALITY: SOUTHERN PERSPECTIVE

The world is growing fast, and rapid urbanisation is a common theme in developing countries. According to UN-Habitat (2003), half of the world's population lives in cities, and urban growth rates are highest in the cities of the Global South. In these

cities, informal urbanisation is normal because of worldwide economic liberalisation (AlSayyad, 2004). Informality is now a form of urbanisation that is here to stay and should be studied as a type of urbanisation, not as a phenomenon. It was prompted by and influenced the rise of urbanisation, and Louis Wirth's (1938) noted three perspectives on urbanism that are relevant when identifying and understanding informality (AlSayyad, 2004). These are:

> "[T]he physical structure, comprising a population base; a system of social organization, involving a characteristic social structure and related patterns of social relationships; and a set of attitudes and ideas of individuals or groups engaged in or operating under forms of collective behavior and/or social control." (AlSayyad, 2004, p. 8)

Informality and the concept of the 'informal sector' emerged in the early 1970s and were influenced by labour migration to cities in the 1950s and 1960s. In 1972, two groups within the International Labour Organisation (ILO) attempted to theorise the informal sector. The first group questioned the internal structure and function of the sector and focused on whether informality consists of particular groups of individuals and/or specific types of enterprises. The second group examined the nature of the sector more generally. Their work led to two theories. First, they "*considered informality to be a marginalized sector, a temporary manifestation of underdevelopment characterized by survival activities of the urban poor*". Second, they "*considered it to be closely connected to the formal sector — an essential, permanent component of a modern economy*" (AlSayyad, 2004, p. 11). Therefore, the informal economy became a dominant sector in the national economy of developing countries (Soliman, 2007).

Hernando de Soto defined informality as a 'survival strategy' that included all extra-legal activities and resulted from excessive state regulations (de Soto, 1989; Soliman, 2007). AlSayyad (2004, p. 26) echoed this argument by stating that "*urban informality does not simply consist of the activities of the poor, or a particular status of labour, or marginality. Rather, it is an organic logic which emerges under a paradigm of Liberalization*". Furthermore, Roy (2005, cited in Soliman, 2007, p. 11) concluded that

"*Informality is not a distinct and discrete mode but is rather the very circuits of artic-ulation that link different types of housing production to one another*". These views show that informality represents the failure of socioeconomic and political programs to meet most people's basic needs and requirements (Soliman, 2007).

In addition, different schools of thought have studied informality. Whilst the Dualist school described it as a group of marginal activities outside the formal system, the Legalist school perceived it as a positive force in a formal context linked to power strategies. Lastly, the Structuralist school considered it an important part of a single system. Lately, informality has been linked to globalisation, reflecting the world's changing economic, social and political geography. As a result, two different models of the relationship between the informal and formal city have emerged: the *Informal-Formal Dichotomous Model* and *the Informal-Formal Dialogic Model.*

The *Informal-Formal Dichotomous Models* emerged from the Dualist and Legalist ap-proaches. The Dualist approach perceived informality as an entity unrelated to the formal system; marginal activities created it in order to provide a living to people on the edge of society. This approach was linked to the Kenya Report by ILO and pro-duced from research carried out on urban areas at the city edge. The research studied social life from an economic point of view,

> "*The part of the urban economy of less developed countries composed of indi-vidual, family or small-size enterprises. It provides the major source of employ-ment in the cities, with salaries lower than the minimum level envisaged by the law and production processes presenting high intensity of work, little ma-chinery, low investments and low barriers on entry*" (Bellanca, 2010, cited in Lutzoni, 2016, p. 7).

Furthermore, the Legalist approach was based on the work of Hernando de Soto. He interpreted the informal economy as a response to the state's inefficiency in regulat-ing the economy. People had to innovate creative and spontaneous solutions to try to integrate with the formal economy.

> *"This extralegal sector is a grey area that has a long frontier with the legal world, a place where individuals take refuge when the cost of obeying the law outweighs the benefit. [...] The poor are not the problem but the solution. [...] What the poor are missing are the legally integrated property systems that can convert their work and savings into capital"* (de Soto, 2000, cited in Lutzoni, 2016, p. 7)

In contrast, the *Informal-Formal Dialogic* Models emerged from the Structuralist and Relational approaches. The structuralist approach perceived informal spaces as an essential part of a single system. The school moved away from a dichotomous approach and argued for several relations between the informal and formal. This research suggests that informality is not only a phenomenon in countries of the Global South; through empirical research conducted by the school, these relations were also explored from an economic point of view. In addition, the Relational approach acknowledged the complexity of economic, social, spatial and cultural relations in the informal context. This approach adopted a multidisciplinary model on the basis that it was not possible to adhere to a single paradigm. Moreover, recent interest in informality has been based on two factors: first, that informality was predicted to disappear or become formalised, but the informal economy has kept growing in innovative and unexpected spaces, and second, that informality has become an element that strengthens and promotes economic and socially sustainable development (Lutzoni, 2016).

III. INFORMALITY: NORTHERN PERSPECTIVE

Informality emerged out of necessity and from a combination of reasons—residents' inability or unwillingness to follow regulations and the state's inability or unwillingness to enforce regulations. Informality is observed in different cities in the North. In New York, USA, various surveys were conducted on different scales, like ignoring building permit requirements and negotiating zoning codes, occupancy codes, and land use regulations. With increasing house prices in Los Angeles and London, people had to revert to building backyard structures and turning them into rental units. In San Francisco, three-quarters of Airbnb units are illegal, and the same can be found

in New York City. While in Ontario, Canada, informality happens from the start of the building process before building permissions are acquired, and many local builders are not registered with relevant organisations (Harris, 2018).

According to Harris (2018), informal development has different modes, and informality exists on several dimensions. It is the violation of regulations that considers the extent, consequences, seriousness, and how many people and regulations are involved. He defines informality as a continuum rather than a binary of informal/formal. "*Degrees of informality have social characteristics and consequences that are discontinuous*" (Harris, 2018, p. 275).

There are five discontinuous factors that define five modes: *latent, diffuse, embedded, overt* and *dominant*. Firstly, *latent informality* can be understood as: "*Regulation [that] casts a temporal shadow beyond the issues and territory to which it pertains*" (Harris, 2018, p. 275). This is common practice in North America, where the unincorporated, unplanned suburbs represent it. Latency is everywhere and places no constraints on the character of urban development, but practically, the concept can be perceived in cases when legislation is proposed or applied. The passage of a new law could turn an entity from formal to informal.

Secondly, *diffuse informality* is an individualistic effort that is uncoordinated and can be found everywhere. It is the small-scale violations, like a worker calling a friend to help him on a job or the sign of a home business being the arrival of many deliveries. These violations can potentially be found everywhere.

Thirdly, *embedded informality* is the crossed threshold when activities become organised. It includes three elements: cooperation, physical concentration and popular legitimacy, which cooperate to support irregular activity, and physical concentration enables them to cooperate. Thus, legitimacy emerges from both. Also, trust is a critical component for the emergence of embedded informality and is based on a common language, culture, class,

Fourthly, *overt informality* is the deliberate ignorance of basic zoning or building law, like in the case of irregular settlements. It requires a great degree of coordination and

leadership; its purpose allows the settlement to be possible with the long-term goal of formalising the settlement.

Finally, *dominant informality* signifies that settlements grow in size and start to shape the state governance itself, whereby they create a *"market for exceptional treatment,' making corruption routine from the street level to the back rooms of legislatures"* (Harris, 2018, p. 278). This mode is easiest to identify when the line between formal and informal starts to blur due to dominance. Thus, informality is everywhere and on different scales but becomes an inevitable part of planning and social existence (Harris, 2018).

Informality in the North exists and grows in different areas and forms, especially in low-income immigrant communities. The rise of informality started under the conditions of inequality where people lived their lives 'off the books'. Conceptually, there was a failure to identify informality as a mode of urbanisation that responded to inequality and the neoliberal regimes of urban governance that were unwilling or unable to address basic employment, housing and the other needs of the poorest residents. They are handled as lapses of enforcement or the cultural differences of new immigrants who have not adjusted to the spatial norms of the Global North. When planners and urban administrators have tried to deal with issues of informality in progressive or sensitive ways, they have perceived it as a product of culture. Their focus revolves around multiculturalist notions of respecting diversity rather than the structural inequalities that led to practices of informality.

The theory in the Global North has two approaches. First, the modernist approach perceives informality as illegal and a form of law-breaking that ignores the adaptation of low-income immigrants to new socio-economic conditions. Second, a multicultural focus in planning theory represents the response to cultural diversity and embraces differences (Porter et al., 2011).

This has led scholars working in the North to differentiate between forms of informality, namely the informality of desire and the informality of need. The informality of desire is the practice that breaks the rules regulating space for entertainment or

the service to a specific ideological project practised by middle- and upper-class residents. The informality of need denotes the practices undertaken by low-class residents that break rules to fulfil their basic needs like income generation or housing (Devlin, 2018a)

According to Devlin (2018a), there are different types of informality. First, Everyday Urbanism means that plans should not be dictated to citizens from the top-down and should not remain fixed in space and time. It destroys the organically evolving urban ecosystem that creates diversity. Planners should engage in dialogue, facilitate discussion and mediate conflict as residents shape the city for themselves. This approach follows the work of Jane Jacobs (1961), who challenged the top-down planning approach. She argued that ground-level urban space production is a better guide than grand, rational plans that see the city as an abstract totality.

Second, Tactical Urbanism is primarily concerned with practical strategies for citizen-driven, small-scale, flexible, cost-effective planning solutions to urban problems. They find inspiration in the creativity and determination of residents who take matters into their hands and incorporate informal tactics within planning strategies. This is the tactic of action first, then asking for forgiveness later, like those of Uber and Airbnb. This type of informality shares the ideologies of Richard Florida (2005) (who discussed the 'creative class' and their role as drivers of urban economic development) and Hernando de Soto (1989) (who focused on economic opportunities latent in the informal economy in the developing world).

Third, DIY Urbanism fully embraces the radical political possibilities of informal practice. It follows Henri Lefebvre's work and his concept of 'right to the city' (Devlin, 2018a). DIY urbanism is initiated, implemented and paid for by the community that responds to urban space needs. It is a form of functional intervention that imitates official responses, is present for a long time, and aims to make the built environment more user-friendly (Finn, 2014).

IV. Informal Social Conditions and Politics

The globalisation process in post-colonial societies started with an integration process but created social exclusion and informalisation. Structural Adjustment Programmes shifted from socialist to liberal economies, resulting in the decline or disappearance of social programmes (Bayat, 2000). Therefore, millions of people who depended on the state for social services had to find ways to survive; thus, globalisation and the transition to a post-socialist economy formal economy fell by 5-15% in Latin America and the Middle East (World Bank, 1995, cited in Bayat, 2000). While in Africa, unemployment grew by 10% annually during the 1980s (Vandemoortele, 1990, cited in Bayat, 2000). In the late 1990s, a third of the labour force across the world became unemployed (CIA, 1992, cited in Bayat, 2000). It resulted in the transition of middle-class and public-sector employees who became urban poor. This restructuring led to the growth of marginalised and informal groups of people and intensified social exclusion.

Global restructuring has rendered people's lives hard in terms of living, working and functioning, and it has become more challenging to become part of economic and cultural modernisation. It made people search for more familiar and informal social and economic arrangements. Thus, it created a tendency for informalisation through structural adjustment programmes, which increased unemployment ad led people to seek informal trading, manufacturing, housing and transportation. "*The new global restructuring tends to intensify the growth of subjectivities, social space and terrain of political struggles that are coming to characterize the cities of the developing world*" (Bayat, 2000, p. 553). As this growth became apparent, the social science community started to intervene. The sociological examination of urban marginality began with the work of the Chicago School of Sociology and Urban Study in the 1920s and the 1930s. It studied ethnic migrants in Chicago and then extended its research to developing countries. From these debates, four models emerged: passive poor, survival strategy, urban territorial movement and everyday resistance (Bayat, 2000).

Passive Poor

This model follows the functionalist paradigm, which perceives the urban poor as a politically passive group that struggles to make ends meet. Oscar Lewis' theory of 'culture of poverty' is based on the urban poor of Puerto Rico and Mexico. He theorised that the essential components of a 'culture of poverty' are fatalism, rootlessness, inadaptability, traditionalism, criminality, lack of ambition, and hopelessness. This concept lacked generalisation as it only applies to one type of culture (Bayat, 2000).

Surviving Poor

The urban poor are perceived as powerless but active in trying to survive unemployment and increased prices – such as through begging, theft, prostitution, and consumption pattern reorientation. Thus, they try to survive but at a cost. John Friedmann's 'empowerment' describes survival as:

> *"poor people's self-organization for collective survival through the institution of the household as the central element for the production of livelihood, the principle of moral economy (trust, reciprocity, voluntarism) and the utilization of their 'social power' (free time, social skill, networking, associations and instruments of production)"* (Bayat, 2000, p. 539).

Political Poor

The 'urban territorial movement' appeared after critiques emerged of the Passive Poor and Cultural Poverty models. Latin American scholars argue that the urban poor integrates into society. They participate in party politics, elections and economic activities and develop territorial social movements through soup kitchens, squatter support groups, church activities, community organisations, etc. These movements of the poor are territorial and organised, which is the poor's attempt to transform socially. It resulted in the development of a common community and residency. This concept does not prevail in Africa, the Middle East and Asia due to the existence of authoritarian states. *"While collective entities such as the charity organizations and*

mosque associations do exist, they rarely lead to political mobilization of the popular classes" (Bayat, 2000, p. 540).

Resisting Poor

Resistance argued that power and counter-power are decoupled, complex, ambivalent and involved in a perpetual 'dance of control' (Pile, 1997, cited in Bayat, 2000). Thus, if there is power, then there will be resistance. Most literature is based on Foucault's perception that power is everywhere and that it 'circulates' and is never "*localized here and there, never in anybody's hands*: (Foucault, 1980, cited in Bayat, 2000). It proves that people can help themselves and create their networks to fight their daily struggles. It does not allow them to acquire any space from the state, while at the same time, the state allows and pushes for increased self-help and local initiatives, meaning they will not fight the state itself. The state removes the burden of social provisions and responsibilities to citizens, resulting in an increasing number of NGOs in the Global South (Bayat, 2000).

Quite Encroachment

"*The notion of 'quiet encroachment' describes the silent, protracted but pervasive advancement of the ordinary people on the propertied and powerful in order to survive and improve their lives*" (Bayat, 2000, p. 545). As they try to improve their living standards, they must tap into the state's infrastructure to obtain electricity or water; they will let their children work in the informal economy on the side to continue their education. These actions are not considered resistance or defensive but rather a silent and gradual grassroots activism to compete with the state's prerogatives, including the meaning of order, control of public space, public and private goods, and the relevance of modernity (Bayat, 2000).

The process of globalisation has increased the number of urban poor because of increased migration to urban areas, the international migration of refugees to other countries, the existence of squatters on public or private lands, and the presence of the unemployed in public spaces, which create informal opportunities. They are all challenging the modern city and the urban governance imposed by the elites. The

form of encroachment differs from one country to another. In Iran, the poor squatted on public and private lands, houses, hotels, sidewalks, and public utilities. The informal economy started to include the middle class, whose income declined during the 1980s. Another example is the rural migrants, urban poor and middle-class poor of Cairo, Egypt. They have squatted on rooftops, cemeteries and public lands, and this encroachment keeps growing by extending informally against any formal system, such as those who had housing provided by the state. The urban poor, in these cases, has had to survive and improve their lives. They have no political background nor want any political gains. They have two main objectives: the 'redistribution of social goods and opportunities' legally or illegally to gain access to land, infrastructure and services essential for survival. Second, cultural and political autonomy from the regulations and institutions of the state. In conclusion, amongst the urban poor, an informal life means being away from the formal system of the state and is based on trust, relationships and negotiations (Bayat, 2000).

2.2.2 INFORMAL BUILT ENVIRONMENT

Informal settlements have the attention of many scholars from different angles. In particular, Kellett & Napier (1995) developed a framework to study the built form of informal settlements. The framework emerged from the analysis of frameworks aimed at vernacular environments. The framework's key elements are households, dwellings and their uses, processes shaping the built environment, and the context. The framework explores the relationships between the different elements.

> *""Households" described in terms of such qualities as the age, gender, opinions, beliefs and skills of members; "dwellings" with qualities of form, substance, function, meaning and locality; as well as how household members "use" their dwelling and the wider "context" in which they live should all be seen as part of an interrelated association which changes through time – gradually or rapidly, traditionally or perhaps traumatically."* (Kellett & Napier, 1995, p. 16).

Also, Kellett & Napier (1995) added the time dimension where each element changes according to the relationships between them and their impact on the process and settlement. They tested the framework on two informal settlements, one in Latin America and the other in Africa. They concluded that there is a transformation over time from single to multi-use, an increase in density, changes in legal status and the introduction of infrastructure — these influence changes in the built environment. Consequently, the framework presents the relations between the formal and informal processes. Furthermore, if the consolidation process continues, it can bring the informal circumstances closer to formality (Kellett & Napier, 1995).

Pojani (2019b) wanted to create a comprehensive and flexible framework that could be used in a different context. Building on Kellet & Napier's (1995) study, Pojani (2019b) developed a conceptual framework for the urban form and architecture of informal settlements. The framework has five parts: context, settlement, houses, dwellers, and process.

First is the context, which can be related to the city's social, economic, cultural, political and institutional characteristics. "*Urban design and architecture cannot be separated from the economic interests they reflect, the institutional interactions that shape their expression, and the cultural norms that frame them*" (Pojani, 2019b, p. 296). Therefore, the researcher framed the context in two ways, namely as "*informal settlements [which] are a spatial manifestation of autonomy and entrepreneurship on part of the poor segments of the population*" (Pojani, 2019b, p. 296), or informal settlements which result from rapid urbanisation, inequality, poverty, and marginality. Although the liberalisation of the economy allowed the rise of informality in housing and economy, Pojani (2019b) framed it as a mix of the two. It is a way to survive poverty and inequality while achieving recognition and inclusion and reclaiming rights (Pojani, 2019b).

Second, the settlement has five criteria to classify informal settlements: size and location, layout and density, land use, public space and image and identity. Firstly, the size and location of informal settlements vary and can range from a single building

that is informally subdivided to a group of houses or entire districts. In comparison, the location is either inside the city or on the periphery. Secondly, in terms of layout and density, informal settlements could follow a grid pattern, especially if built on a flat topography and residents organise the squatting process. In most cases, however, the settlement is primarily walkable. Additionally, the streets are laid out following a particular social ideology which can help maintain strong social ties (Pojani, 2019b). In comparison, density depends on two aspects, whether the houses are single or multi-family houses and the lot size. Thirdly, land use can be very mixed, which helps with employment and residents' livelihoods. Public spaces are vital for income generation activities which extend from homes. Commercial uses are mixed throughout the settlement and typically provide supplies for the community. Commercial uses, therefore, include stores and microenterprises, which appear out of necessity and do not follow the planning regulations of the formal city. Fourthly, public spaces are unlike those in the formal city, as there are no squares or public plazas, while landmarks could be stores or other functional elements. Residents meet and socialise in streets, roofs, and alleys, signifying the efficiency of land use within informal settlements. Finally, regarding their image and identity, informal settlements are often perceived as poor areas that impose visual and social pollution or become places of crime, while security issues vary from one settlement to another. Some researchers have admired informal settlements as 'picturesque, ingenious and full of vitality and that qualities disappear from the formal city (Hernandez-Garcia & Lopez, 2011; Çelik, 2003; Petonnet, 1972, cited in Pojani, 2019b). The unique spatial qualities of informal settlements are like a collage of many layers governed by an 'organised chaos' (Pojani, 2019b).

The third criterion is the house, which has two aspects: *architecture and symbolism* and *materials and technology*. Informal settlements do not follow any regulations but are rather like vernacular settlements. The architecture of the houses follows the cultural and climatic context, which is shared between residents and then personalised to their needs and ideas of an ideal home. For example, a study in the Maghreb found that informal settlers were inspired by traditional Islamic styles (Petonnet, 1972;

Çelik, 2003, cited in Pojani, 2019b), while informal houses in Tanzania followed the Swahili house type (Nguluma, 2003). Nevertheless, inhabitants aim to modernise and express themselves in the architecture of their houses. There are signs of beautification and decorative elements even in the poorest settlements (Dovey & King, 2012), and inhabitants upgrade their homes or extend them when they can afford to do so (Pojani, 2019b). The second aspect is *materials and technology*; houses are self-built with no plans to follow, and materials must be cheap and transportable (Dovey & King, 2011). They tend to use recycled and natural materials or manufactured materials bought from small-scale, informal suppliers (Kellett & Napier, 1995).

Dwellers is the fourth criterion and has two aspects: *conditions of existence* and *place attachment*. The former relates to the changes imposed on the household, which reflect on their house; for example, changing the house design to accommodate a growing family or making improvements following better job circumstances. In addition, place attachment is symbolised by physical and emotional investments, which grow as the settlements are consolidated (Pojani, 2019b).

Finally, Process has four aspects: *origins*, *consolidation*, *gentrification*, and *redevelopment*. Three modes define the *origin* of informality: firstly, settling on unclaimed land; secondly, taking over unused spaces; and thirdly, attaching to formal structures (Dovey & King, 2011). *Consolidation* is incremental and takes many forms, such as room-by-room additions or house-by-house. The consolidation process depends on financial means and can be undertaken to increase the comfort of a house and establish more space to rent or extend a house. Another aspect is *gentrification*. Informal settlements tend to appear on unused and neglected lands, but over time and due to urban expansion, the location of the settlements becomes more central. Through better location, the land value increases, making it attractive to investors, which imposes the risk of gentrification on informal settlers. The last aspect is *redevelopment*, which was the primary approach in the early twentieth century following the Modernist Movement. Later, Turner (1968) promoted self-help housing over slum clearance and redevelopment, and interventions now focus on in situ upgrading, land tenure, the provision of services and connection to the formal city.

Nevertheless, upgrading is a complicated process when linking informal settlements to the city. It must achieve a sustainable settlement and social integration with the city to avoid the space becoming or remaining an excluded island. The framework's purpose is to understand the informal settlement's urban form to better accommodate residents' needs and resource limitations. To achieve this, it is necessary to check the four elements of informal settlement vulnerability (Abbott, 2002a).

First, they are physically marginalised environments (with environmental and social impacts) because they could be in hazardous areas with the risk of landslides or flooding or located on old landfill sites. Also, they could have social problems related to the location, like the risk of eviction and insecurity, which imposes personal risks such as epidemics, theft, injury, and domestic violence. Higher rates tend to be recorded in these areas than in the formal city (Abbott, 2002a).

Second, *the absence of opportunities for asset retention and growth* refers to labour, human capital, productive assets, household relations, and social capital. *Labour* is the poor's greatest asset, while *human capital* represents the connection between the social and economic infrastructure and the immediate, long-term income-earning capacity. *Productive* assets denote housing with a direct effect on income, while *household relations* represent the cohesion between family members, and *social capital* is the strength of social networks in the community. "*Thus, the more assets people have, the less vulnerable they are. And the greater the erosion of their assets, the greater their insecurity*" (Moser, 1995, cited in Abbott, 2002a, p. 322).

The third is *the perception of poverty* amongst the poor and their context identification of priorities; fourth is *the compromised use of space*, whereby informal settlements have privately and publicly compromised spaces. The current built environment has its social benefits. Still, it is hard to access emergency and service vehicles, resulting in a lack of security, emergency access and urban services (Abbott, 2002a).

However, seeking to meet only one vulnerability could lead to a counter effect on another. According to the vulnerabilities, the effectiveness of an upgrade can be measured using the following indicators: Physical risk related to the site, personal

risk, livelihood, the ability to withstand shocks, the recognition of intangible assets, the social value of tangible and communal assets, and the impact on informal spatial relationships (Abbott, 2002a).

Exploring the informal built environment, this investigation should follow three lines of inquiry: physical, social, and economical. The physical characteristics include settlement location, urban form, transportation and infrastructure. Secondly, the social characteristics comprise social services, security, social networks and residents' cultural backgrounds. Lastly, economic activities denote employment, tenure types and housing quality. These characteristics are essential to understanding the dynamism of informal settlements and how they shape the informal built environment. Furthermore, there are links between all those characteristics that are unique to informal settlements.

2.2.3   FACTORS OF TRANSFORMATION

Informal settlements are known as spontaneous and uncontrolled urban growth. They are areas undergoing continuous expansion and transformation by adapting to the current situation. Before controlling the expansion of settlements, it is necessary to understand how the factors evolve and transform. Urban morphology is the study of urban fabric and relations between the components of human settlements on different scales: the physical structure, patterns of land use, movement and connectivity. To better understand the city, there are six patterns to study, namely:

- *"Economic, political, and social interactions of people and their resultant building activities and land consumption within the formal land market.*
- *Hierarchical street and public space network, initially created by beaten paths of real journeys by inhabitants, then formalized and added to by municipal and regional institutions.*
- *Legally land parcels, known as lots or plots.*
- *Topography of the site, including land contours and the location of water bodies that typically constrain broader city development.*
- *Existing and proposed land use and flows of inhabitants.*

- *Three-dimensional composition of the city's-built form, outlining built, and unbuilt areas"* (McCartney & Krishnamurthy, 2018, p. 3).

However, these patterns are insufficient to understand informal settlements. According to McCartney and Krishnamurthy (2018), the following patterns of analysis will build a better understanding of informal settlements. First, nonspatial *social, economic and political factors* have a spatial impact; informal settlements develop because of a lack of affordable houses and emerge in locations that could be hazardous and lack infrastructure or security of tenure. Nevertheless, they are in close proximity to employment. Also, factors like an increased sense of security directly impact the urban form of the settlements and how inhabitants invest in houses.

Second, *situational Factors* offer an understanding of the city's expansion and how it influences the development of informal settlements. A bigger picture of the city will help predict future locations for the development of settlements. This also includes the affordability of land, methods of access and the connection to economic, social and built infrastructure (McCartney & Krishnamurthy, 2018).

Third, *site factors* address issues such as the development of informal settlements in areas where the land value is low, former waste sites, environmentally hazardous areas, or unforgotten places (McCartney & Krishnamurthy, 2018).

Fourth, *circulation space configurations* signify how the inhabitants feel secure and affect the patterns of urban form. This directly responds to the level of connectivity and control between inhabitants and the outside community. The settlement forms include: grid urban or organic urban and are determined by how secure the inhabitants feel living in the area (McCartney & Krishnamurthy, 2018).

Last, *building typology* means determining lot lines and land use, which can be blurred in informal settlements. It means the fine-grained detail of building conditions under which the built and unbuilt can be classified. Thus, there are "*six main types of building conditions within slum settlements that reflect duration, investment, and tenure: (a) developer-built, (b) formally built multifamily housing, (c) self-built*

permanent, (d) self-built semi-permanent, (e) existing formally built tenement, and (f) self-built shack" (McCartney & Krishnamurthy, 2018, p. 9)

In comparison, Roy et al. (2014) argue that *population dynamics*, *rapid economic factors*, *the housing market*, the *informal economy*, *local typography*, *street patterns* and the *politics of slums* influence the growth of informal settlements. These can be understood as follows: First, *population dynamic* signifies the rapid population growth that can worsen existing urban problems, while population change is formulated as the difference between (crude birth rate + immigration rate) and (crude death rate + emigration rate) (Roy et al., 2014).

Second, *rapid economic growth* has led to the formation of informal settlements in developing countries. Economic development often exists in large cities and creates new opportunities and a higher quality of life, which speeds up population growth and places strain on the city's infrastructure (Roy et al., 2014).

Third, *housing market dynamics* affect the growth of informal settlements. From this perspective, formal and informal markets are essential because the formal market has an external influence on the informal (Roy et al., 2014).

Fourth is the *informal economy*. The global informal economy is estimated to be worth 10 trillion USD; it employs around 80% of the workforce in developing countries and is the fastest-growing part of the economy. Workers in the informal sector have low and unstable incomes and lack basic protection and services. However, the informal sector allows much of the population to escape extreme poverty and earn an income to meet their needs. Due to sector informality, employees evade paying taxes, making it attractive to the poor. Some governments recognise the benefits of absorbing excess labour and overcoming unemployment issues (Roy et al., 2014). UN-Habitat (2011, cited in Roy et al., 2014) stated that most young people employed in the informal sector live in slum areas. Therefore, a thriving informal economy leads to a more stable slum and attracts more people.

Fifth denotes *local topography*, whereby informal settlements are usually on marginal or vacant urban lands, or natural hazard-prone sites, while older informal

settlements are generally inside the city and newer settlements are mainly on the peripheries (Roy et al., 2014).

Sixth, in terms of *street pattern*, the streetscape inside informal areas determines their shape and direction of growth as informal areas expand along attractive streets like those hosting street markets, economic centres, etc. Infrastructural urban barriers constrain them, such as a railway track on one side of the settlement, which restricts the growth of the settlement on that side. The close packing of dwellings reduces the external surfaces exposed to the sun and results in maximum shading of private and open spaces. In many cases, narrow lanes permit double access to dwellings at the front and back of the house, which can be helpful for dwellings that combine residential and commercial activities (Roy et al., 2014). UN-Habitat (2012) advocates a move towards the opening of streets in slums as a strategic intervention toward citywide slum upgrading.

Finally, in terms of the *politics of slums*, local politics directly affect the growth of informal areas. "*The local governments directly impacts the legal and regulatory affairs*" (Roy et al., 2014, p. 80). These factors will be implemented through tools to predict the growth of informal settlements (Roy et al., 2014). Also, the spatial configuration of a settlement can entice the state to intervene. For example, narrow streets and/or organic urban fabric are not easily accessible by police and fire trucks in case of emergency.

2.3 ANALYTICAL DISCUSSION ON INFORMALITY

The concept of informality appeared as an alternative to CIAM's functionalist urbanism in the 1960s. It emerged because Modernism ignored social aspects, spontaneousness and self-organisation. Informality became the norm for urbanisation in cities in the Global South, leading to many studies on the phenomenon, which attempted to theorise it. Aldo van Eyck (Lefaivre et al., 2002) was the first to study it, and it was subsequently present in the Situationism movement, in Andrea Branzi's (2006) No-Stop City, and Jane Jacobs' (1961) research on informal uses in the contemporary city,

amongst others. These works led to different perspectives between the Global South and North.

The concept of informality emerged in the 1970s when ILO developed theories on it. Later, Hernando de Soto described it as a 'survival strategy' that emerged from excessive state regulations (de Soto, 1989). Later, AlSayyad (2004) argued that it represented an organic logic that appeared due to liberalisation, while Roy (2005) described informality as a form of expression that connected different types of housing production. Also, different schools of thought studied informality, producing two models of informal-formal relationships. They were *the informal-formal dichotomous model* (developed by the Dualist and Legalist schools) and the *informal-formal dialogic model* (developed by the Structuralist and Relational schools). Most schools explored the informal-formal relations from an economic point of view, except for the Relational school, which acknowledged the complexity of informality and that a multidisciplinary approach was most suitable. In comparison, the Global North's approach to theorising informality incorporates modernist and multicultural thinking in its planning theory. The modernist perceives informality as illegal, while a multiculturalist defines it as responding to cultural diversity and embracing difference. This led to the emergence of two forms: the informality of need practised by low-class residents and the informality of desire practised by middle- and upper-class residents. Both led to three types of informality: everyday urbanism, tactical urbanism and DIY urbanism.

Moreover, Bayat (2000) mentions that the shift from socialist to liberal economies paved the way for the disappearance of social programmes and the fall of the formal economy. The disappearance of social programmes and state support prompted people to act in informal ways. With the growth of informality, the social science community developed five models: *Passive Poor*, *Surviving Poor*, *Political Poor*, *Resisting Poor* and, later, *Quite Encroachment*.

Based on this discussion, this research follows the *Informal-Formal Dialogic Model of the Relational Approach* and the *Quite Encroachment Model.* The relational approach

is the most comprehensive for studying informal settlements and acknowledges that informality is built on different relations between social, economic, spatial and cultural aspects. In comparison, *Quite Encroachment* believes that people try to improve their lives because the globalisation process and economic liberalisation have made them 'the urban poor'; they challenge modern urban governance that imposes and serves urban elites.

Next, Kellett and Napier (1995) developed a conceptual framework derived from other frameworks that considered vernacular environments. Their framework had five key elements: households, dwellings and uses, processes, context and time. The testing of their framework showed relationships between the different elements and between the informal and formal processes. Another framework was developed by Pojani (2019b) and called the *Informal Settlements Urban Form and Architecture Framework*. The framework is built upon Kellet and Napier's framework and has five parts - context, settlement, houses, dwellers and process - each has its own elements.

Abbott's (2002a) study of the informal built environment shows four elements of vulnerability which the following indicators can measure: *physical risk related to the site, personal risk, livelihood, ability to withstand shocks, recognition of intangible assets, social value of tangible and communal assets* and the *impact on informal spatial relationships*. These indicators have shaped this empirical investigation framework, allowing for an expansive understanding of the informal built environment and the different relationships that create these unique areas. The research subsequently developed a set of physical, social and economic characteristics to investigate the informal built environment comprehensively.

Previous research shows that the study of informal settlements-built environments is complicated because of their distinct characteristics and the relationships between them. These studies demonstrate that different relationships shape informal settlements. Thus, investigating informal settlement characteristics is essential, and all the elements should be studied cohesively. Nevertheless, it is crucial to explore each aspect and the reciprocal effects on each other. Therefore, this study will form an

understanding of the dynamics of informal settlements. Also, these studies allow the research to develop three sets of characteristics (physical, social and economic), which are used to study the two case studies.

Furthermore, factors of transformation allow for an understanding of the factors influencing the expansion of informal areas. Two in-depth studies explored and developed an understanding of the main factors behind informal settlement emergence and continued growth; Roy et al. (2014) presented seven factors, while McCartney & Krishnamurthy (2018) identified five factors. Based on these studies, this research developed two sets of factors - non-spatial and spatial factors - and explored the relationships between them and informal characteristics. Those relations formed the link between the informal and formal.

In line with the research aim, a relational approach is most relevant when intending to comprehensively study the physical, social and economic characteristics and factors of transformation. All helped to shape the empirical framework for the investigation.
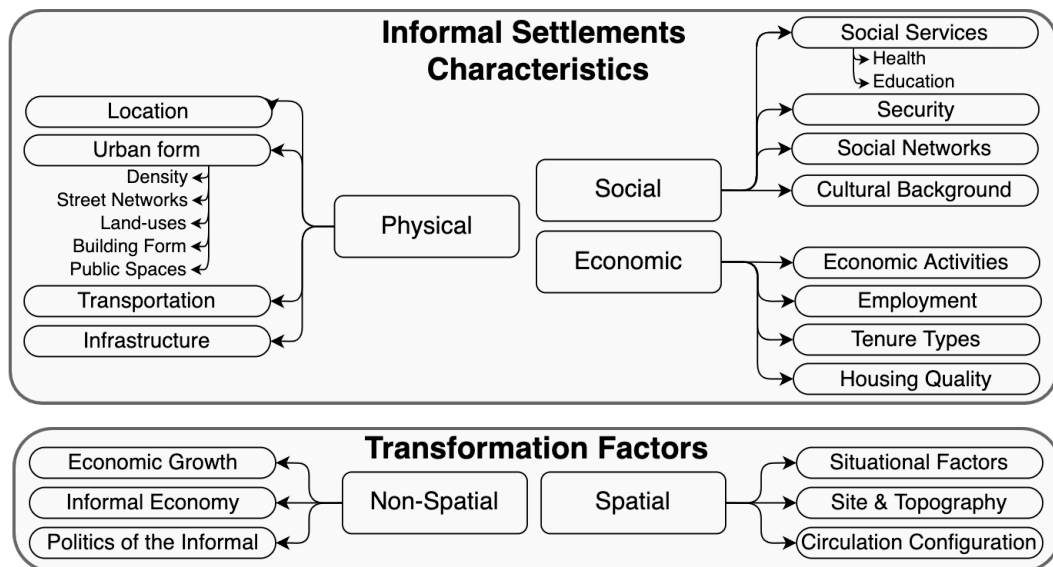
FIGURE 2.1: THE MAIN TAKEAWAY FROM THE INFORMALITY SECTION. THE DIAGRAM SHOWS THE PHYSICAL, SOCIAL AND ECONOMIC CHARACTERISTICS AND TRANSFORMATION FACTORS TO STUDY THE CASE STUDIES.

2.4 SUSTAINABLE URBAN FORM CONCEPTS

Since the 'Brundtland Report' (Brundtland, 1987), the term 'sustainable develop-ment' has become central in many debates and appears in various studies in various disciplines, including architecture, urban design and planning. It became the focus of different scales, from buildings to metropolitan regions, and from this, many defini-tions, concepts, frameworks and planning principles appeared. Sustainable urbanism became the common goal for almost all movements and concepts, in which different concepts appeared to enable sustainability. Those concepts developed a list of indi-cators to cross-examine against the characteristics of informal settlements. The pre-vious section outlined three sets of characteristics; testing them against developed sustainable indicators also provided an opportunity to test the suitability of the in-formal urban form as a sustainable urban form concept, which is appropriate for cit-ies of the Global South.

Jabareen's (2006) study identified seven design concepts commonly implemented in urban forms: compactness, sustainable transport, density, mixed land uses, diversity, passive solar design and greening. According to Jabareen (2006), four sustainable ur-ban forms combine most concepts: Neotraditional Development, Urban Contain-ment, Compact City and the Eco-City. Each is part of a movement or encompasses different concepts. Several other concepts are evident when exploring these con-cepts and theories. Several concepts have been studied on the city and neighbour-hood scale, forming a middle ground between informal settlements and sustainable urban forms. New Urbanism, Smart Growth, Slow Urbanism and the Compact City focus on walkability, compactness, and mixed land uses within the built environment, including the efficient use of available land, comparable to informal settlements. Also, their principles help the development of an intervention strategy to upgrade and integrate informal settlements.

2.4.1 NEW URBANISM

In the 1980s, a new movement in architecture and planning emerged, called New Urbanism, that positioned itself in opposition to Modernism. It had its charter,

conferences and membership in the official Congress for New Urbanism (CNU) (Bohl, 2000). The CNU was founded In 1993 (Knaap & Talen, 2005) and produced the Charter of New Urbanism to present its values and design principles (Day, 2003). New Urbanism is the umbrella term for Neo-Traditional Development, traditional neighbourhood development and transit-oriented design (Bohl, 2000; Talen, 1999). It is a design-based strategy to discourage suburban sprawl and revitalise declining inner-city areas and neighbourhoods (Knaap & Talen, 2005).

New Urbanism principles operate on different scales, from buildings and plots to cities and regions. Its principles promote compactness, diversity, mixed-use, pedestrian and transit orientation (Bohl, 2000), and a sense of community (Talen, 1999). The CNU has 27 principles divided into three scales to guide public policy, development practice, and urban planning. They are:

- The region: metropolis, city and town;

- The neighbourhood, the district and the corridor; and

- The block, the street and the building (Congress for The New Urbanism, 2001).

New Urbanism is not just a movement applied to greenfield sites to fight the suburban sprawl but is also implemented in inner cities. The movement can revitalise inner-city infill and brownfield projects. It now has ten guiding principles for planning that can be applied on any area scale, as shown in Table 2.1.

TABLE 2.1: PLANNING PRINCIPLES OF NEW URBANISM.

Principle	Description
Walkability (NUP1)	- Most things within a 10-min walk of home and work - Pedestrian friendly street design (buildings close to street; porches, windows & doors; tree-lined streets; on street parking; hidden parking lots; garages in rear lane; narrow, slow speed streets) - Pedestrian streets free of cars in special cases
Connectivity (NUP2)	- Interconnected street grid network disperses traffic & eases walking - A hierarchy of narrow streets, boulevards, and alleys - High quality pedestrian network and public realm makes walking pleasurable
Mixed-use & Diversity (NUP3)	- A mix of shops, offices, apartments, and homes on site. Mixed-use within neighbourhoods, within blocks, and within buildings - Diversity of people of ages, income levels, cultures, and races
Mixed Housing (NUP4)	- A range of types, sizes and prices in closer proximity
Quality Architecture & Urban Design (NUP5)	- Emphasis on beauty, aesthetics, human comfort, and the creation of a sense of place, the special placement of civic uses and sites within the community. Human scale architecture & beautiful surroundings nourish the human spirit

Traditional Neighbour-hood Structure (NUP6)	- Discernible center and edge - Public space at the center - Importance of quality public realm; public open space designed as civic art - Contains a range of uses and densities within 10-min walk
Increased Density (NUP7)	- More buildings, residences, shops, and services closer together for ease of walking to enable the more efficient use of services and resources, and to create a more convenient, enjoyable place to live - New Urbanism design principles are applied at the full range of densities from small towns to large cities
Green Transportation (NUP8)	- A network of high-quality trains connecting cities, towns, and neighborhoods - Pedestrian-friendly design that encourages a greater use of bicycles, roller-blades, scooters, and walking as daily transportation
Sustainability (NUP9)	- Minimal environmental impact of development and its operations - Eco-friendly technologies, respect for ecology and valuing natural systems - Energy efficiency - Less use of finite fuels - More local production - More walking, less driving
Quality of Life (NUP10)	- Taken together these add up to a high quality of life, and create places that enrich, uplift, and inspire the human spirit.

Note. From The official website of New Urbanism http://www.newurbanism.org/newurbanism/princi-ples.html

2.4.2   NEO-TRADITIONAL DEVELOPMENTS

Neo-traditional developments (NTD) concept was developed to fight the rise of sub-urbs post-WWII. Architects and planners reverted to the guides and principles of old traditional towns to fight auto-dependent suburbs (Nasar, 2003). The inspiration for NTD came from traditional towns aiming to battle car-dependency, low-density, mono-zone suburbia. Although, one important factor that NTD tries to revive is the sense of community because planners criticised the suburbs for isolating individuals and the disappearance of community and social ties (Nasar, 2003).

In fighting the problems associated with suburbs, NTD is a suburban planning concept that emerged from different concepts such as the neighbourhood unit, garden city and planned unit development (under the umbrella of New Urbanism). NTD is considered the next generation of Planned Unit Developments (PUD) (Christoforidis, 1994). NTD, as a term, is applied to different development concepts that share some of its characteristics. Christoforidis (1994) summarised NTD characteristics as follows:

- Mixed-use core;
- Employment and civic centres;
- Promotion of a sense of community;

- Street patterns which offer different paths to drivers and pedestrians;

- Promotion of socio-economic diversity through diverse housing options for different income levels;

- Mixed land use to increase walkability between homes, businesses and the employment centre;

- High density through accommodating different uses within walking distance;

- Streets that accommodate and encourage street life;

- Common open space for public use;

- Distinct architectural character.

Some of these characteristics are found in five common development concepts: traditional neighbourhood developments, transit-oriented developments, hamlets, metropolitan purlieus and the revitalisation of existing traditional towns (Christoforidis, 1994). Furuseth (1997) mentioned that neo-traditionalists fight the size and homogeneity of suburbanisation, and the character of NTD differs from one place to another by responding to the context. He mentions that Duany and Plater-Zyberk (1993) defined five principles for NTD when designing a self-contained neighbourhood with a unique architectural character and community identity (Furuseth, 1997). NTD principles originate from the charter of New Urbanism, and Duany and Plater-zyberk (1993, The Neighborhood section, para. 2) described the ideal neighbourhood as:

> *"(1) a neighborhood has a center and an edge; (2) The optimal size of a neighborhood is a quarter mile from center to edge; (3) The neighborhood has a balanced mix of activities-dwelling, shopping, working, schooling, worshipping and recreating; (4) The neighborhood structures building sites and traffic on a fine network of interconnecting streets; (5) The neighborhood gives priority to public space and to appropriate location of civic buildings."*

Therefore, NTD is a concept that responds to physical and social problems associated with the suburbs. It tries to create mixed-use, high-density and transit-oriented areas with an increased sense of community.

2.4.3   SMART GROWTH

Urban containment is a form of sustainable development that aims to prevent expansion and force development inward. Containment programmes are applied to control the expansion of cities despite increased population densities through the reduced fragmentation of the urban footprint, less car dependency, improved public transport, saved agricultural lands, decreased infrastructure costs, energy-saving and reduced carbon emissions (Angel et al., 2011). Physical containment policies, development fees, the encouragement of 'infill' development and restrictions on residential capacity are different containment policies (Woo & Guldmann, 2014). Greenbelts constitute a type of physical containment policy and are a spatial technique for containment. A greenbelt functions as a belt around the contained urban area that prohibits development within or outwards. Another strategy is Urban Growth Boundaries (UGB), which comprise a line drawn between the urban area and rural area; it aims to limit urban growth for a certain period and is changeable according to the need (Jabareen, 2006). The difference between greenbelt and UGB is that the first is a physical boundary of greenery where any urbanisation outside is prohibited. Whilst, UGB is a line imposed for a certain period that allows urban development inside of it only. UGB strategy is implemented using regulatory techniques prohibiting urbanisation outside the designated area.

Containment policies have five strategies which range from the strictest to the least restrictive. The first strategy is the most restrictive, with strong boundaries surrounding the urban envelope and all developments of medium- to high-density; this usually denotes a Greenbelt boundary. The second strategy is similar to the first, although the first allows the expansion of only the central city. In contrast, the second allows the growth of neighbouring villages within their own envelope while maintaining strategic gaps. The problem here involves increased land and house prices. The third strategy represents a more relaxed containment as it increases the size of the urban

envelope with a lower density and lower house prices. It is still a Greenbelt, but lower-grade land, 'as-of-right' development may occur with on-site and small-scale cluster services. The fourth strategy is similar to the third, but the countryside can be developed with central services except for risky areas, which are restricted. The last strategy is 'do-nothing', which creates low-density, low-cost houses and the loss of the countryside (Millward, 2006).

The containment paradigm is irrelevant for cities with rapid population growth and densities which are already high. Tight boundaries prevent a realistic assessment of the land needed for expansion and create infrastructure problems, inflated land and house prices, misplaced hopes of infill developments, and excessive densification that is already high. In such situations, the appropriate action is to make room and control the direction of growth. This requires four main components: realistic projections of urban land needs, generous metropolitan limits, the selective protection of open space, and an arterial grid of roads spaced one kilometre apart, which can appropriately support public transport (Angel et al., 2011).

When planned for needed growth, containment programmes become growth management programs. Growth management programmes balance expansion while fulfilling economic, social and environmental needs; this is called Smart Growth (Jabareen, 2006). Smart growth is a counteracting policy against undesirable urban development patterns. It focuses on existing built-up areas to promote greater compactness and efficiency and environmentally friendly patterns of urban development (Arku, 2009). In terms of land-use patterns, this means reusing and increasing land resource uses and infrastructure, increasing and diversifying transit modes, improving the area's jobs/housing balance, and concentrating on mixed land uses and commercial developments in compact centres. On the scale of housing, it creates denser areas through infill development and high-density housing in close proximity to the commercial area and transit lines, and mixed-income and mixed-tenure developments which increase housing affordability and diversify housing options (Danielsen et al., 1999).

Informal settlements will continue to grow and develop on marginal or vacant urban land. They will need to limit their physical expansion, direct their growth toward the appropriate utilisation of land and maintain the compactness of the settlements. Therefore, Smart Growth counteracts the negative consequences of unwanted urban development patterns and focuses on existing urban areas to encourage greater compactness and efficiency and provide inhabitants with different transportation systems, diverse housing options, and employment choices (Arku, 2009). For informal settlements, it is appropriate to limit physical expansion and continue the development of mixed types of housing through different tenure types, keeping and enhancing the mixed-use of spaces with the concentration of activities in settlements and intensifying walkability with less dependence on cars.

2.4.4   COMPACT CITY FORM & MIXED-USE DEVELOPMENT

The literature has outlined seven design concepts for sustainable urban forms: compactness, sustainable transport, density, mixed land uses, diversity, passive solar design and greening. Additionally, there are four different urban forms; Neotraditional Development, Urban Containment, Compact city and the Eco-city (Jabareen, 2006).

Literature on the built environment of informal settlements shows that spontaneous development can cross-examine the different design concepts of sustainable urban forms. First, compactness means any future urban development adjacent to the existing urban structure that minimises transport distances. The frequently used strategy for compactness is intensification denoting the efficient use of land by increasing activities and development. It can include infill development in existing urban areas, redeveloping the built environment, subdivision and conversion, and additions and extensions. Second, density is the ratio of people per land area. The increasing density and integration of different land-use help decrease resource consumption and provide compactness that will increase social interaction. Also, it decreases car use and increases the use of public transport. Third, mixed land uses mean the proximity of compatible uses, resulting in reduced travel distances and less dependency on cars for commuting, shopping and leisure trips. Also, the redevelopment and use of different parts of cities can increase security in public spaces (Jabareen, 2006).

A mixed-use design concept can create and maintain attractive, liveable, sustainable urban environments. In Europe, it forms part of the compact city concept, while in the USA, it is part of New Urbanism. The promotion of mixed-use development depends on two factors: first, the reduction of the need to travel by concentrating on different activities nearby, and second, urban diversity and vitality that will improve the quality of the urban area. The three conceptual levels of a mixed-use development are: increasing the intensity of land use by encouraging a mix of forms and tenures of housing; increasing the diversity of uses by encouraging a compatible mix; and integrating segregated uses and overcoming regulatory barriers concerned with environmental impacts, noise and traffic (Hoppenbrouwer & Louw, 2005). This points to the compact city urban form. This urban form promotes high density, open space protection, mixed land use, revitalised downtowns, Central Business Districts (CBDs) with residential uses and highly-used public transportation. Mixed-use developments facilitate sustainable transportation by shortening travel distances; promoting the sustainable use of land by maximising utilisation; enabling social sustainability as compactness; encouraging social cohesion and cultural development, and increasing economic viability due to the lower cost of infrastructure per capita and increased support for smaller businesses through a larger population (Kotharkar et al., 2012).

In theory, Jacobs (1961) argued that a fine grain mixing of diverse uses creates vibrant neighbourhoods with a balanced mix of working, service and living activities that provide a lively, stimulating, and secure public realm. She differentiated between the mixed primary uses of residential, employment or service functions and mixed secondary uses generated from the demand for primary uses like shops, restaurants, cafes and small-scale facilities. All of this creates movement between different uses during different times throughout the day and night. The mix of land uses can be achieved on different scales – neighbourhood, building-complex and local – or by mixing when space is used for various functions throughout the day (Hoppenbrouwer & Louw, 2005). Jacobs (1961) stated that mixed-use development must meet certain conditions. The district must have more than one primary function and a mix of buildings that vary in age and condition; furthermore, building blocks must be short to

increase the frequency of corner turning, and there should be a dense concentration of people (Rowley, 1996).

Moreover, Rowley (1996) created a comprehensive conceptual model based on the texture of a settlement. This includes three key features, which are grain, density and permeability. Grain is how the components of people, activities, land uses, buildings and spaces are mixed (historic towns have a fine grain, while modern cities have coarse grain). Density means the intensity or activity dependent on the number of users and a mix of uses. Permeability derives from the layout of roads, streets and paths (Rowley, 1996).

Rowley (1996) identified four types of locations promoting mixed-use developments. City or town centres comprise the commercial and civic core of towns and cities, inner-city areas and brownfield sites comprise vacant or built-up areas needing regeneration, suburban spaces, and greenfield locations. This leads to three approaches when promoting mixed-use development: the conservation of established mixed-use settings through gradual revitalisation, the incremental restructuring of existing parts of towns, and comprehensive development - or redevelopment - of larger areas and sites (Rowley, 1996).

These led to the form of the Compact City, promoted on different scales - from infill development to creating new settlements. This urban form is supported because it is perceived to be efficient in its sustainable modes of transportation, efficient use of land, mixed-use, and compactness. This promotes diversity, social cohesion, and economic efficiency as the cost of infrastructure per capita is lower and increased density sufficient to support local services and businesses (Jabareen, 2006).

2.4.5   SLOW URBANISM

Slow urbanism is linked to the sustainable development of cities. It preserves the sense of place, cultural identity, unique neighbourhoods, diversity and walkable communities (Herzog, 1995). Slow Urbanism, or the 'CittaSlow' movement, started in Italy in 1999, and was inspired by the Slow Food Movement that still relates to promoting local production (Galloway, 2018). The movement encourages economic,

environmental and social sustainability and the development of the community and economy via local resources, habits and traditions. One of the essential aspects of Slow Urbanism is its local distinctiveness and sense of place (Knox, 2005). It connects the concept of 'dwelling' and intersubjectivity with the social construction of a place and 'Third Places', which enable accessibility when generating casual encounters and informal social activities. So, "*Third places should accommodate 'characters', 'regulars' and newcomers as well as routine patrons and, like public spaces, should facilitate casual encounters as well as settings for sustained conversations*" (Knox, 2005, p. 8). Moreover, it focuses on compactness, walkable forms, a 'place-sustaining' framework for communities and 'localisation and the importance of identity' (Galloway, 2018).

The movement created the quality-of-life indicator system that assesses towns under six areas: environmental policies and planning, use of infrastructure, integration of technology, promotion of local produce and ways of life, hospitality, and the rhythm of life and sense of place (Mayer & Knox, 2009). These indicators are used to assess six key components (Galloway, 2018):

- *Environmental policies* promote sustainability and maintain healthy living conditions through the following: 'protection of the quality of the air, water, and soil', energy-saving plans, bans on the use of genetically modified crops, controlled electromagnetic pollution, noise pollution and light pollution, and the implementation of policies to recycle waste. Additionally, the use of advertisements and traffic signs aims to avoid disruption to the natural environment and complement existing urban design.

- *Infrastructure policies* enhance the overall vision of place-based sustainability. They prioritise pedestrian-oriented design and alternative modes of transportation so as not to disrupt the existing sense of place and culturally significant urban form.

- *Technologies and facilities for urban quality* mean the provision and use of technology to elevate urban quality, including the use of fibreoptic and wireless networks to maintain connectivity and communication.

- *Promotion of local produce* focuses on native or indigenous goods and services by sustaining local and traditional industries to save the local identity. This includes programmes to maintain local products, traditional methods of work and professions, and preserving local cultural events.

- *Awareness* is the creation of programmes to educate and promote slow urbanism and its benefits to inhabitants.

- *Hospitality* is the relationship between implementing slow urbanism principles, increasing a town's attractiveness, and presenting it to visitors.

These indicators aim to improve the quality of life and promote the power of the local community. The idea promoted by the movement is that a slower and more attentive daily life creates a space to strengthen and build real social bonds, resulting in grassroots initiatives to improve the quality of life in a small city (Zawadzka, 2017). Slow cities are places that focus on originality, heterogeneity, a sense of belonging and appropriation, and the re-exploration of local values, which are used as tools for economic development (Dogrusoy & Dalgakiran, 2011).

Informal settlements are unique areas with their own order and way of life but lack adequate infrastructure and urban services. On the other hand, Slow Urbanism promotes upgrading policies and urban life in small towns to preserve and enhance their built environment, preserve local produce, and increase social cohesion and support local businesses to enable economic development. These aspects are the same when upgrading an informal settlement. It means the sustainable upgrade of the built environment to meet the inhabitants' basic needs and introducing social and economic programmes and community participation in the upgrading process. This aims to create a sustainable settlement socially, economically and environmentally. So, the list

of indicators could be adapted and used to assess the quality of the upgrading intervention.

2.5   ANALYTICAL DISCUSSION ON SUSTAINABLE URBAN FORMS

To help achieve the research aim concerning the sustainable upgrading of informal settlements, it was necessary to understand the range of urban development concepts and compare them to informal settlements. The current discourse on sustainable urban development has many concepts, of which the four most common are: New Urbanism, Neo-Traditional Developments, Smart Growth and the Compact City.

Firstly, New Urbanism emerged in the 1980s and opposed Modernist principles through the different design concepts which emerged under its umbrella. It aims to revitalise deteriorated inner-city areas and works on three different scales: regional, neighbourhood and block. The Charter of New Urbanism has ten principles to guide planning to produce designs which are compact, diverse, mixed-use, pedestrian- and transit-oriented, and promote a sense of community. Secondly, Neo-Traditional Developments (NTD) emerged from New Urbanism's visions of the ideal neighbourhood. It offers a direct answer to mono-zone, low-density and car-dependent suburbs. NTD follows the principles of New Urbanism but tailors these to the neighbourhood scale. Slow Urbanism focuses on the neighbourhood scale by encouraging social and economic development from local resources, habits and traditions. The movement also promotes compactness, walkable urban forms, and preserving the sense of community.

Thirdly, in the quest for cities' sustainable development, Smart Growth emerged to balance cities' growth by meeting social, economic and environmental needs and emphasises reviving and redeveloping existing built-up areas. Land-use patterns and housing are the two scales on which it focuses. It promotes the sustainable development of cities with similar principles to New Urbanism while limiting the physical expansion of cities.

Finally, these concepts steer towards the concept of the compact city and mixed-use development. Those two design concepts are interrelated; to achieve one, it is necessary to implement the other. The compact urban form stipulates mixed-use developments within its principles because mixed-uses shorten travel distances, increase the efficiency and maximal use of land, and encourage social cohesion and economic viability. This leads to more compact urban forms.
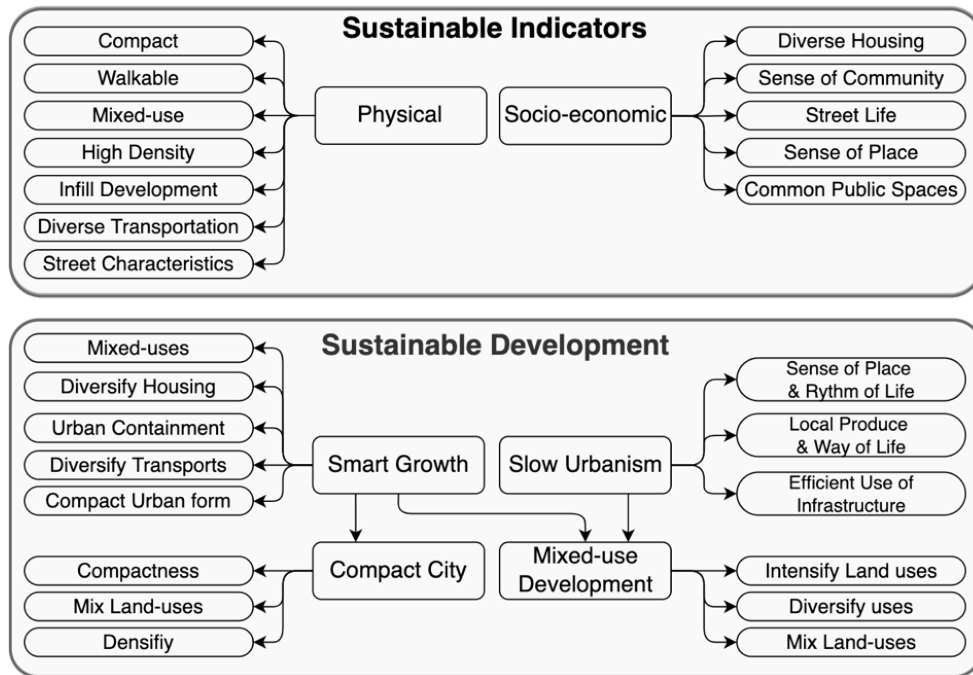
FIGURE 2.2: THE MAIN TAKEAWAY FROM THE DISCUSSION ON SUSTAINABLE URBAN FORMS. THE SUSTAINABLE INDICATORS ARE USED TO CROSS-EXAMINE THE CASE STUDIES WITH THEM, WHILE THE SUSTAINABLE DEVELOPMENT ARE PART OF DEVELOPING IMPROVEMENT OF INFORMAL SETTLEMENTS FRAMEWORK (IISF) AND GUIDING PRINCIPLES FOR THE CONTROL & INTEGRATION MODEL.

One of the research objectives is to cross-examine informal settlements with different sustainable urban development concepts. Those concepts can relate to informal settlements. Therefore, different concept principles allow for development of a list of indicators. The indicators are cross-examined with informal settlement characteristics. In addition, Slow Urbanism and Smart Growth will help to develop the intervention strategy principles. The intervention model must work on upgrading and integrating informal settlements with formal surrounding areas and managing informal growth. Slow urbanism principles are adapted to the informal built environment. The adopted principles are efficient implementation, the use of infrastructure, preserving the sense of place and way of life in settlements, and enhancing and supporting local businesses. In comparison, Smart Growth as a growth management programme aims

to control informal expansion through infill developments in surrounding vacant lands.

2.6 Contemporary Research on Cairo's Informal Settlements

Many studies have been conducted on informal settlements in Greater Cairo. The studies focus on the physical, social, or economic characteristics of informal settlements, policies dealing with informal settlements and the development of diverse frameworks for analysing informal settlements. The aim of reviewing these studies is to understand the state of research on Cairo's informal settlements and further develop this research. The investigation started by identifying relevant studies related to this research's central themes: informal characteristics, informal growth and intervention strategies. The research reviewed relevant recent PhD studies that were conducted. The review identified several studies that could contribute to the theoretical base of this research. First, they were examined by identifying the research problem, aims, and outcome. They were later categorised according to their research area, namely: *built environment characteristics* (divided into *physical*, *spatial* and *social*); *informal expansion*; *intervention strategies* (divided into *community development*, *state intervention* and *unsafe areas*).

2.6.1 Built Environment Characteristics

The informal built environment has several aspects that require investigation, and the review identified several issues. On the physical side, Shawky's (2019) research found a lack of in-depth studies on the urban form of Egypt's informal settlements. Therefore, redevelopment projects and social houses are not suitable for people's ways of life and needs. It was evident in several projects that residents implemented their changes. Spatially, the informal areas and new projects which targeted low-income groups were segregated (Elsayed, 2015). Elsayed (2015) mentioned that the urban fabric of Greater Cairo is fragmented between upper-middle- and high-income groups living in formal areas and new cities built around Greater Cairo and low- and middle-income groups in informal settlements, each in their enclave. Furthermore, there is a lack of studies that deal with cultural factors, specifically the residents'

culture and its effect on the urban space (ElMouelhi, 2014). ElMouelhi (2014) mentioned that NGO-led and upgrading projects elevate living conditions and the provision of infrastructure but lack cultural consideration or the presentation of a clear definition. Thus, the following studies deal with different informal characteristics that could help plan better intervention strategies.

I. PHYSICAL CHARACTERISTICS

Shawky's (2019) study entitled "*Urban Form Principles for the Replacement Projects of Egyptian Informal Residential areas*" investigated the principles of urban form with the aim of guiding the redevelopment of informal areas to achieve the needs of low-income residents. The research was built upon previous studies that did not consider residents' needs. Residents were observed to modify private and public areas to meet their expectations, leading to an area's deterioration. The critical problem is that architects and planners base their designs on the knowledge acquired from experience and architectural theories that originated in developed countries. The designs do not respond to people's ways of life and should be tailored to the relevant community. This problem is present in almost all redevelopment and resettlement projects in Egypt and can be observed in several projects. Shawky (2019) investigated informal areas' urban forms to understand residents' needs and priorities. The investigation helped establish the principles for designing new areas for resettlement projects and low-income housing. The research follows a case study methodology with on-site observations and questionnaires with the residents of the case studies.

The study analysed the urban form characteristics of informal areas and compared them with the characteristics of redevelopment projects. It concluded that the principles of urban form for future redevelopment projects should include high density, compactness, mixed land use, pedestrian-oriented street networks and diverse housing types.

- High-density informal areas fulfil the needs of low-income residents. Also, choosing a house depends on the crowding rate and the number of rooms per unit.

- The compact urban form is convenient for low-income residents because it gives a sense of safety and facilitates observing children playing in the streets.

- Mixed land uses enable residents' homes to be located near commercial uses and markets. It saves money, effort and time for those on a low income. Also, it increases the sense of safety, allowing women and children to move around safely. The distribution pattern of non-residential uses should be linear and clustered, allowing for easier access to services and fulfilling the social service needs of residents within the area.

- A pedestrian-oriented street network is needed because residents tend to depend on walking. The streets are not typically used by cars only but rather are multi-purposed. Markets line the streets that residents traverse to go to work or return homes and offer a gathering place for socialising and celebrations.

- Housing diversity provides different options for the diverse needs of families.

II. Social Characteristics

Lately, there has been increased attention on how residents' culture in informal settlements influences the use of space. ElMouelhi's (2014) study entitled *"Culture and Informal Urban Development: The Case of Cairo's Ashwa'eyat (Informal Settlements)"* highlights the relationship between the culture of residents and the informal production of urban space through cultural variables like ethnicity, religion, class and income. The complexity of residents' lives and how this influences the relationship between culture and informality is under-researched. Elmouelhi focuses on residents' cultural factors and behaviours that create and shape the space. He aimed to better understand Cairo's informal settlements by recording and analysing their culture and social organisation. His grounded theory research used five case studies and multiple qualitative methods. He found that informal settlements are not chaotic but *"… should be reframed as a product of interaction between different actors – mainly the*

residents and their cultural factors and power relations among each other - and the urban physical characteristics." (ElMouelhi, 2014, p. 291).

Cairo's informality is based on traditions. The use of space responds to their needs and aligns with values originating from their cultural background. Informal institutions like NGOs, mosques and churches compensate for the absence of formal services, which are not against beliefs or values. Persons who have gained power based on cultural factors become community leaders and help to solve daily issues or conflicts. Religious cultural factors are the sources of values and regulations in informal areas (ElMouelhi, 2014). Consequently, any activity can occur in the urban space if residents' values and beliefs accept it. They are usually shared among the residents because most informal residents originate from rural areas, and Cairo's popular areas originate from rural areas too.

Elmouelhi (2014) observed that the pattern of use in urban space relates to social cohesion, the urban economy, and urban society. Social cohesion develops from values which originate from a place of origin, relationships between neighbours and the use of space, strengthening the relationships between residents and the owners of shops, workers, and so forth. Also, the shared use of space allows for the development of social networks and increases social cohesion. Space is used as an extra working space and an asset for business owners in the urban economy. The use of space connects residents of informal settlements to residents of formal areas through the provision of services, thus creating an urban society. Also, residents practice their rights in their local space because formal rules do not apply; instead, they apply their own rules, which stem from their cultural background. Therefore, informal settlements are complex; they are articulated in the relations between cultural factors, urban physical characteristics, the use of space, and power relations.

The research concluded that residents' cultural factors help to understand urban informality. In the planning phase of urban interventions, cultural factors should be studied to define the relationship between the physical characteristics of urban space and residents' culture and to increase the potential of the intervention project. The

cultural factors and how they affect the area's urban development should be available to local authorities and decision-makers when linking regional and national strategic planning. ElMouelhi stated that within the research phase of the intervention, three questions must be asked: *"Who are the different types of residents who manage daily life"*; *"why are they doing it that way"* and *"what rules control the mechanism of daily life"* (ElMouelhi, 2014, p. 301).

Abdelhalim (2017) also conducted a study on cultural characteristics entitled: *"Behavioral & Cultural Patterns (B.C)s and Upgrading Informal Settlements in Greater Cairo Region"*. Abdelhalim states that the social characteristics of informal settlements have a strong influence on their development. Abdelhalim built this argument on a gap in knowledge whereby existing studies only focused on the physical built conditions and infrastructure of informal settlements. Abdelhalim (2017, p. 4) focused on the cultural factors influencing the urban space *"each place in the informal settlements has its own character, with inhabitants' personalities, and accordingly, their development project should be compatible with their own culture, hopes and capabilities"*. Therefore, the study converted culture and behaviour (non-physical factors) into measurable physical attributes by producing a "Behavioural cultural factors matrix for urban spaces" that could be integrated into a comprehensive development strategy.

III. SPATIAL CHARACTERISTICS

Elsayed's (2015) research entitled *"Spatial and Socio-economic Factors: Mutual Implications in Informal Area"* hypothesised that spatial segregation invokes socio-economic segregation on a metropolitan scale. The spatial configuration of the built environment's street and road network relates to socioeconomic differences and a microscale spatial integration of dwellings within the street network, generating micro-economic activities in informal areas. Elsayed (2015) developed an approach based on space syntax theory at the city and settlement levels to find the relations between socio-economic aspects and built environment spatial layout. The research analysed four case studies in Greater Cairo (three informal and one formal area) and employed space syntax, observation, a questionnaire and document analysis research tools.

Elsayed (2015) found that informal areas are the segregated parts of the city resulting from weak accessibility, although this differs within the areas. The local scale is integrated, which helps with the area's local functioning. Informal areas are located near global movement roads to gain access to the rest of the city and workplaces. However, they lack the axial integrators that link the local street network with the surrounding areas. Spatial segregation creates small cities within the city. Also, the resident's extra social network is weak, which results in social segregation. Finally, he found that this does not connect the most skilled and educated residents to their area who may want to move out. Thus, Elsayed recommended an intervention that connects segregated informal areas with the citywide street network while preserving the existing local spatial structure. He proposed:

- Connecting informal settlements with the main movement roads.
- Linking the sub-centres of informal areas with the wider urban context.
- Planning commercial activities that are based on spatial accessibility to reduce travel time, increase economic gain, and increase social interactions.
- Developing a planning approach that contributes to the urban land use of new projects.
- Removing physical barriers and gaps to encourage non-locals into informal areas.

2.6.2 INFORMAL EXPANSION

Another research area considered by some researchers is informal growth. Informal settlements in and around Greater Cairo continue to grow. The current focus of the state is on removing unsafe areas and relocating the residents, but unplanned areas are still expanding, which is an important research area. In Egypt, no model exists to predict future informal expansion (Mahmoud, 2010). Also, there is no information to establish any management control (Osman, 2016). Osman (2016) also stated that there are no spatial technology tools in Egypt to monitor the informal conversion of agricultural land to urban land. The state does not have the capacity to assess future

planning policies before implementation to observe any future effects. Thus, the following two studies consider informal growth due to the gap in this area within Egypt.

Mahmoud's (2010) study entitled *"Modelling and Simulation of Informal Housing Growth"* identified a deficiency in the literature related to the expansion and management of informal housing; thus, the tools and policies that predict their expansion is limited. His research explored new approaches to clarify and manage the growth of informal settlements. The study aims to develop a growth model to predict future informal settlements and explore the dynamics of informal settlements in Greater Cairo. Mahmoud (2010) combined Cellular Automata techniques with GIS to predict the future expansion of informal settlements.

Mahmoud's (2010) research developed the Informal Housing Growth Model (IHGM), which can be used as a tool for future strategic urban planning through the simulation and prediction of the growth of informal settlements. The model integrated GIS and CA Technologies to develop its framework. He used GIS for data preparation, management storage, retrieval and visualisation interface, while CA developed dynamic exploration, interaction with functions, weighting coefficients, calibration transition rules, prediction and dynamic visualisation. IHGM is a predictive tool to understand the dynamics of informal settlements' growth and expansion, which can support the work of planners, policymakers, and local government officials.

Osman's (2016) study entitled *"Driving Forces and Future Directions of Informal Urban Expansion in Greater Cairo Metropolitan Region"* aimed to analyse the spatial-temporal relationship between urban sprawl and its driving socio-economic and physical forces. Thus, Osman identified the effect of different housing policies implemented to halt the growth of informal settlements, quantified spatial-temporal sprawl patterns, identified the socio-economic and physical forces that influence the sprawl, and noted the consequences of policy interventions on future patterns of growth and the risks on agricultural lands.

Osman found that the government could not decrease the number of vacant houses in Greater Cairo and failed to attract residents to new urban communities to

influence the increase in informal housing. This led to increased expansion onto agricultural land characterised by the growth of unsuitable land uses like discontinued development, strip development and leapfrog development. The sprawl was concentrated in three spots, the northern part near the regional transportation network, the middle and southern part of the central sector, and around urban centres of cities and villages. Giza increased demand for buildable lands along its edges near local urban centres and away from CBD and the Nile. The driving force for expansion was near existing urban centres and major roads to encourage increased accessibility, leading to more informal housing near existing routes. Socio-economic factors that led to increased expansion were being near economic incentives and social facilities, the availability of administrative functions and land supply. It was noted that any of these factors could drive expansion (Osman, 2016).

2.6.3 INTERVENTION STRATEGIES

Dealing with informal settlements in Egypt has many problems. First, planning cannot deal with increasing informal expansion. They focus on new cities and link them with existing ones, hoping they will absorb the increasing population. However, this planning system adopts theories from developed countries that are unsuitable for developing nations. Also, there is a lack of participation in Egypt because the size of the informal settlements is big, so it isn't easy to participate in different community groups (Khalil, 2007). There is a problem with what they publicise and what is happening; in reality, most upgrades only focus on the physical aspects and lack any participation (Elfouly, 2012). This leads to the unsafe/unplanned categorisation system of informal areas developed by ISDF and based only on physical aspects. Therefore, ISDF interventions were made in unsafe areas through eviction and resettlement, and this approach has been criticised. The problems of resettlements are: (1) the relocation houses are not designed for the community and do not meet their needs, (2) design standards are not suitable for the families' needs and way of life, (3) locations are far away with inadequate services and (4) they are moved randomly which destroys social networks (Abdel-Moniem, 2016). This creates a problem whereby some

leave their new houses and move back to informal areas, making this research area important in Egypt.

I. COMMUNITY DEVELOPMENT

Khalil's (2007) study was entitled *"Community Development in Informal Areas: defining effective development units and participatory evaluation methods"* concerning community development in informal settlements and the shortcomings of its projects. She identified three main problems. First, informal settlements comprise a big area with a high population density, creating issues in reaching all community members and securing their participation in the development process. The larger area and increased population create different problems and priorities for each settlement. Second, community development projects face mismanagement and miscommunication between the different institutions that are aiming to develop the same community. Also, differences in vision arise between foreign donor agencies, governmental institutions with centralised policies, and the community itself. Third, evaluating and following up on community development projects and whether they succeed in positively impacting the community.

Khalil (2007) has the following four research aims: First, to find the obstacles and problems in previous community development strategies. Second, to identify the perfect size of the community as a unit for development by dividing informal settlements into smaller areas to help increase the community participation rate. Third, define an extended role for the planner in community development projects. Fourth, define the tools to evaluate the effect of community development projects on the community and evaluate different stages of the projects and the different participating institutions.

Khalil's conclusion offered recommendations regarding the nature and size of developmental units. First, the informal settlement should be divided into developmental units linked to the local community to maximise efficiency. At the same time, the participation of local community organisations through understanding its effective geographical area. Moreover, the establishment of local community organisations

should be encouraged in areas that lack them. These organisations should provide services to 15,000 – 20,000 residents. There should be capacity building amongst local organisations - from serving the community to introducing, designing and implementing participatory urban, social and economic development plans in the surrounding local area. The boundaries of administrative units should be revised, and the incompatibility problem or overlapping of administrative units of different sectors (social units, educational regions, etc.) should be resolved.

The planner's role in community development projects is to first organise the informal community before understanding its problems in-depth and then design and implement projects. Failing to classify and recognise different social groups and their problems will achieve no real progress in the following stages. Second, the planner should work with different community groups and use simple language for communication. The educational sector of planning and design disciplines should be upgraded to include studies related to informal community development and participatory designs. Third, the continuous training of architects and planners should prepare them to work with different groups with different disciplinary and cultural backgrounds.

In addition, it is advisable to introduce and encourage the different executing organisations to evaluate their projects to increase transparency and exchange information between different participating organisations in the community development initiative. Second, evaluating tools should be used to encourage the participation of different stakeholders. These tools should offer space to gather different opinions and ensure that the actual picture is captured. Tools should also gather recommendations on how to elevate the quality of projects. Third, the results of the evaluations should be integrated with current and future projects to help increase efficiency. Fourth, the capacity of the community should be relied upon on who should be employed to decrease dependency on outside support. Fifth, stakeholders should be included in the projects' preparation, design and implementation to increase the sense of ownership. Finally, evaluations should be included in planning education and training planners on different evaluation tools.

II. STATE INTERVENTIONS

Elfouly's (2012) research is also concerned with state intervention projects. Her study *"Handling Slums within the Framework of a Comprehensive Development Approach"* aimed to theorise the current framework used to generate and formulate programs and projects directed at informal settlements in their local context. Furthermore, it aimed to define a responsible institutional structure, indicate the network of relationships that govern it, and extrapolate the value system that forms the framework as a requirement for its development.

Elfouly noted the presidential decree to establish the ISDF and implement a national plan to deal with informal areas; however, she found that it worked only in unsafe areas. As a result, there is no clear strategic line for the links that generate and formulate projects in informal areas, nor to determine what prompts each project to develop its own circumstances, which decreases the efficiency of projects that deal with large informal areas. Moreover, the lack of local vision to deal with informal areas is attributed to a weak political will at the governorate level. The existence of a legislative gap supports it. There is no mention of informal settlements in unified building law except at the level of projects (Elfouly, 2012).

The research noted the limited ability of programs and projects to translate the comprehensive concept declared by the state. The approved classification of informal areas is limited to the urban dimension and excludes social and economic dimensions. This renders the programs incomprehensive in improving the quality of life and limited to the urban aspect; thus, projects have a limited ability to translate the state's declared orientation within the regulatory context framework. Also, unified building law deals with these projects within the limits of detailed plans that only define the urban perspective. This, therefore, limits it to urban design projects, land divisions, or landscape projects which form part of general strategic plans. Besides, the funding of these projects was based on budgets of sectoral plans that were prepared separately. The research shows that projects undertaken by localities (contrary to the projects adopted by the central government) are more responsive to residents' needs. Also, localities tend to upgrade more than demolish, which suggests greater

alignment with the declared direction of the state than projects undertaken by the central government (Elfouly, 2012).

Therefore, a dichotomy dominates in on-ground projects, specifically between levels of the institutional structure (central and local) and its sectors (government, community, experts, etc.) and between projects. The absence of mechanisms to create the required communication reinforces this dichotomy. Also, the dichotomy between central and local levels is confirmed by the control of government representation and the marginalisation of community representation. This means the duplication and overlap of tasks and responsibilities within the institutional structure and the incompatibility of authority with the degree of responsibility (Elfouly, 2012).

III. Unsafe Areas

Unsafe informal areas received some attention from Abdel-Moniem (2016) and Sayed (2019). Abdel-Moniem's (2016) study entitled *"An Integrated System for Re-settlement and Improving the Quality of Life for Residents of Unsafe Areas in Egypt"* investigated an intervention targeted at unsafe areas using relocation strategies. The existing strategy for unsafe areas was relocation, which had many deficiencies. According to Abdel-Moniem, institutions responsible for the relocation focused on physical aspects and neglected the non-physical. This led to a defect in the composition of quality-of-life standards. Moreover, they divided unsafe areas and did not deal with them as one unit, which led to the destruction of the social structure and a lack of participation by residents during the relocation. After relocating residents, they did not evaluate the project to understand whether it succeeded. Finally, they did not include the replanning or expansion of new city areas for relocating residents of unsafe areas.

Abdel-Moniem (2016) aimed to develop an integrated system to deal with re-housing projects that depended on quality-of-life standards compatible with residents' needs and formed the basis for design and evaluation. In developing the framework, she produced a set of recommendations directed at responsible stakeholders, architects and planners and civil society organisations.

When dealing with unsafe areas, responsible stakeholders must include non-physical aspects and not just re-house residents in any available housing units. Alternatively, unsafe areas should be integrated with the formal city to allow residents access to different social services and job opportunities. This would harness the potential of informal residents and subsequently improve their standard of living. While working on re-housing projects, residents' participation is essential at each stage of a project in order to increase awareness and give a sense of ownership. Furthermore, the projects should be transparent, and the role of each stakeholder should be specified to avoid any overlapping of tasks. Finally, the inclusion of civil society organisations should support a re-housing project because they act as middlemen between residents and responsible institutions. In addition, architects and planners must involve the community in the project design to ensure that it meets their needs. It should help produce suitable houses and basic infrastructure within the project design, and residents would have open spaces and services that meet their needs.

In addition, civil society organisations should increase awareness, train residents to maintain their new area, and develop social and economic programmes that meet their needs. At the same time, they must communicate such needs and demands to responsible institutions. Finally, they must increase awareness of the surrounding neighbourhoods of re-housing areas and encourage equality to integrate different socio-economic groups.

The second cited study concerned with intervention projects targeting unsafe areas is Sayed's (2019) *"The framework of policies dealing with informal settlements in Egypt by Sustainable Urban Development Approach"*. Sayed (2019) noted the absence of a framework that considers the physical aspects, human capabilities and community participation of informal areas and their development. Thus, social, economic and environmentally sustainable development is not pursued.

Sayed's (2019) research developed a framework that benefitted from both physical aspects and human potential in developing informal settlements. He identified the institutions and legislative frameworks which organised the development of informal

areas and developed a mechanism to employ sustainable urban development to update the policies dealing with informal areas that benefit from physical aspects (positive for growth) and human capabilities.

Sayed recommended the need for the comprehensive categorisation of informal settlements, which includes urban, social, economic and strategic aspects. He stated that the negative image of poor areas that stipulates their removal and the relocation of residents should be abandoned. Instead, social and economic connections with the formal areas should be developed. Moreover, Sayed recommended the development of a framework to encourage participation by the private sector when upgrading informal areas. This would lead to increased investment and elevate the economic aspects of certain valuable informal areas.

2.7 ANALYTICAL DISCUSSION ON CONTEMPORARY RESEARCH OF GREATER CAIRO

Informal settlements in Greater Cairo still pose a big problem. They account for more than half of all urban areas in the Greater Cairo region, housing over 60% of the population. The magnitude of the phenomenon has drawn the attention of researchers who have analysed different aspects of informal settlements. Recently, researchers have paid more attention to upgrades for informal settlements or relocation projects for unsafe areas. Now, they focus on the cultural factors which shape informal settlements and analyse the government's framework.

Shawky (2019) studied two informal settlements which followed the two main typologies of informal settlements in Cairo. At the end of the study, she recommended that the urban form of low-income housing should be high-density compact urban forms with mixed land uses and a pedestrian-oriented street network. These principles are common characteristics of the physical urban form of informal settlements, but not all settlements have the same social and economic characteristics.

Furthermore, ElMouelhi's (2014) study focused on the relationship between residents' culture and the use of urban space. He concluded that residents' rules

stemmed from their cultural background and governed the use of the space due to the absence of formal rules. The traced pattern of use relates to social cohesion, the urban economy and urban society. He concluded that it is essential to study cultural factors and how they affect the development of the settlement as this is useful for the planning phase of intervention projects. Abdelhalim (2017) adopted a similar perspective by omitting social and cultural factors from the development of informal settlements. Abdelhalim developed a behavioural cultural factors matrix for urban space that converted cultural and behavioural factors into measurable physical attributes that forms part of a comprehensive development strategy.

Elsayed (2015) studied the effect of spatial segregation on informal settlements, which produced socio-economic segregation on a city scale. The spatial integration of the informal street network with dwellings allowed for micro-economic activities. The study stated that urban interventions should integrate the local street network with the citywide street network while preserving their local spatial structure.

Another topic discussed was informal growth. The first reviewed study developed the Informal Housing Growth Model (IHGM), which was used to predict the future expansion of informal settlements by helping planners, policymakers and local government officials in their future strategic planning (Mahmoud, 2010). The second study analysed the spatial-temporal relationship between urban sprawl and the physical and socio-economic driving forces. He concluded that continued expansion results from the failure to attract residents to new cities. Meanwhile, they are attracted to living near regional transportation links, existing local urban centres and existing economic areas and social facilities (Osman, 2016).

Another group of studies focused on intervention strategies, such as Khalil's (2007) research on the deficiencies of current community development projects. Her research identified problems with community development projects, the perfect size when dividing the community into developmental units, and the role of community organisations. She defined the role of the planner and the importance of evaluating different project stages and participating institutions. Elfouly (2012) concentrated on

how the state generates and plans intervention programmes and defines a responsible institutional structure. She found that a state of dichotomy dominates between central and local institutions and different sectors. This is created by: the control over government representation and marginalisation of community representation, duplication and overlap of tasks and responsibilities within the institutional structure, and the incompatibility of the authority with the degree of responsibility. Furthermore, Sayed (2019) found that interventions in Egypt still do not have a concrete framework that includes human capabilities and community participation in the process of informal development.

Meanwhile, Abdel-Moniem (2016) was concerned with unsafe rehousing projects. Rehousing projects tend to focus only on the physical aspects and divide unsafe areas, which leads to the destruction of the social composition and weak community participation. To overcome these problems, she developed a framework that built on the quality-of-life standards compatible with residents' needs; this formed the basis for the design and evaluation.

When investigating existing research, it was noted that a relational approach would be most appropriate for studying informal settlements. It showed that the informal built environment meets the needs of informal residents. Shawky (2019) showed that the urban form suits residents' ways of life and that they face problems in new public houses. This further illustrates the existence of different relations between the physical environment and social and economic characteristics. Also, it indicates that Egypt's informal settlements have similar relations to those found in informal settlements globally (Chapter 4). However, this needs further investigation to understand how socio-economic characteristics affect the urban form and adapt to the characterisation of informal settlements (Figure 4.13). Furthermore, the studies of informal growth show that different spatial and non-spatial factors influence the growth of

informal settlements and that studying them could be vital to controlling their growth.

Contemporary Research

Physical Characteristics

- Redevelopment projects should of the following characteristics: High density, Compact urban form, Mixed land-use, Pedestrian-oriented Street network and housing diversity (Shawky, 2019)

Social Characteristics

- The space use depends on residents needs and should not be against their beliefs and values (ElMouelhi, 2014).
- The use of urban space is related to social cohesion, urban economy and urban society (ElMouelhi, 2014).
- Space characteristics influenced by the residents personalities, which should interventions be compatible with their needs and culture (Abdelhalim, 2017).

Spatial Characteristics

- informal areas are the segregated parts of the city resulting from weak accessibility, but within the areas themselves, it differs. Thus, creating cities within the city (Elsayed, 2015).
- the need to connect the informal areas with the city's street network while preserving the existing local spatial structure (Elsayed, 2015).

Informal Growth

- the state failed to attract the residents to new cities, reflected in increased informal housing. Therefore, increased expansion on farmland (Osman, 2016).
- The expansion concentrated on northern part near the regional transportation network, the middle and south part of the central sector, and around urban centres of cities and villages. Also, near existing informal ones away from Nile and Cairo's CBD (Osman, 2016).

Intervention Strategies

- Dichotomy is the main dominant trait in on-ground projects; between levels of the institutional structure and between its sectors (Elfouly, 2012).
- The absence of mechanisms that work to create the required communication (Elfouly, 2012).
- The need to develop new categorisation that include urban, social, economic and strategic aspects. (Sayed, 2019).
- Stop removing deteriorated areas and develop a framework that encourages the participation of private sector to encourage investment and elevate the economic aspects of informal areas (Abdel-Moniem, 2016).

FIGURE 2.3: THE DISCUSSION ON CONTEMPORARY RESEARCH ON CAIRO'S INFORMAL SETTLEMENTS ADDS TO THE FINDINGS RELATED TO CHARACTERISTICS OF INFORMAL SETTLEMENTS, FACTORS OF TRANSFORMATION AND FACTORS OF SUCCESS OF INTERVENTION STRATEGIES.

Area of Research	Author	Title	Summary
Physical Characteristics	Shawky, K. (2019)	*Urban Form Principles for the Replacement Projects of Egyptian Informal Residential Areas*	- The study investigated the urban form of informal settlements to formulate the main principles to guide future redevelopment projects. - The study found that redevelopment projects should follow certain principles: High density, compact urban form, mixed land-use, pedestrian-oriented street network and housing diversity.
Social Characteristics	ElMouelhi, H. (2014)	*Culture and Informal Urban Development: The Case of Cairo's Ashwa'eyat (Informal Settlements)*	- The study investigates the relationship between residents' culture and the informal production of space. - It is found that the use of space depends on residents' needs and not against their beliefs and values. - The use of urban space relates to social cohesion, urban economy and urban society.
	Abdelhalim, E. (2017)	*Behavioral & Cultural Patterns (B.C)s and Upgrading Informal Settlements in Greater Cairo Region*	- The study focused on cultural factors influencing the urban space. Residents' personalities influence spaces' characteristics, and interventions should be compatible with residents' cultures and needs. - The study produced the "Behavioural Cultural factors matrix for urban space".
Spatial Characteristics	Elsayed, A. (2015)	*Spatial and Socio-economic Factors: Mutual Implications in Informal Area*	- The study assumed that the spatial configuration of the built environment's street and road network relates to socio-economic differences and the microscale of dwellings' spatial integration with the street network, generating micro-economic activities in informal areas. - The study concluded that informal areas are the segregated parts of the city resulting from weak accessibility, but within the areas themselves, this differs. The spatial segregation created cities within the city. Also, the study recommends the need to connect informal areas with the city's street network while preserving the existing local spatial structure.
Informal Growth	Mahmoud, I. (2010)	*Modelling and Simulation of Informal Housing Growth*	- The study explores new approaches to clarify and manage informal growth due to the lack of available tools and policies to predict informal expansion. - The study developed the Informal Housing Growth Model. It is a tool for understanding the dynamics of informal settlements' growth and expansion, aiding planners, policymakers and local government officials.
	Osman, T. (2016)	*Driving Forces and Future Directions of Informal Urban*	- The study aimed to study the relationship between urban sprawl and its socio-economic and physical driving forces.

		Expansion in Greater Cairo Metropolitan Region	-	The study found that the state failed to attract residents to new cities, which reflected an increase in informal housing. Therefore, increased expansion was noted on farmland. The expansion concentrated on the northern part near the regional transportation network, the middle and south parts of the central sector, and around urban centres of cities and villages. Also, it was near existing informal sites away from the Nile and Cairo's CBD.
Intervention Strategies	Khalil, H. (2007)	*Community Development in Informal Areas: defining effective development units and participatory evaluation methods*	- -	The study concentrated on the shortcomings of community development projects. She investigated current projects' problems, how to increase community participation, defined the planner's role, and developed tools to evaluate projects. She concluded with a set of recommendations for the nature and size of the developmental unit (for planners) and to evaluate projects.
	Elfouly, H. (2012)	*Handling Slums within the Framework of a Comprehensive Development Approach*	- -	The study aimed to understand the framework used to generate programs and projects directed at informal settlements. Also, it defines the institutional structure and network of relations governing it. The study found that dichotomy is the dominant trait in on-ground projects (between levels of the institutional structure and between its sectors) and explored what reinforces it and the absence of mechanisms that help create the required communication.
	Abdel-Moniem, N. (2016)	*An Integrated System for Resettlement and Improving the Quality of Life for Residents of Unsafe Areas in Egypt*	- -	The study investigated the deficiencies of relocation strategies aimed at unsafe areas, aiming to develop an integrated system to deal with re-housing projects that depend on quality-of-life standards compatible with residents' needs as a basis for design and evaluation. Developing the framework, she produced a set of recommendations directed at responsible stakeholders, architects and planners and civil society organisations.
	Sayed, M. (2019)	*The Framework of Policies Dealing with Informal Settlements in Egypt by Sustainable Urban Development Approach*	- -	The study developed a framework that considered not only the physical aspects but also human potential in developing informal settlements. The study recommended the need to develop new categorisations that included urban, social, economic and strategic aspects. It suggested the removal of faulty ideas concerning the removal of deteriorated areas and developed a framework to encourage the participation of the private sector. This aimed to encourage investment and elevate the economic aspects of informal areas.

2.8 CONCLUSION

The chapter discussed three essential topics that form the research's theoretical base. It started with informality and the different perspectives between the Global South and North, exploring its history, the reasons for its emergence and the different perceptions. Also, it discussed two main aspects that the rest of the research built upon them. The first was the informal built environment, which shows that the study of the built environment must be comprehensive before planning an intervention strategy. It then considered how to study the characteristics of informal settlements and the presence of relationships between them. They are in line with the *Relational School's informal-formal dialogic model*, which acknowledges the complexity of informality and the importance of different relationships in shaping it. The other informal-formal models had an economic point of view which is very narrow to aid in studying the complexity of informal settlements. According to other conceptual frameworks (Section 2.2.2), informal settlements cannot be studied in isolation from the surrounding context, strengthening the logic behind following the informal-formal dialogic model. Also, those conceptual frameworks show that the built environment has many aspects that must be investigated to build a comprehensive image of any informal settlements. Therefore, the empirical research framework is built upon those concepts (Section 3.5.1).

Another critical aspect of fully understanding the dynamics of informal settlements is the need to understand the transformation factors that influence their growth. After analysing different studies concerned with informal growth (Section 2.2.3), there are two types of factors; spatial and non-spatial. They must be part of a study because governing informal expansion needs to understand the factors that influence it. Moreover, there is a need to develop a framework to conceptualise all of the previous together, the relationships between the physical, social and economic characteristics and the relationships between them and the different factors of transformation.

Next, the chapter explored different sustainable urban concepts. It discussed New Urbanism, Neo-Traditional Developments, Smart Growth, Compact City and Mixed-

use developments, and Slow Urbanism. As these have become the main directions in development to ensure the sustainability of our cities, it was essential to form a holistic picture of the most prevailing concepts. Also, most sustainable urban concepts can be related to informal settlements; informal urban form is mainly walkable, compact and of high population density, similar to sustainable urban concepts. But those concepts developed in the Global North could impose problems if directly imported by the Global South cities. Therefore, the research developed a list of indicators to examine the urban form of informal settlements to identify where it stands in the dialogue on sustainable urban forms. This will be an aid for sustainable urban development in the Global South. Also, those principles offer the basis for developing an intervention strategy to upgrade the living conditions of informal settlements, integrating them with formal urban areas and controlling their growth. The most relevant concepts that can help develop the intervention strategy are Smart Growth as a growth management concept and Slow Urbanism as the basis for upgrading. The principles of those concepts can be relatively adapted to informal settlements context.

Finally, the third and final section examined Egypt's diverse state of research in the past few years. Although different research areas exist, there is still a focus on informal settlements. The studies focus on different built environment characteristics, informal expansion, or intervention strategies. Almost all research on informal settlements focuses on intervention strategies or aspects that could elevate the efficiency of intervention strategies. This part of the review highlighted a problem with intervention strategies, whether on an institutional level, community level or due to the sustainable approach. It strengthened the knowledge gap of this research by considering how to upgrade unplanned informal areas and integrate them into the formal planning process to ensure the sustainability of informal settlements. In recent studies, there are still problems with informal settlement upgrading. In Egypt, there is no clear framework that defines the objectives of informal upgrading and no clear guidelines that indicate the responsibility of different institutions. Additionally, community participation in upgrading is almost non-existent.

To summarise, the theoretical base of the research had three main lines of inquiry: understanding informality, exploring different sustainable urban forms, and the state of research on Greater Cairo's informal settlements. It formed the basis for developing the research framework and methodology described in the next chapter.

Chapter 3.   METHODOLOGY

3.1   INTRODUCTION

Investigations conducted on informal settlements have employed different approaches and designs depending on the researcher's perspective. Such investigations can be qualitative or quantitative, but the aim of developing a strategy that controls their expansion and integrates informal spaces into formal urban planning requires a qualitative approach. The approach was selected because of the qualitative tools implemented throughout the investigation.

The chapter presents the research strategy and approach followed and the philosophical position of the research. It also explored the methods and tools used for the data collection and the justification for selecting these methods. Additionally, the context is presented, namely where the case studies are located and the criteria underpinning the selection of the case studies. Finally, the empirical investigation framework and the process in which the research is conducted are presented.

3.2   PHILOSOPHICAL POSITION, APPROACH & DESIGN

The system of inquiry is based on the emancipationist philosophical position. Ontologically, it adopts *"the view that there are multiple realities that are shaped by the full spectrum of contextual values including social, political, cultural, economic, ethnic, gender and disability aspects"* (Salama, 2019, p. 10). When investigating informal settlements, their context and reality are shaped and studied from different perspectives, whether based on the built environment or socio-economic, political, cultural or environmental factors. Also, the nature of these settlements is not the same in every city. They somewhat differ from one context to another, from one region to another, and even from one settlement to another. They can be perceived and studied from different perspectives according to the researcher's background.

Epistemologically, *"knowledge is historically and contextually situated where researchers are active participants, not only discovering and analysing realities, but also*

engaging with and intervening in these realities" (Salama, 2019, p. 10). The knowledge about informal settlements is contextually based on their situation. Also, the base of knowledge cannot be interconnected with a different phenomenon.

Two main perspectives of inquiry are relevant to the methodology of research in architecture. First, Technically Oriented Research (TOR) originally had a systematic, computational and managerial frame of reference. Second, Conceptually Driven Research (CDR) originally had a psychological, person-environment (A) and person-environment (B) perspective (Salama, 2019). Lately, new trends have emerged from the TOR and CDR. The TOR developed by merging systematic and computational frames of reference and grew by creating two new areas, specifically Environmental Sustainability and Space Syntax. The current development of CDR is divided into three frames of reference: traditional dwellings and settlements, quality of urban life and educational and pedagogical research. Research on traditional dwellings and settlements tends to interpret the dynamics of traditional settlements and dwellings and explore *"built forms embodies cultural norms, informality, socio-spatial practices especially of minority groups, everyday urban environments, authenticity and the notions of imagined and manufactured heritages and traditions"* (Salama, 2019, p. 17)*.*

This research follows the frame of reference of traditional dwellings and settlements. The study focuses on the dynamics and uniqueness of informality and informal settlements and how inhabitants have built and governed their environment outside the formal rules by analysing the physical, social and economic conditions. This forms the basis for developing an intervention strategy to upgrade and integrate informal settlements and control their growth.

Thereafter, the research follows a qualitative approach due to several reasons. First, the researcher collects the data by employing multiple methods, such as reviewing documents and maps and interviewing various experts. The research process keeps evolving and changing throughout and, in the end, forms a more comprehensive picture of the settlements through the different data collected (Creswell, 2013).

The research design involves multiple case studies that explore different settlements in-depth. The case study design is *"an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context"* (Yin, 2018, p. 15); also, *"the case study involves studying the case in relation to the complex dynamics with which it intersects and from which the case itself is inseparable"* (Groat & Wang, 2013, p. 421). Furthermore, using multiple cases is more compelling and strengthens the research results (Herriott & Firestone, 1983; Yin, 2018).

3.3   RESEARCH CONTEXT

In Greater Cairo, with its population of over 20 million inhabitants (around 20% of the country's total population) (United Nations, Department of Economics and Social Affairs, 2018), 65% of the population lives in informal settlements (Magdi, 2018). In Cairo, informal settlement typologies are based on privately owned agricultural land, squatter settlements on public lands, and 'cities of the dead' houses, which are unique and house around 300,000 residents (Hegazy, 2016).

The development of the underground metro network, ring road and new towns shaped Cairo's growth but fragmented the city's urban fabric. Whilst informal settlements house 65% of the population, gated communities – at the opposite end of the spectrum - started to develop in the 1990s (Mekawy & Yousry, 2012). The inhabitants of informal settlements cannot be generalised as poor based on the conditions in which they inhabit. Previous studies have shown that households in informal areas illustrate a range of incomes close to the Greater Cairo average (Hendawy & Madi, 2016). The formal expansion of the city moves towards gated communities, which only serve the high-income group. Low- and middle-income groups prefer informal settlements because they are self-sufficient. They have shops, workshops and markets that fulfil their needs in addition to work-home proximity. Walkability is another key feature because of their compact form, as walking is the preferred mode of transportation within the settlement. Furthermore, social networks and participation are distinct as streets act as an extension of homes and offer a sense of safety (Séjourné

et al., 2009). Urban development did not respond to people's needs as the country requires over 300,000 low-income housing annually (Nadim et al., 2014).
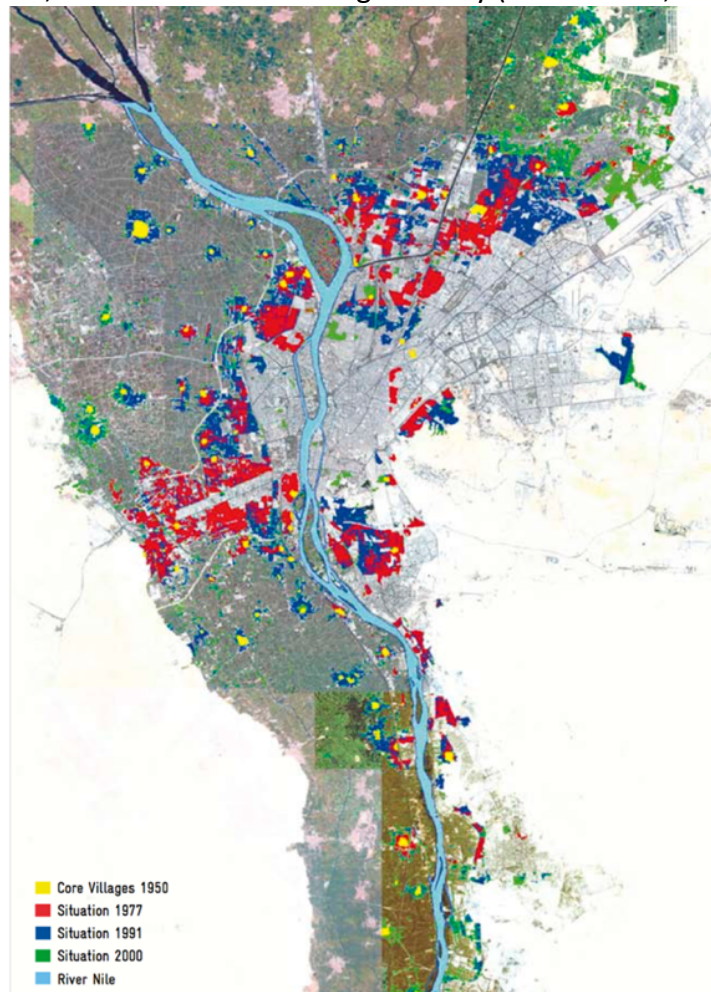
FIGURE 3.1: THE GROWTH OF INFORMAL SETTLEMENTS OVER TIME IN AND AROUND GREATER CAIRO (KIPPER, 2009)

Case Study Selection Criteria

From the literature, there are four informal settlement typologies: Squatter settlements on public or private lands, the illegal subdivision of suburban lands, the deterioration or change of use of a formal building, and the informal extension of a formal building. In Greater Cairo, there are two main typologies, the illegal subdivision of agricultural lands and squatter settlements, which account for almost all informal settlements. The first case is an informal settlement on privately owned agricultural land, and the second is a squatter settlement on public lands. Therefore, the two case studies follow two different typologies. These two typologies differ in location as the settlements on agricultural lands are mainly based on the western and northern periphery of the city, while the squatter settlements are on the eastern periphery, with

some inside the city boundaries. Also, another criterion is that the settlement should be considered well-established with no significant interventions to alter its urban form; this means studying the original built environment built by the community over time. Another reason for choosing a well-established area is that it will have undergone all early informal development phases and can account for the size of a district. Therefore, it can be cross-examined with a list of indicators developed from the sustainable urban development concepts. Moreover, exploring transformation factors will reflect a more realistic situation that can better help develop the growth management part of the intervention strategy than studying a newly found informal settlement. So, the criteria for the case study selection are:

- One case study per typology,
- Information-rich cases,
- Well-established settlement,
- A settlement of a size comparable to a district,
- Unplanned settlement according to ISDF.

3.4 RESEARCH METHODS & VALIDATION

The research tools used to conduct the fieldwork and data collection were qualitative and followed a qualitative approach and design. The research methods were in-depth documents and literature review, and synchronous interviews. Multiple methods were used to acquire data from different perspectives and as a tool for data validation. Creswell and Miller (2000) identified different strategies to validate the data in qualitative research, and those commonly used include member checking, triangulation, thick description, peer reviews, and external audits. This research employs two validation strategies. First, triangulation is the use of multiple methods *"it is a validity procedure where researchers search for convergence among multiple and different sources of information to form themes or categories in a study"* (Creswell & Miller, 2000, p. 126). This strategy has four types: across data sources, theories, methods, and among different investigators (Creswell & Miller, 2000; Denzin, 1978). The research implements a triangulation strategy through multiple methods and data

sources. Second, *thick and rich description* is a procedure whereby the researcher describes the study's setting, participants and themes in detail. Its purpose is to create *"… verisimilitude, statements that produce for the readers the feeling that they have experienced, or could experience, the events being described in a study"* (Creswell & Miller, 2000, p. 129).

So, the research employed three research methods: literature review, interviews and exploratory case study. First, the literature review was conducted to form an understanding of informal settlements globally and develop the research's theoretical base. After investigating the Global South, the literature review shifted the focus to Serbia and its capital Belgrade. The case of Belgrade acted as an exploratory case study where the research went more in-depth than those in the Global South. Later, the research went on to more in-depth details on the case studies of Greater Cairo. In the Belgrade case, the research involved a literature review of the context and different informal settlements; interviews with experts in Belgrade supported the data collection process for the case. Later, the research focused on the chosen two case studies in Greater Cairo. These two cases were investigated by exploring different studies and documents related to the cases and interviews with academics and experts who had substantial experience and backgrounds in intervention strategies and the two case studies.

3.4.1 LITERATURE REVIEW

The literature review was divided into two phases. The first phase involved a review of the literature to explore the topic, identify the gap in knowledge and conceptualise the key issues. It was complemented by exploring different urban theories and concepts of sustainable urban development to develop the framework for empirical investigation.

The literature review is multi-scalar. First, it started with the Global scale and is divided into four categories: (1) different typologies of informal settlements and their definition; (2) understanding the underlying causes for the emergence of informal settlements; (3) different physical, social and economic characteristics, and (4) case

studies from different regions to analyse the different intervention strategies. Second, it focused on the regional scale of a Southeast European region, namely the exploratory case study of Belgrade, Serbia. The literature followed the same categories as the global scale (Section 4.3). It started by matching the Global typologies to those in the region and Belgrade in order to understand the causes for the emergence of informal settlements, different characteristics and the different intervention strategies. Finally, the national scale of Egypt denoted the location of two case studies. The literature followed the same categories to map the different typologies of the informal settlements in Egypt with the global typologies. This aimed to interpret the causes for their emergence, identify the different characteristics of informal settlements and explore the intervention strategies implemented. At the end of this phase, the research partly achieves the first objective – *investigate the physical, social, and economic characteristics of the informal settlements and the relationship between them* – and answers the first research question: *What are the different characteristics that shape the informal built environment?* Also, it partly achieves the second objective – *explore the factors of success of intervention strategies*.

The second phase represents the start of the data collection for the two case studies in Cairo, Egypt. The data collection starts with a comprehensive literature review to investigate the cases' different physical, social and economic characteristics. Following the development of the framework, the gaps in the data are noted (Table 3-2) through the implementation of the research tools. At the end of this phase, the research partly achieved the first objective – *investigate the physical, social and economic characteristics of the informal settlements and the relationship between them*.

The end of phase one concluded with the first tier of the Characterisation of Informal Settlements Framework (CISF) (Figures 3.2, 3.3 & 3.4). The literature review helped to understand the physical, social and economic characteristics. Throughout the process, relations between them were noted and represented in the framework. Furthermore, the phase two outcomes were to adapt the framework to Cairo's informal settlements and develop the other two tiers of the framework. The two tiers concern the factors of transformation and cross-examine informal settlements with

sustainable urban indicators. The factors of transformation and sustainable urban indicators are developed from the informal theories and urban development concepts discussed in Chapter Two.
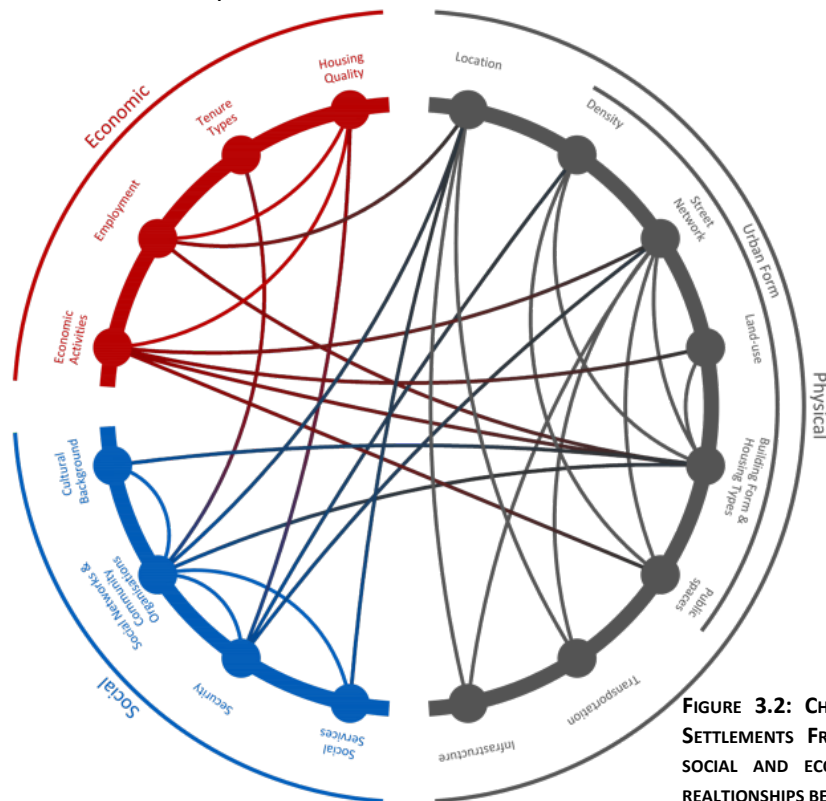
FIGURE 3.2: CHARACTERISATION OF INFORMAL SETTLEMENTS FRAMEWORK: TIER 1 (PHYSICAL, SOCIAL AND ECONOMIC CHARACTERISTICS AND REALTIONSHIPS BETWEEN THEM)
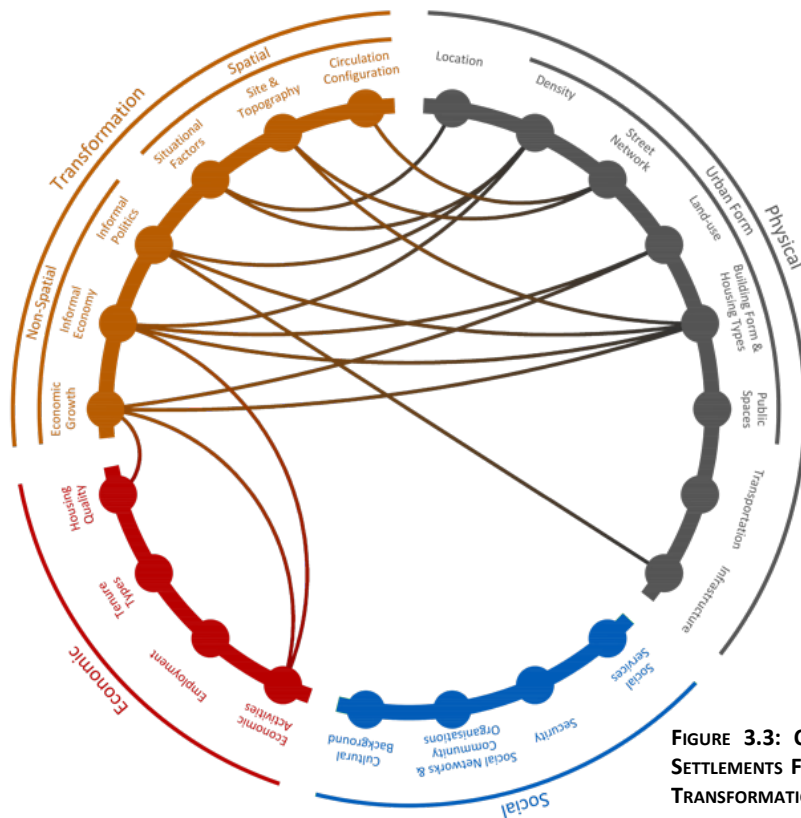
FIGURE 3.3: CHARACTERISATION OF INFORMAL SETTLEMENTS FRAMEWORK: TIER 2 (FACTORS OF TRANSFORMATION)
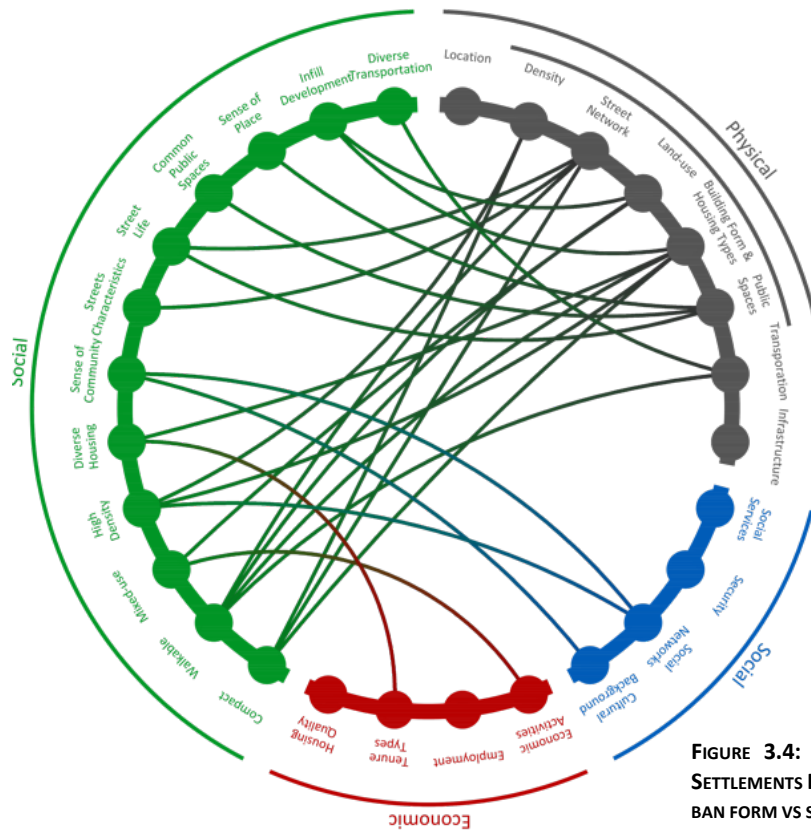
FIGURE 3.4: CHARACTERISATION OF INFORMAL SETTLEMENTS FRAMEWORK: TIER 3 (INFORMAL URBAN FORM VS SUSTAINABLE URBAN INDICATORS

3.4.2 INTERVIEWS

In-depth interviews are one of the main methods used to conduct qualitative research and one of the most important means of gathering data in a case study approach (Yin, 2018). The type of interview selected was a one-on-one synchronous interview. The online format was chosen to follow current social distancing measures imposed due to the COVID-19 outbreak. Between the two stages of interviews, the interview format differed. The first stage was a semi-structured format with open-ended questions, which formed an open discussion to allow participants to speak freely on the matter. The second stage is an unstructured format that provides opportunities to discuss and validate the developed intervention model with experts.

The interviewees are architects, urban planners and academics with hands-on experience working in informal settlements. They were identified in two ways. The first was by inspecting the authors of the reviewed studies, which indicated their expertise level. The second was contacting different NGOs in Greater Cairo who have done projects in informal settlements. The interviews formed the second step in the data

collection process. Interviews were used to fill the gap in knowledge concerning the case studies' physical, social and economic characteristics and the different relationships between the characteristics. They sought an understanding of the dynamics of the settlements and validation of the Control and Integration Model. The interviewees were invited to take part in the research through email. Throughout the study, 14 interviews were conducted out of 22 invitations sent.

Before conducting the interviews, ethical approval was granted by the University of Strathclyde Ethics Committee (Appendix A). The first stage discusses three main themes: the case studies' different characteristics, an investigation of the relationships between the settlements' characteristics and the factors of success of intervention strategies (Appendix D). This helps in the development of the *Characterisation of Informal Settlements Framework*. At the end of this stage, the research accomplished the first objective – *investigate the physical, social and economic characteristics of the informal settlements and the relationship between them* – which answered the first research question *What are the relationships between the different characteristics that shape the informal built environment?* and the second objective – explore the factors of success of the intervention strategies – which answered the second question: What are the factors that contribute to the success of intervention strategies? Also, the data obtained helped to address the third objective – *to cross-examine the informal settlements with the concepts of sustainable urban development* – and to answer the third research question: *What is the relationship between informal settlements and sustainable urban development in Greater Cairo?*

The second stage discusses and validates the developed Control and Integration Model concept, which is a tool for integrating informal settlements within the formal city (Appendix E & F). The interviews took the same format, and experts validated the developed strategy to achieve the final objective – *develop a strategy to integrate the informal settlements with the formal city and manage its growth* – which answers the final question: *What are the different strategies to upgrade Greater Cairo informal settlements and integrate them into the formal urban planning process?*

3.4.3   EXPLORATORY CASE STUDY: BELGRADE, SERBIA

Belgrade, the capital of Serbia, the country's largest city and the territory of former Yugoslavia, has undergone a proliferation of informal growth since the 1990s, becoming the dominant form of city development. Its informal expansion is mostly on agricultural lands and conducted through illegal subdivisions and the conversion to residential lands on the city periphery. Belgrade is home to 1.6 million inhabitants, and informal settlements form 44% of its total residential areas (Figure 3.5) (Radulović et al., 2013). Natural increases and rural-urban migration led to the rapid growth of informal settlements after WWII. The city's development was centrally controlled and planned to follow socialist rules. A large proportion of people during the socialist era settled in apartments in a typical socialist multi-family unit.

TABLE 3.1: A COMPARISON TABLE BETWEEN THE INFORMAL SETTLEMENTS IN EGYPT AND SERBIA.

Global		Egypt	Serbia
Causes	Rapid urbanisation	√	√
	Political and economic changes	√	√
	Shortage of land/housing	√	√
	Building regulations & standards	√	√
	Low income & poverty	√	√
	Shortage of social housing	√	√
	Lack of governmental support	√	√
	Unaffordability of formal housing	√	√
Typologies	Illegal suburban subdivision on legally owned lands	√	√
	Squatter settlements on public lands	√	√
	Overcrowded, dilapidated housing in the city centres	√	√
	Cities of the dead (exclusive to Cairo)	√	−
Intervention Strategies	Eviction & demolition	√	√
	Direct public housing	√	√
	Indirect public housing	√	−
	Regularisation	−	√
	Upgrading (total redevelopment)	√	−

Also, a significant portion of the workforce was looking for places to live at this time, thus creating pressure on the city's periphery. In addition, the economic crisis and high poverty during the 1990s and the transition to a global economy encouraged private ownership. The public sector stopped investing in the housing sector, and market prices were becoming unaffordable to a vast sector of the population,

prompting most residents to look for informal housing on the periphery of the city (Mitrovic & Antonic, 2013).
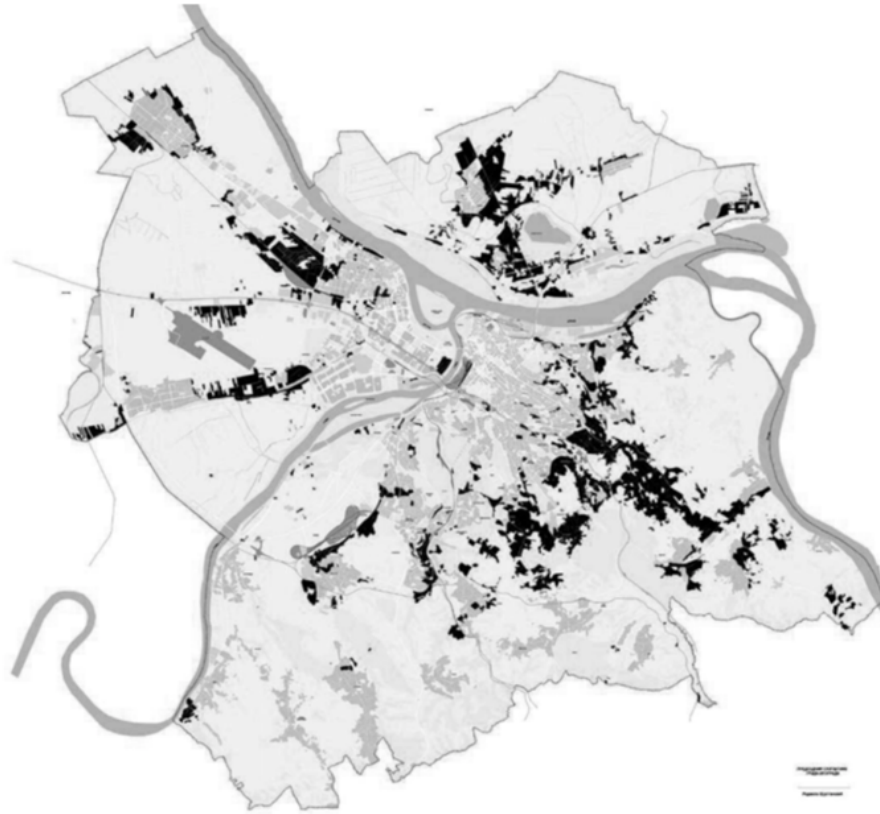
FIGURE 3.5: DISTRIBUTION OF INFORMAL SETTLEMENTS (BLACK) IN BELGRADE, ACCORDING TO BELGRADE MASTERPLAN 2021
(RADULOVIĆ ET AL., 2013)

Belgrade is an exploratory case study. The investigation implemented three methods: Literature analysis, interviews and field visits. The interviews are of semi-structured format (Appendix D – adapted to Belgrade context), with 12 participants. The participants were academics with experience in informal settlements and NGO staff in different organisations in Belgrade that are working toward elevating the informal residents' quality of life. The reason for choosing Serbia is the similarity in economic and political changes and the reasons for the emergence and growth of informal settlements, with the dominant typology of informal settlements being the illegal suburban subdivision of agricultural lands (Table 3-1). Both countries have undergone several political changes, from monarchy to republic, with changes to their economic systems, from socialist to capitalist. These changes created almost the exact causes that led to the emergence of informal settlements (Table 3.1).

3.5 RESEARCH PROCESS

The research started with a general literature review on informal settlements. A preliminary review identified the knowledge gap, research questions and objectives and set the research methodology and framework (Figures 3.6 & 3.7).

1. Afterwards, a systematic literature review was conducted. Global, national and individual case studies were the three scales of the review. First, the global scale was divided into three groups: *general*, *case studies* and *intervention strategies,* and each included sub-groups as the process advanced. By the end of this stage, the research identified reasons for the emergence of informal settlements, including their typologies, characteristics, and the types of intervention strategies developed. This created a blueprint for the second scale.

2. On the national (Egyptian) scale, the literature analysed matched the typologies to the global scale, developed an understanding of the causes, determined the different characteristics of each typology and explored the history of the intervention strategies.

3. The analysis of the literature review was manual. Each study was assigned to its relevant category, although some featured one or more. Later, each category was analysed for common themes, and different relations were sought for the physical, social and economic characteristics. By the end of this step, a knowledge gap was identified, and the Characterisation of Informal Settlements Framework (CISF) was developed.

4. The investigation of Belgrade, Serbia, was conducted next. The researcher took part in the Erasmus exchange programme with the University of Belgrade, Serbia. Before travelling to Belgrade, the researcher conducted a comprehensive literature review. The review followed the same pattern used on the global and national scales. It identified the reasons for the emergence, as well as different typologies, case studies and intervention histories. Later, one settlement was chosen for investigation in more depth because the

researcher visited the settlement and met with different academics, NGOs and experts with experience in working on informal settlements.

5. After exploring the Belgrade case study, the data collection on the two selected case studies began. Guided by the investigation framework (Figure 3.6), it began with reviewing all studies and documents related to the two case studies. The literature was imported into NVivo, and nodes were created for each case study using the themes in Table 3-5. In addition, interviews were conducted with academics and experts to fill gaps in the literature regarding the case studies. Then, the transcribed interviews were imported into NVivo and coded to the same previously created nodes. Finally, the nodes were investigated manually to complete the data required (Table 3-4). Also, the transcribed interviews were investigated and coded to the same nodes. The data were analysed manually.

6. A further phase involved the review of recent PhDs conducted on informal settlements in Cairo. The theses were reviewed, imported into NVivo and coded. The codes were used to identify each thesis's problem, aim and outcome. Later, the theses were categorised for analysis according to their research area, and the analysis was manually conducted. The PhDs contributed to understanding the state of research in Egypt and the factors of successful interventions.

7. In the end, the analysis of the case studies allowed the researcher to test and adapt the Characterisation of Informal Settlements Framework (CISF). Afterwards, the Improvement of Informal Settlements Framework (IISF) was developed, which achieved the aim of the research – to develop a Control & Integration Model.

Research Stages	Aim
General literature review	• Identified the knowledge gap • Develop research questions and objectives • Set the research methodology and research framework
Systematic literature review on the Global South	To identify the following: • Reasons behind the development of informal settlements. • The different typologies • The different characteristics. • Types of intervention strategies.
Systematic literature review on Egypt's informal settlements	To identify the following: • Reasons behind the development of informal settlements. • The different typologies • The different characteristics. • Types of intervention strategy.
Analysis of the literature review	• Finding the knowledge gap. • To identify the different relations between the physical, social and economic characteristics. • Develop the Characterisation of Informal Settlements Framework
Systematic literature review on Belgrade, Serbia informal settlements	To identify the following: • Reasons behind the development of informal settlements. • The different typologies • The different characteristics. • Types of intervention strategy.
Data collection on the two selected case studies through literature review and interviews	To identify the following by implementing the Characterisation of Informal Settlements Framework: • The different characteristics. • The factors of transformation. • Cross-examine the cases with sustainable urban indicators.
Reviewing recent PhDs conducted on informal settlements in Cairo	Each thesis was reviewed according to the following: identify the problem, aim and outcome of each thesis. Later, the theses were categorised for analysis according to their research area.
Develop an intervention strategy	The process concluded with the development of the Control & Integration Model. The developed model was the result of the whole research process.

3.6 FRAMEWORK FOR EMPIRICAL INVESTIGATION

3.6.1 INFORMAL BUILT ENVIRONMENT CHARACTERISTICS

The physical, social and economic characteristics were investigated for each case study, and the different relationships between them were identified. There were connections between different characteristics, and some were unique in each case study. This is a prerequisite for developing an intervention strategy. In order to develop a list of characteristics to investigate the relationships, informal theories were used to develop a set of physical, social and economic features. In chapter two, Abbott's (2002a) study recognised four vulnerabilities and a list of indicators to measure the effectiveness of an upgrade. The elements of vulnerability are *Physically marginalised environment, opportunity for asset retention and growth, perception of poverty* and *compromised use of public & private spaces.* The indicators were *physical risk related to the site, personal risk, livelihood, ability to withstand shocks, recognition of intangible assets, the social value of tangible* and *communal assets* and *impact on informal spatial relationships.* Following a review of the indicators, a list of characteristics was developed (Table 3.3).

TABLE 3.3: THE LIST OF CHARACTERISTICS DEVELOPED FROM ELEMENTS OF ANALYSIS.

Elements of Analysis	List of Indicators	Built Environment Aspects	List of Characteristics
Physically marginalised environment	Physical and personal risks & marginality index	Physical Characteristics	− Location − Urban form − Transportation − Infrastructure
Compromised use of public & private spaces	Spatial relationship of private and public spaces		
Opportunity for asset retention and growth	Livelihood & importance of informal sector	Social Characteristics & Economic Characteristics	Social: − Social services − Security − Social networks & community organisations − Cultural background
Perception of poverty	Socio-economic value of tangible and intangible assets		Economic: − Economic activities − Employment − Tenure types − Housing quality

Besides the characteristics data, there are the factors of transformation. These factors are essential to understanding the reasons behind the continued expansion of

informal settlements. McCartney & Krishnamurthy (2018) and Roy et al. (2014) studies each developed a set of factors, and as such, the research developed two sets of factors: non-spatial and spatial factors. The non-spatial factors are economic growth, informal economy and informal politics, while spatial factors are situational factors, site & topography and circulation configuration. These factors are investigated from the different characteristics of each case study (Table 3.4) and developed the second tier of the Characterisation of Informal Settlements Framework (CISF).

So, the first step of the empirical investigation was to gather data on the characteristics of informal settlements. The data and method of the collection matrix (Table 3.5) presented the tools employed to collect the data, while Table 3.5 presented the themes used for the data analysis. The themes and sub-themes were identified when analysing the case studies data.

TABLE 3.4: FACTORS OF TRANSFORMATION AND THE CHARACTERISTICS USED TO INVESTIGATE THEM

Factors of Transformation		Characteristics
Non-Spatial	Economic Growth	Land-use, Building Form & Housing Types, Economic Activities and Housing Quality
	Informal Economy	Density, Land-use, Building Form & Housing Types and Economic Activities
	Informal Politics	Density, Building Form & Housing Types and infrastructure
Spatial	Situational Factors	Location and Density
	Site & Topography	Street Network and Building Form & Housing Types
	Circulation Configuration	Street Network

TABLE 3.5: THE DATA AND METHOD OF COLLECTION FOR INFORMAL SETTLEMENTS CHARACTERISTICS MATRIX

Data			Collection Method		Data Required
			LR	OI	
Physical	Urban Form	Density	X		Average population density in informal settlements
		Street Network	X		Grid/organic, hierarchy of streets & accessibility to the surrounding areas
		Land-use	X	X	The distribution of different uses in the settlement
		Building form & Housing Types	X	X	What are the different types of housing unit
		Public Spaces	X	X	The identification of the public spaces and their uses
	Location		X	X	The location relative to the formal city and why inhabitants prefer the location.
	Transportation		X	X	Identification of different methods to travel within and in and out of the settlement and accessibility points
	Infrastructure		X	X	The method of accessing different infrastructural services (electricity, water & sanitation)
Social	Social Services		X	X	The availability of healthcare and educational services within the settlement and, if not available, where and how they access it.

	Security	X	X	How inhabitants manage safety within the settlement
	Social Networks & Community Organisation	X	X	How the community compensates for the absence of different services
	Cultural Background	X	X	Do the cultural factors of inhabitants influence the organisation of the settlement or not?
Economic	Housing Quality	X	X	Safety and durability of buildings
	Tenure Types	X	X	The land's security of tenure & the different tenure types available
	Employment	X		Sources of income. The availability of different types of business within the settlement.
	Economic Activities	X	X	Is the settlement known for a certain type of business or craft?
Table Key: (LR = Literature Review) – (OI = Online Interview)				

TABLE 3.6: THEMES UTILISED FOR ANALYSING THE DATA OF INFORMAL SETTLEMENTS CHARACTERISTICS

Themes	Physical	Social	Economic	Transformation
Sub-themes	− Density − Street network − Land-use − Building form & housing type − Public spaces − Transport − Infrastructure − Location	− Social services − Security − Social networks & community organisation − Cultural	− Economic activities − Employment − Tenure types − Housing Quality	− Economic growth − Informal economy − Politics of the informal − Situational factors − Site factors & local topography − Circulation configurations

3.6.2 FACTORS OF INTERVENTION

To develop an intervention strategy, it is necessary to explore the factors of success and the effect on different settlement characteristics; this leads to the essential factors for developing an intervention strategy. The data was collected through two main methods, a literature review and interviews with experts. The literature review was used as a point of departure to learn from previous cases around the globe, and to understand the areas in which they succeeded and what needs to change. In comparison, the interviews were conducted with the experts to gain information on what they experienced in the field. The data required are shown in Table 3.7, and the themes for the data analysis are shown in Table 3.8. The process was inductive because the data needed was developed during the literature review on different case studies from around the globe. The cases were subsequently analysed to understand their factors of success and failure.

TABLE 3.7: THE DATA AND METHOD OF COLLECTION FOR INFORMAL SETTLEMENTS IMPROVEMENT MATRIX

	Data	Method of Collection	Data Required
Physical	Infrastructure	Literature Review & Online Interviews	The interviews were conducted with the experts to understand the importance of different factors for improvement and how they affect each other.
	Preserve urban form		
	Streets		
	Accessibility		
	Public spaces		
	Spatial integration		
Social	Preserve social networks		
	Social services		
	Skills development		
	Social integration		
Economic	Property rights		
	Micro-finance		
	Empower local economy		

TABLE 3.8: THEMES UTILISED WHEN THE ANALYSING THE DATA FOR INTERVENTION STRATEGY FACTORS

Themes							
Decision-making	Success Factors	Govern-ance	Legalisa-tion	Mainte-nance	Participa-tion	Relocation	Upgrading

3.6.3 SUSTAINABLE DEVELOPMENT

Inductive and deductive reasoning has been applied when comparing informal settlements with sustainable urban forms. Inductively, the literature review on different characteristics showed that informal settlements could relate to a sustainable urban form. Deductively, the theoretical literature review on sustainable urban concepts developed a list of indicators. A discussion on sustainable urban concepts was presented in chapter two and focused on the following concepts: the Compact City, New Urbanism, Smart Growth & Neo-traditional Developments. Each had its principles, which were compared to find the common aspects. A list of indicators used in this research was then developed. The indicators (Table 3.9) were cross-examined with the case studies' characteristics. The different physical, social and economic characteristics of the case studies were investigated to find if the indicators were present or not. The third tier of the Characterisation of Informal Settlements Framework (CISF) was developed from this point.

Also, the development of intervention strategies applied different urban concepts. The strategy deals with two aspects: upgrade & integrate and controlling informal growth. The principles of aspects were developed from the urban concepts, while the

upgrade & integrate principles were developed from Slow Urbanism. In addition, the control over growth was based on Smart Growth, the Compact city and Mixed-use developments.

TABLE 3.9: INDICATORS OF DIFFERENT SUSTAINABLE CONCEPTS AND THE IMPLEMENTED ONES DERIVED FROM THEM

Compact City	New Urbanism	Smart Growth	Neo-Traditional	Implemented Indicators
− Compactness − High density − Mixed land-uses	− Walkable − Mixed-use − High density − Connectivity − Diverse housing options − Quality architecture & urban design − Traditional neighbourhood structure − Green transportation − Sustainability − Quality of life	− Walkable − Mixed-use − Compact building − Diverse housing options − Strong sense of place − Preserve open areas − Infill developments − Diverse transports options − Cost effective − Community-stakeholder partnership	− Walkable − Mixed-use core − High density − Diverse housing options − Sense of community − Street patterns to allow drivers and pedestrians − Streets to encourage street life − Common open public spaces	− Compact urban form − Walkable − Mixed-use − High density − Diverse housing − Sense of community − Street characteristics − Street life − Common public spaces − Sense of place − Infill development − Diverse transportation

3.7 CONCLUSION

This chapter presented the research's emancipationist philosophical position, which can be explained by the interpretation from different perspectives and disciplines. Plus, the changing nature of informal settlements does not allow for interconnectivity between different bases of knowledge of a phenomenon. Traditional dwellings and settlements is the frame of reference since the focus is on the distinctiveness and changing nature of informal settlements. Informal settlements are complex, with the need to approach them not only from the physical aspect but also from the social and economic aspects, leading to a more suitable qualitative approach. Also, this approach was the best due to the exploratory nature of the research. The quantitative approach will not allow the research to evolve. The results of informal settlements cannot be quantified, predicted, studied in isolation or generalised because each settlement has unique qualities and characteristics. It allowed the research process to evolve throughout the study, where a quantitative approach would not allow it, while

multiple cases were employed to strengthen the research results. The multiple cases method was used to investigate different typologies of informal settlements to have a more comprehensive and rich understanding of the different typologies and allow for comparison between them. Also, the case study method allows the study to explore the cases in their context and the relationships between the settlement and surrounding context, further strengthening the qualitative approach. Later in the research process, the developed framework can be adapted and tested on different typologies, strengthening its results.

The qualitative approach directed the application of qualitative tools from an in-depth analysis of documents, a literature review and synchronous interviews. Those tools allowed us to do an in-depth investigation of the two case studies and develop a detailed and holistic understanding of the different relationships between the characteristics, with the same approach to the factors of success and cross-examine the cases with sustainable urban form indicators. All of this led to the development of the Control & Integration Model. Later, the data was validated using *triangulation* by implementing two tools and *thick and rich descriptions*. The tools were used to implement the empirical investigation framework to explore the informally built environment characteristics, success factors of intervention and conduct a cross-examination of the cases with sustainable urban concepts. The next chapter outlines the start of the investigation process, focusing on the Global South.

Informal Settlements Typologies

- Squatter Settlements on public or private lands
- Illegal Subdivision of suburban lands

Informal Settlements Characteristics

Physical
- Location
- Urban form
  - Density
  - Street Networks
  - Land-uses
  - Building Form
  - Public Spaces
- Transportation
- Infrastructure

Social
- Social Services
  - Health
  - Education
- Security
- Social Networks
- Cultural Background

Economic
- Economic Activities
- Employment
- Tenure Types
- Housing Quality

Sustainable Indicators

Physical
- Compact
- Walkable
- Mixed-use
- High Density
- Infill Development
- Diverse Transportation
- Street Characteristics

Socio-economic
- Diverse Housing
- Sense of Community
- Street Life
- Sense of Place
- Common Public Spaces

Transformation

Non-Spatial
- Economic Growth
- Informal Economy
- Politics of the Informal

Spatial
- Situational Factors
- Site & Topography
- Circulation Configuration

Intervention Strategy Aspects

Physical
- Spatial Integration
- Streets
- Accessibility
- Public Spaces
- Infrastructure Upgrade
- Preserve Urban Form

Social
- Social Integration
- Social Services
- Preserve Social Networks
- Skills Developments

Economic
- Preserve Social Networks
- Skills Developments
- Empower Local Economy
  - Microenterprises
  - Home-based

Sustainable Development

Smart Growth
- Mixed-uses
- Diversify Housing
- Urban Containment
- Diversify Transports
- Compact Urban form

Compact City
- Compactness
- Mix Land-uses
- Densifiy

Slow Urbanism
- Sense of Place & Rythm of Life
- Local Produce & Way of Life
- Efficient Use of Infrastructure

Mixed-use Development
- Intensify Land uses
- Diversify uses
- Mix Land-uses

FIGURE 3.6: INVESTIGATION FRAMEWORK

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Problem

Informal settlement's subpar living standards, marginality and uncontrolled expansion

Aim

The development of Control & Integration Model to intervene in the context of informal settlements to elevate the current conditions, integrate with the formal city and control the spontaneous expansion

Questions

What are the different characteristics that shape the informal built environment?

What are the factors that contribute to the success of intervention strategies?

How can Greater Cairo informal settlements be compared to the concepts of sustainable urban developments?

How to upgrade and integrate Greater Cairo informal settlements with the formal urban planning process?

Objectives

Characterisation of Informal Settlements

Improvement of Informal Settlements Framework

Informal Settlements Vs. Sustainable Urban development

Intervention Strategy Development

Investigation Framework

Typologies
- Squatter Settlements
- Illegal Subdivision

Informal Settlements Characteristics
- Physical
- Social
- Economic

Intervention Strategy Factors
- Physical
- Social
- Economic

Transformation
- Non-spatial
- Spatial

Sustainable Indicators
- Physical
- Socio-economic

Sustainable Development
- Smart Growth
- Compact City
- Slow Urbanism
- Mixed-use Development

Case Studies

Exploratory Case
- Belgrade Case Study

Main Cases
- Cairo Case 1 — Squatter Settlement
- Cairo Case 2 — Illegal Subdivision

Methods

Literature Review
Observation
Interview

Literature Review
Online Interview

Literature Review
Online Interview

Literature Review
Online Interview

Control & Integration Model

A tool for urban integration and governing the informal settlements growth through continuing the informalisation process while improving the current conditions

FIGURE 3.7: RESEARCH GENERAL FRAMEWORK

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Chapter 4. CHARACTERISATION OF INFORMAL SETTLEMENTS: A GLOBAL PERSPECTIVE

4.1 INTRODUCTION

The investigation started by exploring informal settlements globally, specifically by looking for the different causes of informal housing emergence and its expansion into settlements. This was achieved through reviewing case studies from Africa, Asia, Europe and Latin America. Afterwards, an understanding of the different typologies and physical and other characteristics of informal settlements was gained from different cases. Finally, different intervention strategies were identified in different cases to achieve a collective overview of the intervention strategies.

Later, the focus shifted to Serbia, the context of the exploratory case study of Belgrade, Serbia. The review focused on the same categories as the Global scale. It started by matching the typologies of these settlements with those of the global context, understanding the causes behind the appearance of informal settlements, and identifying the physical, social and economic characteristics and different intervention strategies through various case studies.

4.2 CHARACTERISATION OF INFORMAL SETTLEMENTS: GLOBAL SOUTH

The phenomenon of informal settlements emerged in the 1950s in low- and middle-income countries in the Global South, which could not fulfil the demand for low-cost housing. According to the UN, the overall percentage of informal dwellers decreased globally from 39% to 30% between 2000 and 2014; nonetheless, the number of informal dwellers has reached around one billion and is still increasing (Satterthwaite et al., 2018).

This increase creates different burdens socially, economically, politically, environmentally and legally. Socially, communities have no regular access to public facilities and services. Also, public authorities perceive them as minor citizens, and they suffer from discrimination. Economically, they do not pay taxes, and regularisation

programmes cost up to three times the cost of formal urban developments. Politically, they are manipulated by politicians who make promises to resolve their problems. Environmentally, inhabitants encounter below-standard living conditions, health and safety hazards, pollution, environmental degradation, a lack of sanitation, narrow and challenging access to streets, overpopulation, etc. Legally, the lack of secure tenure to occupy the place created a risk of eviction and a lack of basic rights to access the banking system or proof they live in the city (Fernandes, 2011).

4.2.1 The Different Typologies

The typologies of informal settlements and the criteria that define them differ from one perspective to another. Davis (2006), in *Planet of Slums*, developed a framework to categorise informal areas based on location and informal/formal conditions (Table 4.1) (Kamalipour, 2016).

Another classification based on urban form, the framework has four indicators: Location, *Constructability*, *Road Networks* and *Building Materials*. This classification presents 16 different groups of settlements. The first indicator is *location* which can be at the centre or periphery. Informal settlements either appear close to the active areas of city centres or on the peripheries of cities where lands are of lower value and not included in any urban development plans. Thus, inhabitants face a lower risk of eviction. Also, they want to be close to places of employment, like airports, mines, or industrial zones. The second indicator is *constructability*, which means lands that are urbanised and zoned for residential use or unbuildable lands. The oldest slums are on lands zoned for residential use. The third is the *road networks* of the settlement, which determines whether it used to be a formal settlement or takes an organic form by filling the gaps, densification or taking vacant plots. Fourth is the *building materials* used to determine how secure settlers feel about their settlement. Thus, the more permanent the materials, the more secure the habitat (Chenal et al., 2016).

A.	Metro Core				
	1.	Formal			
		(a)	tenements		
			(i)	hand-me-downs	
			(ii)	built for poor	
		(b)	public housing		
		(c)	hostels, flophouses, etc.		
	2.	Informal			
		(a)	squatters		
			(i)	authorized	
			(ii)	unauthorized	
		(b)	pavement-dwellers		
B.	Periphery				
	1.	Formal			
		(a)	private rental		
		(b)	public housing		
	2.	Informal			
		(a)	pirate subdivisions		
			(i)	owner-occupied	
			(ii)	rental	
		(b)	squatters		
			(i)	authorized (including site-and-service)	
			(ii)	unauthorized	
	3.	Refugee Camps			

Note. From "Planet of Slums", by M. Davis, 2006, p. 30

Dovey and King (2011) differentiated between the typologies through the main process of informal growth, *settling* on unclaimed land, *inserting* into abandoned fragments of urban space and *attaching* onto the structures of the formal city as it grows. The informal growth process could happen in different places, from unused lands to the edges of formal settlements. The process mostly happens incrementally as inhabitants continue to extend horizontally or vertically. This depends on the gathering of different resources as they become available. The territories where informality grows determine the typology of settlements. "*These topographic, infrastructural and interface conditions are all subject to changes that lead to transformations in the informal settlements and to slippage from one category to another.*" (Dovey & King, 2011, p. 19) (Figure 4.1)

Districts are the settlements that have grown to become large, mixed-use districts such as Kibera, Nairobi and Dharavi, Mumbai. *Waterfronts* denote the occupation of land between the water surface (lakes, canals, rivers, etc.) and formal city, which could include environmentally hazardous areas. This typology is prevalent in the Southeast Asian region, such as the Khlongs of Bangkok and the rivers of Manila.

Escarpments are usually on the margins of the formal city, close to mountains where the topography is too steep. Like waterfronts, they are prone to environmental hazards such as the Favelas of Rio de Janeiro. *Easements* are found in the buffer zones around urban infrastructures like railways and freeways. *Sidewalk* settlements develop on sidewalks lined with blank walls or fences, with no access to properties beyond the walls; spatially, they are linear, one-room-deep rows of housing and can extend vertically. *Adherences* are the informal extensions of a formal building, whether external or internal. *Backstage* is the attachment to or insertion between existing buildings of the city and hidden from the public gaze. Finally, *Enclosures* are when the informal is contained within formal shells, such as a building or vacant lot; examples include the cemeteries of Cairo and Indonesia (Figure 4.2) (Dovey & King, 2011).
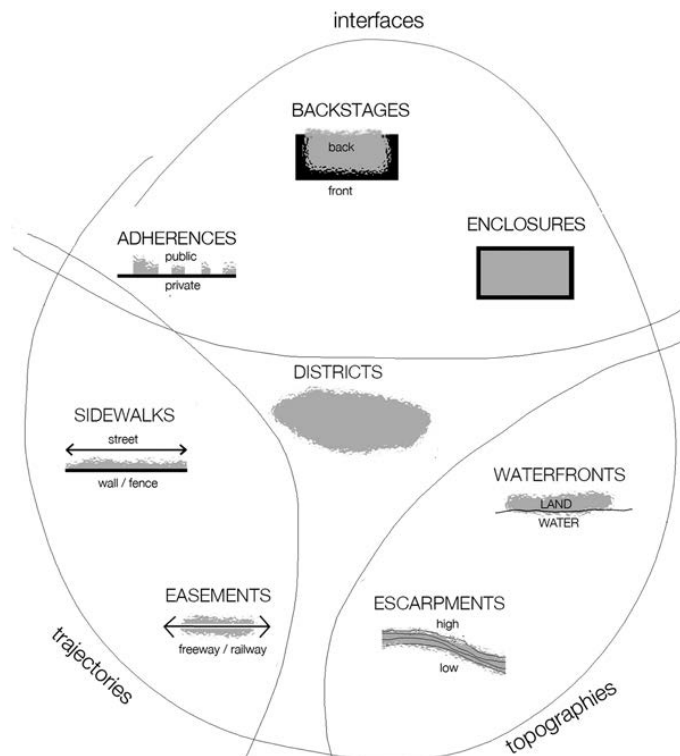
FIGURE 4.1: DOVEY & KING (2011) TYPOLOGY OF INFORMAL SETTLEMENTS

Moreover, Tsenkova (2009) based her typology on a spectrum of characteristics with a range of responses to each characteristic. The characteristics are legal status, security of tenure, physical, environmental, socio-economic and cultural and political participation. Her work was based on Europe and showed five different typologies:

squatter settlements on private or public land; settlements for refuge and vulnerable people; upgraded squatter settlements; illegal suburban land subdivision on legally owned lands, and overcrowded, dilapidated housing in the city centres or densely urbanised areas (Tsenkova, 2009).
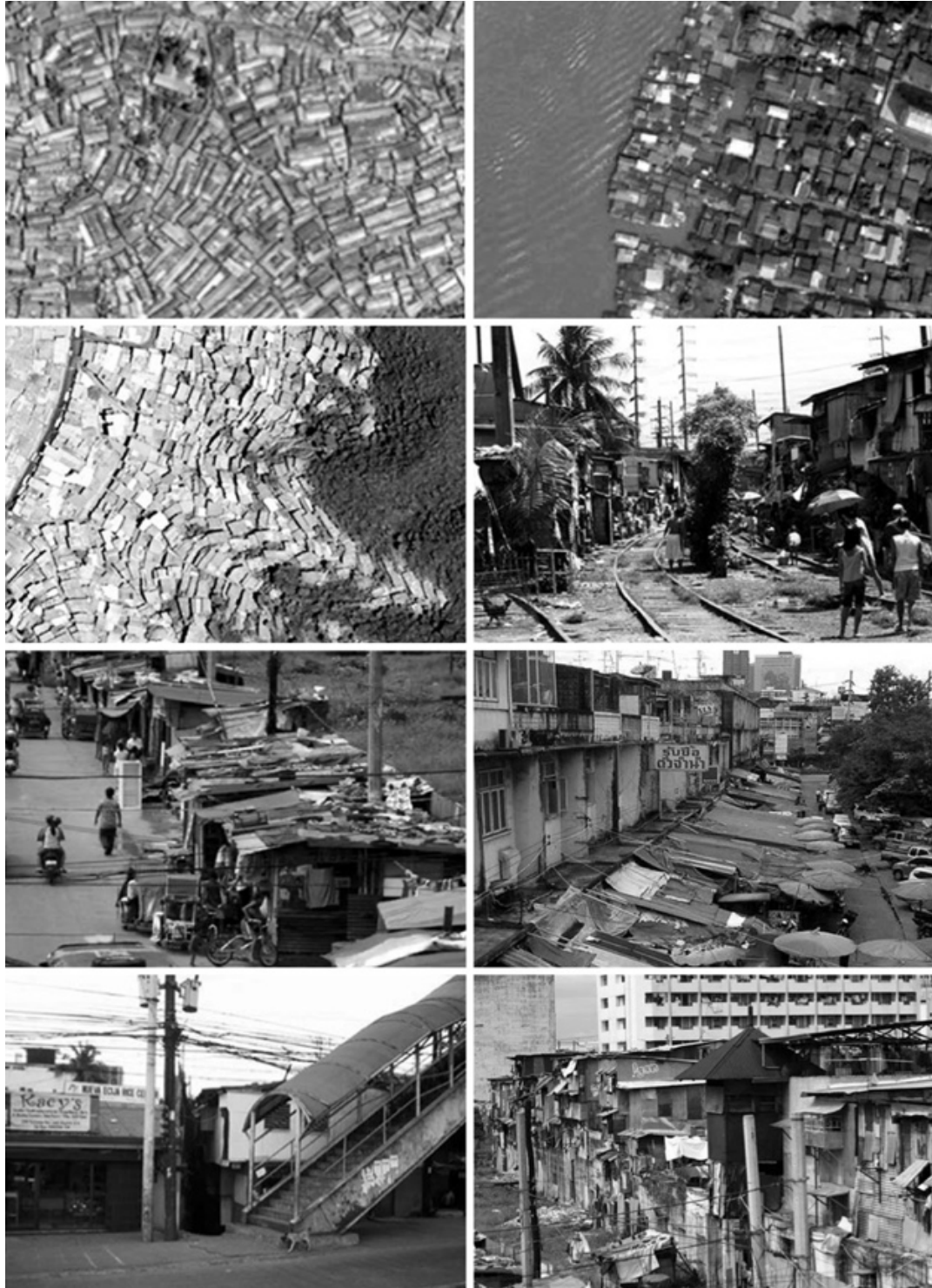
FIGURE 4.2: EXAMPLES OF DOVEY & KING (2011) TYPOLOGIES (FROM LEFT TO RIGHT, TOP TO BOTTOM: DISTRICTS, WATERFRONTS, ESCARPMENTS, EASEMENTS, SIDEWALK, ADHERENCES, BACKSTAGE AND ENCLOSURES)

4.2.2 Causes of Informal Settlements

In sub-Saharan Africa, 73% of its population lives in informal settlements. It is the highest percentage of informal settlers in a single region. The proliferation of informal settlements is due to the following reasons: rapid urbanisation, the weak application of laws and regulations by authorities, and a failure to create an economic base that can support all levels of a population and provide basic infrastructure and services. Moreover, most people cannot afford the building techniques used in the formal areas, financial institutions ignore the poor population, there is a lack of social programmes, houses are unaffordable, and high building standards and regulations (Wekesa et al., 2011). According to UN-Habitat, 31% of urban dwellers in South East Asia live in slums (Minnery et al., 2013) due to different reasons related to rapid urbanisation; thus, the reasons differ from one country to another.

I. African Region

Informal settlements provide housing to 70% of the urban population in Tanzania. In Dar es Salaam city, 50% of residential areas are informal because the city planning is based on racial segregation and utilises different housing schemes (Nguluma, 2003). In Zanzibar, the reasons behind the emergence of informal settlements are the rapid urbanisation that led to the failure of planned and serviced lands and the division of development control responsibilities to several uncoordinated authorities. After the 1964 revolution, the government distributed three-acre plots to landless families for agricultural purposes only; however, as the population grew, people started building on them. This was influenced by the inadequate distribution of formal residential lands to an increasing population and the lack of financial resources to compensate people to gain land for development. In addition, socio-cultural reasons were influential, specifically feeling comfortable living in informal settlements, which were recognised as the only places to enjoy 'Swahili life' (Ali & Sulaiman, 2006).

In Kenya, informal settlements started in the 1920s. The colonial government wanted to control the African population by keeping their wages low, segregating Europeans from African residential areas, and setting a standard of public health

among the African population to control the spread of diseases. Informal growth was influenced by several factors (Nabutola, 2005):

- *Rapid urbanisation* increased the demand for housing;
- The *inability of the government to provide affordable housing* to low- and no-income people;
- A *lack of resources*, whereby the housing sector competed with other sectors for resources;
- *Urban policies and building regulations* were rendered inefficient in producing affordable houses, and
- *Poor infrastructure and the lack of land policies* encouraged the manipulation of land tenures.

The British established Juba, Sudan, in the 1920s. During the Anglo-Egyptian Condominium rule, between 1898 and 1956, the British introduced policies to limit the number of people migrating from rural to urban areas through a highly centralised and discretionary leasehold system. It prevented people with insufficient financial capital and no governmental connections from securing a leasehold. In 1956, independence lifted migration restrictions, and the city grew. Informal settlements appeared in the 1960s and 1970s, and the population proliferated after it became the seat of the Southern Regional Government. So, government employees and others who wanted to benefit from the economic boost moved to the city while local urban authorities could not keep up with the demand for housing. By 1979, less than 15% of the houses built were permanent, while some were built on plots legally acquired from the local authority. During the second civil war, rural areas were under rebel group control, forcing people to move to the city. After the Comprehensive Peace Agreement, the population continued to increase, although the government did not plan to issue urban development policies (McMichael, 2016).

II. ASIAN REGION

In Kabul, Afghanistan, 80% of the city's population lives in informal settlements. People moved to the city to live in a more secure place, pursue a better life and

education, or look for employment. This increased population was coupled with ignorance of the government due to reasons associated with security and rural rehabilitation programmes (Fazli, 2015).

In Iran, the country faced a rapid urbanisation process between 1956 and 2006, increasing the total population living in urban areas from 31.4% to 68.6%. Over the next decade, it was estimated that a quarter of its urban population would live in informal settlements. This was caused by a lack of strategic planning, inappropriate policies for urban management and urban development plans, unbalanced budget management and the unbalanced distribution of national income. These can be summarised as the failure of the governance of the state (Tilaki et al., 2011).

In Jeddah, Saudi Arabia, during the oil boom in the 1980s, rural-urban migration and foreign migrants increased pressure on the housing market, triggering the fast growth of informal settlements. So, the unplanned central areas became the most affordable location, with foot access to facilities, services and jobs. The urban infrastructure was poor, and the subdivision of residences over time led to increased population density. The only way the urban poor could afford high central rent prices was through overcrowding (Karimi et al., 2007).

In China, there was a political dimension to the emergence and development of informal settlements. The state-owned land in cities and collectives owned rural land. Municipalities could acquire rural lands and change their ownership to the state if acting in the public interest. So, municipalities prioritised agricultural lands because of their lower costs and to avoid relocating people. This led to the conversion of farmland to land for urban development, an exodus from village settlements and not integrating into the administrative structures of municipalities. Also, the country had a system whereby each citizen should have only one permanent residence and only access services related to that location. Changing location required a lot of paperwork and official approval. This system was called 'hukou' and was used to control rural-to-urban migration. In the reform era, it allowed rural migrants to work in the city, although the 'hukou' system excluded them from changing their addresses to the city

area. So, they lived in the city but had no right to any urban entitlement, like the right to state-subsidised housing (Zhang, 2011).

III. LATIN AMERICA REGION

Medellin, Colombia, is the centre of gold mining and coffee production; the city developed several large manufacturing plants and middle- and small-size industries in the 20th century, which created a centre for employment, education and opportunities for the northwest region of the country. From the late 1940s to the 1950s, civil war in small towns and the countryside increased migration; another surge occurred in the 1980s because of guerrilla, paramilitary and army activity, which terrorised the countryside. Thus, two-thirds of the population now live in barrios (Betancur, 2007).

IV. EUROPEAN REGION

In Portugal, informal settlements appeared during the economic growth in the 1960s and 1970s when the economy opened to the European market. The informal settlements increased in and around Lisbon and Porto as they were economic hubs; this saw an increase in rural-urban immigration. Also, in the 1970s, war refugees moved to the city after independence from the Portuguese colonies (Silva & Farrall, 2016).

Madrid, Spain, experienced a similar influence behind the development of its slums. They appeared in the early 20th century in the southern and eastern peripheries of the city after the Spanish civil war of the 1930s. Rural-to-urban migration combined with city centre regeneration policies prompted the poorest households to move to the peripheries. Later, starting in the 1970s, the state introduced different housing and slum clearance policies. These policies have influenced the growth of Europe's largest slum, Canada Real Galiana, which houses 11,000 residents and families who have not been rehoused. It is the home of Moroccan and Latin American immigrants (Aguilera, 2016).

Similarly, the Ile-de-France in Paris, France region saw the first slums appear in the 1930s when the government called on a large workforce from Spain, Portugal, and Italy after pressure from business leaders. In the 1950s, new slums appeared that housed the Algerian workforce. After rehousing all slum residents and removing the

last slum in Nice in 1976, they reappeared again in the late 1990s, housing immigrants from Eastern Europe after the collapse of the communist bloc; these were labelled as 'Roma' (Aguilera, 2016).

V. SOUTHEAST EUROPE

The region has undergone a 'triple transition' marking the political change to a democratic system, economic shift to a market economy and decentralised governance; simultaneously, the war had an impact. These changes occurred alongside incompetent planning and land management systems, which resulted in the growth of informal settlements. The lack of up-to-date masterplans and detailed regulatory plans created an obstacle to implementing strategies to integrate informal settlements, while the local governments of Serbia, Montenegro, and Bosnia and Herzegovina failed to develop detailed regulatory plans. This occurred alongside the lack of institutional capacity to monitor and enforce detailed plans (Tsenkova, 2012).

Regarding land management, the transition to decentralised governance has burdened local municipalities with new functions without allocating sufficient resources to fulfil them. Also, land registration systems are weak; less than 60% of the land is registered in Serbia, Albania and Montenegro cadastres. The weak municipalities, poor land management systems and lack of detailed plans have rendered the issue of official building permission so hectic that going through an informal route is much easier (Tsenkova, 2012).

4.2.3 EXPLORING INFORMAL SETTLEMENTS CHARACTERISTICS

At first glance, informal settlements send a spontaneous, random, chaotic, deprived image; however, residents create an order and logic that makes sense to them. Thus, their unique characteristics and qualities have enabled residents to survive over the years. Nevertheless, this poses economic, social and environmental challenges; economically, they move a lot of investment outside the formal economy, and inhabitants do not pay property taxes or utility fees as they connect illegally. Socially, they lack social infrastructures like schools, clinics, hospitals and social services. Lands occupied by houses sometimes could have been better used for parks, commercial or

social uses. Also, unemployment and social service benefits are not allowed because their occupation is illegal. Environmentally, they have unreliable illegal connections to water, electricity and sanitation because of the extra load they represent, which exceeds what the system is designed for. In addition, they lack proper maintenance because of a lack of subscription payments. Also, limited or no waste management leads them to dump their garbage and sewer discharge in rivers, lakes and the banks of rivers, whilst settlements can occupy areas prone to environmental hazards or naturally preserved areas (Tsenkova, 2009).

I. PHYSICAL CHARACTERISTICS

Informal settlements are either in the unplanned pockets of inner-city areas or peri-urban areas such as Ayobo in Lagos, Nigeria (Opoko et al., 2015). Settlements like Dharavi, Mumbai, are established on the city periphery, and over time, the city's growth has made it a central location (Mukhija, 2001). Inner-city areas are usually of poor quality and sometimes located on environmentally risky sites or in areas which pose a health risk. People squat there because of its proximity to employment areas like industrial zones, port areas and city centres, while peri-urban areas are on a larger scale. People choose these areas because of the low supply and unaffordable lands in the city (Chenal et al., 2016). The settlement location is vital to residents because it is usually located in areas with good access to public transport and near job opportunities. Thus, the urban form creates a compact, dense and walkable area.

Materials and techniques differ from region to region and from country to country. In sub-Saharan Africa, informal settlements are built from poor-quality materials and lack adequate housing units and basic infrastructure (Figure 4.3) (Wekesa et al., 2011). In Nairobi, Kenya, houses were built from temporary construction materials like mud, timber and wattle (Alder, 1995). Also, settlements had very poor services; if present, they had "*earth roads and paths, earth drains, communal water points and shared pit latrines*" (Alder, 1995, p. 88). Unlike Iranian informal settlements, houses are very similar to those in formal areas (Tilaki et al., 2011). While in Tanzania, there was no significant difference between informal and formal building materials

(Nguluma, 2003). On the contrary, Afghanistan has better quality and better areas that are easily upgradable (Fazli, 2015).

Informal settlements are unplanned areas that grow spontaneously and randomly. The incremental generative process keeps adapting to the current situation (Billig, 2010). Also, they have inadequate or a lack of urban services (educational, medical facilities, policing and fire services), public spaces and urban infrastructure (water, electricity, sanitation and solid waste management) (Opoko et al., 2015). For example, in South Africa, basic services like water were mainly accessed through water taps, non-flushing toilets, and poor access to electricity (Richards et al., 2007).

FIGURE 4.3: HOUSES BUILT FROM MAKE-SHIFT MATERIALS IN KIBERA, KENYA, SUB-SAHARAN AFRICA (HUCHZERMEYER, 2006, AS CITED IN WEKESA ET AL., 2011)

II. SOCIAL CHARACTERISTICS

It is commonly known that informal settlements are home to poor and marginalised urban residents (Wekesa et al., 2011). With a group of poor people squatting in a particular area, they develop social networks and community-based organisations over time. In the early days of a settlement, these networks are crucial for survival and compensate for the lack of urban services and facilities. They are there to maintain safety, solve disputes between community members, and so forth (Massey, 2013). They deal with everyday needs like childcare, food contributions, sharing resources and care for sick elderly (Chitengi, 2015). These networks overcome the burden of a high unemployment rate, like in South Africa, which ranges from 58% to 72%;

in Buffalo City, Durban and Alexandria-Johannesburg, there is a high rate of crime and overcrowding (Wekesa et al., 2011). In Tanzania, informal settlements are home to different groups of social and economic status, ranging from poor to wealthy inhabitants (Nguluma, 2003). In Ayobo, an informal settlement in Lagos, Nigeria, the majority share the same buildings and facilities, which creates conflicts between the residents (Opoko et al., 2015). In South Africa, Richards et al. (2007) showed that access to educational facilities was difficult because inhabitants need to travel outside settlements; this challenge is similarly experienced in relation to access to health and community services.

III. ECONOMIC CHARACTERISTICS

Economic characteristics create a challenge by moving many investments outside the formal economy; the houses and lands in the settlements are traded outside the formal system of real estate agents, taxation, or registration which creates dead capital that cannot be used for mortgages or loans (Tsenkova, 2009). In contrast, in Kenya, house owners usually have some legal or quasi-legal status, but this differs whether the land is public or private. They can get a temporary occupation licence on public land, whilst private land owners get permission to build and rent (Alder, 1995).

Furthermore, residents are low-income group migrants from rural areas, but in some settlements, like in Iran, they have a better economic status (Tilaki et al., 2011). Low- and middle-income groups could dwell in them – including those looking for employment and better access to services. Thus, residents may live near areas of employment, thereby reducing the unemployment rate and increasing the level and commitment to education. Therefore, informal settlements house a third of the labour force (Dovey, 2013) that works in industrial and construction fields, domestic workers, transport operators, lower-level government employees and food vendors and their production facilities (Kapadia, 2006). In Nairobi, Kenya, informal residents usually work in the informal sector, for example, as street traders or run unlicensed small businesses. The small businesses are called 'jua kali' and can be manufacturing, repair and services that serve other areas of Nairobi (La Ferrara, 2002).

IV. Environmental Characteristics

Informal settlements have poor environmental conditions. This could be from poor sanitation and waste disposal management (Ferguson, 1996) or occupies on environmentally preserved lands (Tsenkova, 2009). In addition, the high-density nature of these settlements reduces natural light and air, which could lead to skin and respiratory diseases (Fernandes, 2011). In contrast, the compactness of the settlements creates walkable districts, efficiency in land use, low resource consumption rates, and materials recycling and reuse. Devi et al. (2017) compared two informal settlements with the formal district in Suva, Fiji. The study showed that the two informal settlements have a smaller ecological footprint compared to economically advantaged settlements. The only component with no significant difference was the water consumption, as it was relatively inexpensive, but the high density in informal settlements meant less water consumption.

TABLE 4.2: DIFFERENT COUNTRIES' INFORMAL SETTLEMENTS CHARACTERISTICS

Country	Physical	Social	Economic
Iran	− Unplanned − No infrastructure − No services − Similar quality to formal housing	− Rural immigrants − Unskilled labours	− Low economic class
South Africa	− No infrastructure − Low-quality housing − Inside the city or in peri-urban areas − Near employment areas	− High crime rate − High violence rate − Drug abuse − Poor health − Organised crime practices	− Lack of tenure security − High unemployment rate − Poverty − Informal jobs
Tanzania	− Similar quality to formal housing − Poor infrastructure − High density	− No services − Socio-cultural ties to 'Swahili life' − Wide range of social groups	− Secure tenure − Wide range of economic groups
Pacific Islands	− Inside the city or in peri-urban areas	− Socio-cultural ties	
Indonesia	− Inside the city	− Rural immigrants	
Kenya		− Rural immigrants	− Income-generating enterprises − Home-based
Pakistan	− Near employment areas		− Informal economy
Mexico	− No infrastructure − Peri-urban locations	− High crime rate − Discrimination	− Low-income
Jamaica	− High density − Weak street network and bad conditions of roads − Informal utility connections − Poor sanitation		
Nigeria	− No services − Roads in bad condition − No water	− High secondary education status − No health care − No education	− Self-employed
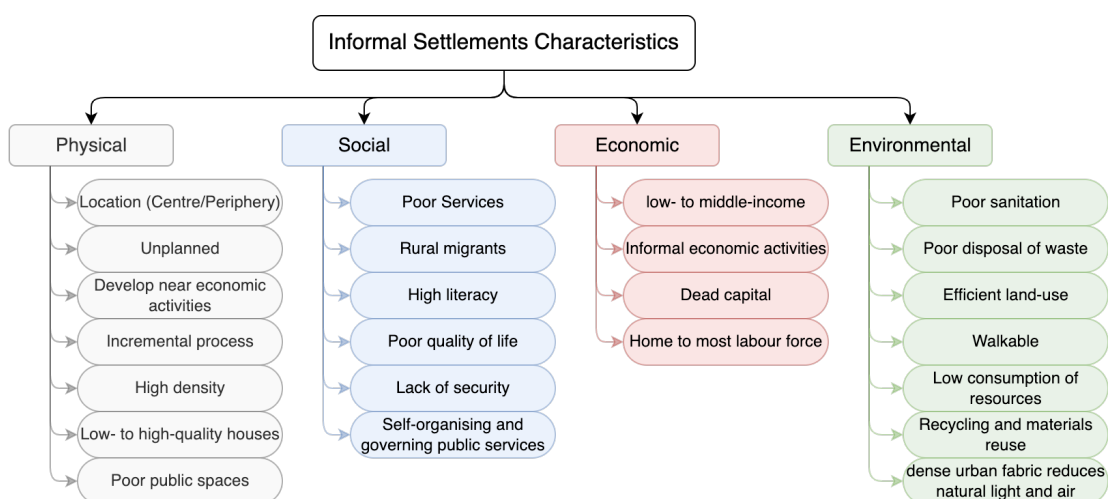
FIGURE 4.4: INFORMAL SETTLEMENTS: GENERAL CHARACTERISTICS

4.2.4 CASE STUDIES FOR INTERVENTION STRATEGIES

I. INDONESIA

In 1999, Indonesia implemented a decentralisation process that moved the power, responsibilities and resources to sub-national administrations. As a result, cities and districts had to provide a sufficient level of urban infrastructure. They shifted the design and implementation of the programme from a top-bottom to a bottom-up approach and empowered communities by encouraging public participation in both design and implementation. They introduced several programmes: *Urban Poverty Alleviation Programme (P2KP) (later transferred to PNPM); Neighbourhood Upgrading and Shelter Sector Programme (NUSSP); Community-based Initiatives for Housing and Local Government (Co-Build); Life Improvement Programme for Poor Urban Communities and Regional-based Plans for Management of Slum Housing and Neighbourhoods,* and *Rusunawa Development (units for rent in social housing)* (Table 4.3) (Roitman, 2016).

TABLE 4.3: INDONESIA'S SLUM MANAGEMENT PROGRAMMES (1999-2011)

Programme	Year of Implementation	Program Components	Performance
P2KP/ PNPM Mandiri Urban Areas Implemented in 33 Provinces, 268 Cities/ Districts & 10,923 Urban/ Rural Villages	1999 – present	− Improving the quality of the environment (infrastructure) − Improving the quality of human resources and health	Beneficiaries: 14,805,923 KK (head of households)

		− Increasing accessibility in starting business operations	
NUSSP Implemented in 32 Cities/ Districts & 1,353 Urban Villages	2005 – 2010	− Improving the quality of the environment (infrastructure) − Increasing accessibility to financial resources	Beneficiaries: 1,226,817 KK Area:7,608 Ha
Co – BUILD 12 Cities	2000 – 2003	− Residential upgrading beneficiaries − Increasing community access to land ownership	Beneficiaries: 10,000 KK
Rusunawa Development	2003 – present	− Construction of Rusunawa units (TB) − Building Rusunawa basic infrastructure	Beneficiaries: 13,720 KK
PLP2K-BK Implemented in 20 Provinces, 31 Cities/Districts & 33 locations	2010 – 2011	− Improving public infrastructure, facilities and utilities (PSU) − Improving quality of the environment − Increasing accessibility to business operations.	Beneficiaries: 33,000 KK Area: 165 Ha

Note. From "Report on the achievement of millennium development goals in Indonesia 2011", by Alisjahbana, 2012, p. 102.

The government and World Bank funded the PNPM programme. It had two main objectives: empowering poor communities and improving quality of life. The PNPM programme deals with housing and physical and community infrastructure. The programme's function is structural and takes a hierarchical form, whereby a self-organised community group creates proposals to present to the Independent Community Board –its members are from the community – who act as the middle-man between the community and programme officers (Roitman, 2016).

According to Roitman (2016), communities and households benefitted from the programme, but the beneficiaries were not always the poorest or most vulnerable. Also, community participation was limited to the initial stages, although the decision-making was carried out by the elite group in the community or at the national government level.

II. KENYA

The colonial government policy to control the African urban population influenced informal settlements' development. To do so, it aimed to keep the wages of the African population low, segregate Africans from European residential areas, and keep a

reasonable standard of public health among the African population to control the spread of disease. This policy cramped the African population in the eastern and southern parts of the city. In addition to the lack of housing supply to accommodate the high population and growth rate of urbanisation, there was an inability to provide affordable houses to low- and no-income populations. In addition, unaffordable building regulations and standards existed while urban policies favoured formal housing that could not provide affordable dwellings for most new households (Nabutola, 2005).

In Nairobi, the population of informal settlements is around 55% of the city's population, with a density of 750 persons per hectare compared to 50-180 persons per hectare in formal areas. They build the dwellings from temporary materials and suffer from inadequate urban services like unpaved roads and paths, communal water taps and toilets (Alder, 1995).

In collaboration with UN-Habitat, the Kenyan government initiated an upgrade programme to address the policies that contributed to the development of informal settlements and promote the growth of physically, socially and economically sustainable urban settlements. The Kenya Slum Upgrading Project (KENSUP) targets national and local government levels. The programme covers the three largest cities in Kenya, starting with Kibera Slum in Nairobi.

The national-level scope developed policies to address: the living conditions of informal settlements; the development of poverty reduction strategies; the development of standards and materials that are appropriately relevant to the needs of the poor; the effectiveness of all stakeholder organisations and the government; capacity building through training key staff at central government; local government and community levels; resource management by mobilising the resources within the community, and the development of systems to learn, document and share the experience locally, nationally and internationally. While local government scope aims to mobilise and involve the community and all stakeholders through participation in producing housing and decentralising decision-making; socio-economic and physical mapping;

decision-making and planning; relocating when necessary; providing the infrastructure; upgrading housing quality; implementing livelihood strategies to help reduce poverty; and regularising land in order to integrate settlements in the formal physical and economic framework. Within the scope of each level sits the overall strategies of the programme, which are (Nabutola, 2005):

- The inclusivity of all stakeholders (inhabitants, organisations, NGOs, local authorities, governmental agencies, professional associations, private sector and international development agencies) in implementing the project components;
- Private-public partnerships to deliver, maintain, support, pay for services, and manage the facilities developed in settlements with the communities who are the key players;
- The security of tenure for the settlements;
- Income generation and poverty reduction strategies;
- Environmental matters;
- The de-densification for service wayleaves;
- A media strategy to educate the public and residents, and
- To meet development costs.

In 2011, the Kenyan government collaborated with World Bank, Swedish International Development Cooperation Agency, and Agence Française de Développement (AFD) to initiate the Kenya Informal Settlement Improvement Programme (KISIP). The difference between KISIP and KENSUP is that KISIP is a short-term (2011-2016) programme focusing on infrastructure, land tenure, and participatory urban planning and strengthening urban management institutions. In comparison, KENSUP is a long-term national strategy focusing on housing improvement, the provision of physical and social infrastructure, community participation, mobilisation and organisation.

The programmes had strong governmental support in terms of financing and human resources, and community participation was adopted in the project's policy. However, the programmes faced many challenges (Anderson & Mwelu, 2013):

- The programme was designed following community participation, but it was very weak as the communities were not fully engaged.

- KISIP focused on mobilising communities through the development of a civil society that did not occur.

- The Ministry of Housing was responsible for directing all activities and approving budgets; they publicised that the project was community-led, but in reality, they took the decisions.

- The coordination between KISIP and KENSUP was poorly linked even though the same ministry ran them.

- There were transparency issues in the selection of municipalities, bidding and contracting issues.

III. SOUTH AFRICA

Dualism and spatial fragmentation characterised South African cities, as they built towns on the principle of segregation by building temporary dormitory zones for black labour (Wekesa et al., 2011). A lack of basic infrastructure and services characterises informal settlements. Also, they have a high rate of crime, poverty, HIV, drugs and unemployment (ranging between 58% to 72% across different settlements) (Richards et al., 2007).

In 1994, the country introduced the Reconstruction and Development Programme (RDP), and in 2004 introduced the Breaking New Ground (BNG) policy. They based both policies on the site-and-service strategy; they delivered plots with free services to the poor with a housing unit (Amin & Cirolia, 2018). BNG's primary objectives were as follows:

- *"Accelerating the delivery of housing as a key strategy for poverty alleviation;*

- *Utilizing the provision of housing as a major job creation strategy;*

- *Ensuring property can be accessed by all as an asset for wealth creation and empowerment;*

- *Leveraging growth in the economy;*

- *Combating crime, promoting social cohesion and improving quality of life for the poor;*

- *Supporting the functioning of the entire single residential property market to reduce duality within the sector by breaking the barriers between the first economy residential property boom and the second economy slump;*

- *Utilizing housing as an instrument for the development of sustainable integrated human settlements, in support of spatial restructuring"* (Department of Human Settlements, 2004, p. 9-10)

After the BNG housing policy, the country shifted its policy towards upgrading informal settlements. They had two approaches: First, total redevelopment when people had to relocate, and as a result, social and economic networks broke down because the new locations were far from the required urban opportunities. Second, in situ upgrading aims to preserve social and economic networks by minimising the number of relocating people (del Mistro & Hensher, 2009).

In eThekwini municipality, in situ upgrading was chosen. The municipality acted as a developer, and the community's role in upgrading involved electing a Community Development Committee (CDC). The CDC was the link between the municipality and residents. It had three roles: to develop a housing list, facilitate the entry, movement and exit of external professionals, and attend meetings with the municipality and residents. Post-upgrade, the CDC's role changed to regulate land and house use, stop the building of poorly constructed extensions or new shacks in the settlement, and impose rules to govern the safety of the settlement. The upgrade process in eThekwini municipality improved basic housing needs, political power for the CDC, tenure security and well-being (Patel, 2013).

> *"Reflecting on the upgrade process, from the perspective of a broad range of (committee and non-committee) residents living in Zwelisha, the upgrade was a success on the basis that basic housing needs were met, political power increased (for the CDC) and residents' self-defined tenure security and wellbeing*

improved. Tenure security, broadly defined as a resident's ability and willing-ness to reside in a given space" (Patel, 2013, p. 216).

Another case study is Besters Camp, located in the Durban Metropolitan Area. It houses 50,000 inhabitants within five subareas with unique socio-economic and physical characteristics. The upgrade process was started in 1989 by an NGO called the Urban Foundation Informal Settlements Division (UFISD). The City of Durban and the Independent Development Trust (IDT) funded the project. The infrastructure and tenure delivery finished in 1995. After the upgrade, the settlement pattern remained almost unchanged, with less than 1% of the households relocated. The upgrade process was accompanied by a high degree of community participation in planning and implementation decision-making. The planning process in Besters Camp had the following principles:

- *"Planning literally needs to be from the ground up; it should not be a desktop exercise that is then imposed upon the settlement. Given the situation on the ground is not fixes, but is constantly changing (both socially and physically), the planning process should accommodate such changes on an ongoing basis.*

- *Planning needs to be conducted with the residents' participation at all levels. Residents' involvement can range – from decisions about planning principles to input about locations for service infrastructure – in order to marry technically and socially optimal solutions.*

- *Planning should be an iterative process whereby the ideal end state evolves, rather than being an initial imposition on the process. Layout plans, for example, should be created during later stages of implementation in the form of as-built plans, rather than preceding the upgrading process as master planning would dictate.*

- *Planning needs to be inseparable from the principle formulation, design, and implementation process. Furthermore, planning is only one element of what should be a multidisciplinary approach to the upgrading process.*

- *While planning needs to be grounded in an understanding of micro settlement-level dynamics, it must be linked to an understanding of the macro political and economic forces that provide the context for settlement growth*" (Van Horen, 2000, p. 393).

In the Besters Camp upgrade, there was an acceptance of the informalisation process that shaped the planning process. The process ignored many of the usual legal and institutional blocks that appeared in the form of formal building standards and codes. However, the project followed the conventional legal tenure without considering the system established by residents. The people kept ignoring and thus did not register when there was a transfer of ownership (Van Horen, 2000).

IV. COLUMBIA

Medellin, the second-largest city in Columbia, started to develop in the early 20th century by profiting from gold mining and coffee production. It was home to large manufacturing and middle and small industries. It created a centre for jobs, education and opportunities for rural inhabitants to migrate. In the 1940s and 1950s, a civil war in small towns and the countryside increased migration. In the 1980s, migration increased again because guerrilla actions, paramilitary activity, and army actions terrorised the countryside. As a result, low-income people had to invade lands and illegally subdivide them, creating high-density, inadequate street systems and public facilities and spaces, leading to informal settlements to house two-thirds of the urban population. Over time, the city developed services and facilities in many of these settlements. Later, they were identified as 'normalised' neighbourhoods, with the most recent and under extreme conditions being identified as 'subnormal' (Betancur, 2007).

In 1993, the city of Medellin and the governments of Colombia and Germany established the Integral Program for Subnormal District Improvement in Medellín (Programa Integral de Mejoramiento de Barrios Subnormales en Medellín, or PRIMED) to integrate the settlements physically and socially (Betancur, 2007). The programme's objectives were to "*strengthen planning, management and inter-institutional*

collaboration; promote community participation and state-civil society partnerships; improve basic infrastructure, public services and public spaces; upgrade informal housing; secure land tenure for informal settlements; and mitigate geological risks on the mountainsides" (PRIMED, 1996, p. 59).

The programme was structured over six main elements, *"a flexible and relatively in-dependent administrative structure with direct access to the sources of power, inter-institutional cooperation, a clearly defined focus, a comprehensive approach, conti-nuity, and a community participation framework"* (Betancur, 2007, p. 6). These elements are (Betancur, 2007):

- Administrative Structure: PRIMED operated autonomously, despite being part of the Housing and Social Development Corporation of Medellín. It had direct access to the presidency and the mayor's office. Also, the coordinating group allowed a close connection between all agencies and the programme director. PRIMED was responsible for planning, coordination and administration, while governmental entities, NGOs and sub-contractors handled implementation.

- The focus was on certain settlements: with tailor-made interventions for each settlement following their unique circumstances and conditions. The focus was on physical improvement, environmental risk and land tenure.

- The programme's approach: eliminate any political intervention with a high level of professionalism and efficiency. It maximised its connection and approach with community and local groups because it did not represent any party or the government. At the same time, it had access to decision-making powers, local, national and international entities with high levels of participation among all stakeholders, including the communities. PRIMED tried to include interventions on different levels (physical, housing, tenure, employment, social, etc.), but it mainly addressed physical improvements aimed at elevating economic conditions and quality of life.

- Comprehensiveness: the programme was a success in upgrading physical infrastructure, public facilities and services in the settlements, legalising the residents' tenure and improving their houses.

- Continuity and Community Participation: the programme's intent is to give the community a sense of ownership to take charge and continue in the future with the work. PRIMED wanted to involve the community in all stages, from determining what people needed and setting priorities to implementation and maintenance.

The programme's crucial point was the highly participatory process. The residents engaged in planning and implementation, and the transportation system enabled residents to travel to the city for work and access services (Hermanson, 2016).

> *"[I]t is clear that the target areas were incorporated to the city via streets and paths. Infrastructure improved significantly. The program carved out open spaces and produced or improved public facilities and institutions. Many households were able to improve their houses and legalize tenure"* (Betancur, 2007, p. 14).

However, the programme had a weak impact on employment, education and health. The jobs created were temporary, and the skills learned did not lead to employment (Betancur, 2007).

V. BRAZIL

The country reached an urbanisation rate of 75% of its total area, with 4,000 favelas scattered across the country. The Favelas had over 6 million inhabitants in the metropolitan areas of Rio de Janeiro and São Paulo (Segre, 2009). In 1994, Rio de Janeiro had 660 favelas housing over one million inhabitants. The favelas' residents are not the poorest in the city, but they lack inadequate urban services and infrastructure and experience increased violence related to drug trafficking (Riley et al., 2001).

The intervention by the housing department of the Rio de Janeiro municipal government had two axes: the Rio-Cidade and the Favela-Bairro Programmes. The first aimed to revitalise public urban spaces, including architectural and functional

aspects. The second aimed to upgrade informal settlements with basic services and infrastructure and integrate them with the formal city (Segre, 2009). Favela-Barrio was a comprehensive upgrading programme for medium-sized informal areas and was implemented on a wide scale with the financial backing of the Inter-American Development Bank. It was a multi-sectoral programme that aimed to physically and socially upgrade the favela's facilities and spaces and increase the connectivity between settlements and the city's fabric (Fiori & Brandão, 2009).

The programme was initiated by a competition by the Institute of Brazilian Architects, Municipal Planning Institute and Municipal Housing Department that asked for ideas on how to approach the problems of the favelas. The programme treated each favela as a project in itself and assigned a team of architects and social scientists. The project tackled existing problems, while community participation approval was a crucial part of the initiative.

The programme concept aimed to integrate favelas with the city through social integration and by introducing urban facilities accessible to all city residents. Thus, this would open the city to the residents of the favelas. The programme depended on the role of architecture and urban design in public spaces, including their impact on the city and connecting people. The use of public spaces like roads, squares and public facilities was designed and implemented to invite city inhabitants who had never entered the favelas to walk through or engage with their cultural events. According to Fiori et al. (2001), the components of the programme were:

- The installation and upgrading of water and sanitation infrastructure and public and domestic lighting networks.
- Reforestation.
- The opening and paving of roads, squares and walkways.
- Elimination of natural hazards.
- Construction of new housing for essential resettlements
- Setting up of rubbish collection system.
- Commencement of land tenure regularisation processes.

- Construction and reform of buildings and their subsequent use as nursery schools, community centres, and income generation and training centres.
- Construction and operation of new sports and leisure facilities.
- Construction of commercial establishments (kiosks).
- Construction and operation of social and urban advice centres.

The areas implemented by the programme were seen improvements in better physical conditions, the increased value of land and properties, enhanced connectivity, and a few residents resettled. However, there were almost no direct impacts on educational levels, health issues and income generation problems, while the indirect impacts on economic conditions, employment and social conditions were not assessed (Fiori & Brandão, 2009). Also, the programme influenced the image of the favelas, which came to be recognised as a different but essential part of the city that needed improvements, not by following the regulations of the formal city but by treating them as unique areas. However, the lack of community participation in the Favela-Bairro programme posed some difficulties; this was due to mistrust between the community and the government, which affected different parts of the project ranging from allowing the project to fulfil residents' demands, the efficiency of construction to the long-term maintenance of the settlements (Fiori et al., 2001). Also, land tenure regularisation processes were part of the programme. The regularisation process had a counter effect as it encouraged people to form new informal settlements to benefit from the programme as prices increased in the informal market. This caused gentrification as real estate developers pressured people to sell (Fernandes, 2011).

VI. TURKEY

In the 1950s, informal settlements in Turkey emerged in large cities like Istanbul and Ankara. They developed on public lands and some in environmentally hazardous areas. The industrialisation period and rapid urbanisation increased the number of people migrating from rural to urban areas. Informal inhabitants are mainly from a low educational level and difficult economic situations (Uzun et al., 2010).

In the beginning, the government issued a law to demolish and prevent the formation of new settlements, but it failed due to economic, social and political reasons. They changed their approach toward legalisation, hoping people would improve their living conditions if they secured their tenure. Thus, the authorities enacted Amnesty Laws No. 2805 in 1983 and No. 2981 in 1984. Amnesty Law No. 2981 applies to all informal settlements on public lands built before the law's introduction; thus, if any household member owned a property in the same municipality, the law would not be applied (Uzun et al., 2010).

The process starts when an application is made to the municipality where the informal building is located. Then a certified surveyor is appointed who prepares the required documents and sends them to the municipality, treasury, province and foundations administration to finalise the procedures. However, the policy failed and resulted in the preservation and increase of informal settlements. Legalised settlements were on the periphery of the cities, and, over time, urban expansion meant they became part of the city centre. Considering that, residents partnered with private developers and changed the development to include high-rise buildings, shopping malls, and offices. Thus, it encouraged the people to squat on other public lands in the hope of legalisation in the future (Uzun et al., 2010).

As a result of the failed attempt of Amnesty Laws that made informal settlements a tool to earn money, in 2003, the Turkish Housing Development Administration (TOKI) changed its approach towards upgrading informal areas and protecting the residents who were only seeking shelter. TOKI is a non-profit organisation working in the housing and urban sectors. It builds low- and middle-income social housing and runs informal settlement upgrade programmes. The upgrading model is implemented in unplanned areas, occupied public lands, environmentally hazardous areas and historical areas. TOKI has two approaches: either demolish and redevelop the informal area by constructing new houses in the same place and allocating units to the rightful holder, or demolish and relocate the informal area by constructing new homes in a different area and relocating the people (Uzun et al., 2010).

The process starts when the local authority applies the informal area to TOKI. They start with the feasibility and design of the project. Then, a commission is formed between the local authority and TOKI to determine the real estate value and the rights holders. The area residents earn their right to a new house and are obligated to pay the difference within 15 years (Uzun et al., 2010).

VII. DISCUSSION

There are different approaches for interventions from the previous cases, from eviction and demolition to in-situ upgrading, for example, legalisation in Turkey and site-and-services in South Africa. The common thing between them is the changed approach to upgrading, but still, there are differences between them.

In Indonesia, the state decentralised the decision-making, delegated it to sub-national administrations, and the community participated in the process. The community created proposals that the community board presented to officers, but their participation stopped there. The national government or elite community groups were the decision-makers. Like the community board, they established Community Development Committee (CDC) in South Africa. However, the CDC was more involved, which delivered better results. The CDC was responsible for facilitating entry, developing housing lists and participating in meetings with the municipality. After the development of the informal settlement, it became responsible for the governance of the upgraded settlement. Comparing the CDC and the Community Board, the CDC had more responsibility and control and delivered better results. Another upgrading approach was in Kenya. The government implemented two programmes prioritising community participation, but in reality, their participation was weak because the government took all the decisions. Also, there were management issues between the two programmes.

Another approach for upgrading was integrating the informal settlements with the formal city. Brazilian and Colombian experiences are the best examples of that approach. In 1993, the Colombian government initiated a programme to physically and socially integrate informal settlements with the formal city. They focused on

connecting the informal settlements with the city transportation network to facilitate the residents' access to services and jobs in the city. While in Rio de Janeiro, Brazil, they had a different approach. They initiated two programmes to upgrade the informal settlements, integrate them with the city, and revitalise public spaces. The integration was based on social integration by introducing urban facilities and public spaces accessible to all city residents.

Of all the mentioned programmes, the most successful was the Brazilian, Colombian and South African experience. Nevertheless, still, they had their weaknesses. In Colombia, the focus was on transportation integration and neglected the economic and social aspects where there was a weak change in employment, education and health. Similarly, in Brazil, the project had the same weaknesses, but it improved the physical conditions and value of the land.

Country	Approach	Intervention Type	Summary
Indonesia	Moving the power and responsibilities to sub-national administrations Bottom-up design and implementation Community participation in design and implementation	Physical upgrading of housing and physical and community infrastructure	Not the poorest or the most vulnerable benefitted from the programme. Community participation was limited to the initial stages only Decision-making carried by the elite group of the community or national government level
Kenya	KISIP is a short-term programme that focuses on infrastructure, land tenure, participatory urban planning and strengthening of urban management institutions. KENSUP is a nationwide long-term strategy focusing on housing improvement, physical and social infrastructure provision and community participation, mobilisation and organisation.	Comprehensive upgrading strategy	The programmes were designed on community participation, but it was weak. KISIP's mobilisation of communities through the utilisation of civil society did not occur. The Ministry of Housing retained the responsibility to direct all activities and approved budgets which was the opposite of what is publicised There was no coordination between KISIP and KENSUP even though they are run by the same ministry. There were transparency issues in the selection of municipalities, bidding and contracting issues.
South Africa	In 1994, the country introduced the Reconstruction and Development Programme (RDP), and in 2004 introduced the Breaking New Ground (BNG) policy. After the BNG housing policy, the country shifted its policy towards the upgrading of informal settlements	RDP and BNG are site-and-services strategy Total redevelopment or in-situ upgrading	In total redevelopment whereby people must relocate, the social and economic networks broke because the new locations were far from urban opportunities In-situ upgrading, the Community Development Committee was established to develop a housing list, facilitate external professionals' entry, movement and exit, and attend meetings with the municipality and locals. Post-upgrade CDC's role changed to regulate land and house use, stop the building of poorly constructed extensions or new shacks in the settlement and impose rules to govern the safety of the settlement
Columbia	They established PRIMED. Its objectives were: strengthen planning, management and inter-institutional collaboration; promote community	Comprehensive upgrading strategy	The residents engaged in planning and implementation, and the transportation system enabled residents to travel to the city for work and access the services

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	participation and state-civil society partnerships; improve basic infrastructure, public services and public spaces; upgrade informal housing; secure land tenure for informal settlements; and mitigate geological risks on the mountainsides		The programme had a weak impact on employment, education and health. The jobs created were temporary, and the skills learned did not lead to employment
Brazil	The Rio-Cidade aims to revitalise public spaces' urban, architectural and functional aspects. The Favela-Bairro Programmes aims to upgrade the informal settlements with basic services and infrastructure and integrate them with the formal city	Comprehensive upgrading programme that aims to integrate the favelas with the formal city	They saw an improvement in the physical conditions, the value of land and properties increased, connectivity was enhanced, and a few residents were resettled, but there were almost no direct impact on education levels, health issues and income generation problems The lack of participation by the community in the Favela-Bairro programme posed some difficulties; this was due to the state of mistrust between the community and the government. The regularisation process had a counter effect as it encouraged people to form new informal settlements to benefit from the programme
Turkey	Legalisation starts when the application is made to the municipality where the informal is located, then a certified surveyor is appointed who prepares the required documents and sends them to the municipality, treasury, province and foundations administration to finalise the procedures. After failed attempts to legalise, they changed their approach to upgrading, as evidenced by TOKI (a non-profit organisation in the housing and urban sectors). The upgrading model is implemented in unplanned areas, occupied public lands, environmentally hazardous areas and historical areas.	First phase: evicts and demolish Second phase: legalisation. Third phase: total redevelopment of informal areas or relocating the residents to new homes in a different area.	Legalisation failed because legalised settlements were on the periphery of the cities, and over time, the urban expansion made it to the city centre. Thus, this encouraged residents to partner with private developers and sell their houses, then squat on other public lands and repeat the process. While upgrading started when the local authority applied the informal area to TOKI. They started with the feasibility and design of the project. Then, a commission was formed between the local authority and TOKI to determine the real estate value and the right holders. The area residents earned the right to a new house and were obligated to pay the difference within 15 years

4.2.5   DIFFERENT INTERVENTION STRATEGIES IN THE GLOBAL SOUTH

I.   EVICTION & DEMOLITION

It is based on evicting the inhabitants, clearing the settlement, and removing any informal structures. This strategy has two schemes: the hard scheme, when there are no compensation plans and inhabitants are perceived as criminals and the soft scheme, where the state prepares a resettlement plan or a form of compensation (Fegue, 2007).

II.   DIRECT PUBLIC HOUSING

From the 1950s to the 1970s, a common approach was public houses provided by the state, which assumed that informal development results from a deficiency of affordable housing (Fegue, 2007) or emerged as a compensation plan for evicted residents who have to be resettled in public houses. The problem is that governments tried to reduce the cost. They reverted to building housing in cheap locations on the peripheries far away from employment. In addition, they imported architectural models brought by the private sector, which were treated as 'solutions'. The model was not adapted to local features, while favouritism flourished and the economic interests of the low-income population were marginalised (Amado et al., 2016). Also, the relocation of residents disrupted the already established social and economic networks (Billig, 2010).

III.   INDIRECT PUBLIC HOUSING, SITE-AND-SERVICES & AIDED SELF-HELP

From the 1970s to the 1980s, sites-and-services were the approach to provide subdivided plots with secure tenure, basic infrastructure to the household and social facilities provided by the public sector. The resident could later incrementally build their house, and some programmes offered to build the core unit, allowing the dweller to expand later when they could afford it (Wekesa et al., 2011). The main objective was to provide an economically accessible framework for shelter and employment to informal inhabitants. Site-and-service components include land, public utilities, community facilities and land tenure security (Fegue, 2007).

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Aided self-help is a strategy derived from the work of John Turner and uses local products, materials and traditional techniques to build houses. It comprises two actions, the first is from the government or international agencies, and the second is from the effort of informal settlements inhabitants. The government or international agencies provide support in the form of a standard design, supervision, building instruction, financial support, and the provision of materials while inhabitants supply the labour. This strategy has many advantages, such as a greater sense of belonging and ownership that can render a greater sense of responsibility. In addition, the costs can keep low while the building process can be quick and on a larger scale. Moreover, the residents can familiarise themselves with the area while building their houses and develop social ties within the community. Indeed, residents are most aware of their needs, and building allows them to adapt their houses to their needs (Fegue, 2007).

The difference between sites-and-services and aided self-help is that the former is more concerned with land subdivision and planning by ensuring public facilities and infrastructure. The latter is concerned with building houses of acceptable standards (Fegue, 2007). The problem with these approaches echoes those of direct public housing. The location of the sites could be far away from employment opportunities or experience supply shortages (Wekesa et al., 2011). Besides the lack of skills and support for people, it creates conditions like those existing in informal settlements (Amado et al., 2016).

IV. REGULARISATION

Another approach is to regularise and secure tenure for residents. This approach is better for several reasons: there is no supply of land or financial resources to facilitate relocation, the presence of social networks deters residents from relocating, governmental obligations allow the urban poor access to housing, relocating could have environmental consequences, and ignoring informal settlements leads to the generation of rights for residents to stay (Fernandes, 2011). International organisations promote regularisation and tenure security because (1) integrating informal markets with the formal economy is a prerequisite for slum upgrading programmes, and (2) the social and economic integration of informal settlements requires the formal

recognition of a legal pluralism of tenure and the diversity of land markets (a prerequisite for sustainable development). It is achieved through formal land registration, the provision of individual property rights and giving the rights of occupancy, and giving preference to collective rather than individual interests (Durand-Lasserve, 2006).

However, regularisation programmes have affected the prices in informal markets. New informal settlements are forming, hoping to be legalised and can sometimes prompt gentrification if the settlement is in a centralised and valuable location, where private developers pressure people to sell. Legalised and regularised settlements still need to be upgraded to become urban and environmentally sustainable (Fernandes, 2011).

V. Upgrading

Upgrading is concerned with physical, social, economic and environmental improvements. It denotes the provision of basic services and infrastructure, regularising security of tenure, protection against environmental hazards and access to health care and education (Fegue, 2007). The government alone can undertake the upgrading or partner with community groups, local businesses and local authorities.

Upgrading has two approaches. First is total redevelopment, where some or all residents must be relocated temporarily or permanently. The new locations are usually worse and far from employment and urban opportunities, destroying the established social and economic networks. This approach is considered when the existing location poses health and safety risks (Amao, 2012). The second approach is in situ upgrading, which is the incremental improvement of the settlement's housing, infrastructure, tenure and basic services (del Mistro & Hensher, 2009). This approach has evolved to include the community in every phase of the upgrade (Amao, 2012). It involves the active participation of all stakeholders: residents whose primary concern is house improvement, tenure security and access to services, the principal engineer who is interested in public health and safety, the politician who cares about gathering more acceptance from the people and enhancing their social profile, the community-

builders to raise awareness, and the international funders who finance projects that enhance the quality of the life of the poor (Fegue, 2007).

In situ upgrading is the preferred strategy when upgrading informal settlements. The World Bank and NGOs apply it as a low-cost option. The upgrading begins with a transformation of the physical environment through residents' participation in the public sector. Initially, it started with the provision of basic infrastructure and regulation of tenure and later became more comprehensive by including economic, social, organisational and environmental upgrades (Amado et al., 2016). This approach has been the norm due to the failure of direct and indirect public housing programmes and low-cost alternatives to demolition and relocation. The upgrading approach seeks to help the urban poor by empowering them socially and economically and recognises that housing for the poor will always be constructed by them (Wekesa et al., 2011).

In situ upgrading programmes have three thematic approaches. First, the *provision* of physical *infrastructure* is an integral part of a sustainable human settlement and a core element of the upgrading process. It represents a progressive upgrade that starts with infrastructure, after which the government secures the tenure, and the process ends with the upgrade of houses. Second, *community action planning (Microplanning)* divides the project into stages – initiation, planning, design, implementation and maintenance – where planning is the most crucial stage for community and city involvement. Third, *physical transformation through a holistic plan (Plano Global)* is the most comprehensive, as it creates a relationship between the physical, social and economic aspects. This programme is based upon GIS in capturing data and generating a data management system that links physical layout plans with social and economic information on residents. It allows for a new and more appropriate planning process (Abbott, 2002b).

Upgrading an informal settlement can be initiated and fronted by government-led upgrading. It is very effective in improving housing conditions, infrastructure and services; Community-led upgrading is good at documenting and mapping informal

settlements in order to provide information for upgrading. In comparison, relocation and new build can be effective if it meets the requirement of dwellers, such as being close to the labour market and employment opportunities; NGO-led upgrading is the most effective approach, as NGOs work with the community and their organisations and with the local governments which helps to close the gap between them (Satterthwaite et al., 2018).

The essential objective of such upgrading programmes is that informal settlements become sustainable developments in every respect and integrate with the formal fabric of cities. So, the planning phase of projects should have these principles:

- Planning should be conducted from the ground up and reflect the flexibility of informal settlements as they keep changing.
- Community participation should be considered in every aspect.
- It should be an incremental process; and
- It should understand how the micro-level dynamics of the settlement are linked to the macro-political and economic forces in order to understand the settlement's growth (Van Horen, 2000).

Before upgrading, crucial elements must be considered: A complete analysis and understanding of the socio-economic context, community participation, and the need to complement a physical upgrade with social and economic programmes (Brown-Luthango et al., 2017).

4.3 FACTORS OF SUCCESS FOR INTERVENTION STRATEGIES IN THE GLOBAL SOUTH

Intervening in an informal settlement is a challenging task. The ultimate goal of any intervention strategy is a physical, social and economic integration with the formal city, improved quality of life, the elevation of living standards, and the control and management of the informal expansion. From experiences around the globe, upgrading an informal settlement needs to be a mix of top-down and bottom-up

approaches. Intervention strategies go through different stages, such as policy adjustments, preparation, implementation, and post-occupancy.

4.3.1 ADJUSTMENT TO POLICIES AND BUILDING REGULATIONS & STANDARDS

Adjustment starts from the top; the state must recognise informality as an alternative form of urban development (Bari, 2016) and integrate informal urbanisation with the formal urban process. It will lead to the formal recognition of informal settlements as a solution to the housing shortage (Chisholm, 2019). Also, the adaptation of housing regulations and standards should respond to residents' needs, aspirations and incomes by introducing flexible housing standards, accepting incremental building methods, accepting social-cultural land administration and customary land titling, co-operating between all stakeholders and ensuring the participation of local communities (Chitengi, 2015). Furthermore, it must introduce two different scales for intervention policies: (1) a nationwide policy and (2) a specification that each settlement has its tailored intervention strategy.

4.3.2 PRE-PLANNING STAGE

Several points are covered in this stage. First, decentralisation of settlement intervention decision-making prevents the interference of big political figures and institutions who are not residents. Second, a complete analysis of the built environment, including the settlement's socio-economic, socio-spatial, cultural and unique characteristics. Third, an understanding of the way of life and movement of people in and around the settlement and how this influenced the land-use distribution (Goodship, 2019). Fourth, ensure the availability of a sustainable source of funding that covers all stages of the project (Lungu, 2016). Fifth, clearly communicate with the community the intentions of the intervention in order to secure their participation at all stages of the intervention (Lungu, 2016). Finally, establishing an independent management programme, including representatives from the community and different stakeholders of the intervention project, is crucial during the project implementation and after its completion (Lungu, 2016).

4.3.3 PLANNING STAGE

After the completion of the settlement analysis, the planning stages should be conducted from the ground up and preserve as much of the settlement's flexibility and dynamism as possible by recognising the importance of the informal economy to the livelihoods of residents and avoiding imposing a formal spatial order (Nogueira, 2017). Also, it is vital to preserve the movement of the people in and around the settlement (Goodship, 2019), respect cultural rules and norms, and preserve the way of life as well as the social and economic networks.

4.4 DISCUSSION

The typologies of the informal settlements differ from one perspective to another. It could be based on location and the informal/formal condition (Davis, 2006), urban form (Chenal et al., 2016), the informal growth process and the spatial territory it occupies (Dovey & King, 2011), or characteristics and conditions of the settlements (Tsenkova, 2009). Therefore, there are four types of informal settlements: *squatter settlements* on public or private lands, *illegal subdivision* of suburban lands, *deterioration or change of use of formal housing* and *overcrowded, dilapidated housing in the city centres.*

Based on the discussion in Chapter 2, the globalisation and industrialisation of cities in the Global South made them attractive to individuals seeking better services and jobs. Also, a relational approach was the best for understanding the reasons for the non-spatial and spatial factors that influenced the development of informal settlements. There is a network of reasons behind the development of informal settlements. First is rapid urbanisation through natural increases and the attractiveness of cities to rural inhabitants who seek better employment, better social services, and better education, among other reasons. Rapid urbanisation created pressure on the housing sector with extra demand and a lack of affordable housing for rural migrants. At the same time, the private sector could not supply such housing because of the building regulations and standards, which would render any formal housing unaffordable to a large portion of the population. The unaffordability of formal housing

combined with the shortage of social housing, low incomes and increased poverty made informal settlements the only option for shelter.

The spontaneous growth of informal settlements and trying to fulfil their needs created unique, dynamic and constant adaptations to the situation. They emerge on any vacant land, whether in the city centres or on the periphery of cities and are usually close to employment opportunities with good access to transport. The urban fabric is organic or follows a grid of the old division of agricultural lands. Mixed-use, walkable, and high-density characterises such spaces which do not follow the regulations or rules of the formal city. Also, the residents depend on established social and economic networks to compensate for the lack of urban services and infrastructure, which became crucial in dealing with day-to-day needs.

The proliferation of informal settlements in low- and middle-income countries made it urgent to intervene. It ranges from the eviction and demolition of a settlement to its acceptance as the only option for affordable housing. In the pursuit of better living standards in informal settlements, there were several attempts to intervene. The history of interventions is divided into phases. They are (1) eviction and demolition, whereby public housing thought that increasing the housing stock would stop the growth of informal settlements, (2) site-and-services and aided self-help, regularisation and legalisation of the settlements, and (3) the current preferred method to upgrade settlements.

Upgrading is a complicated strategy due to the dynamic nature of the settlements and the multiple aspects that need development. There are different cases of upgrades in different countries with varying degrees of success. They differ from a single sector to multi-sectoral upgrading programmes. With the aim of any intervention is the sustainable development of informal settlements and their integration into the formal city. The interventions toward a single sector, like housing improvement, provision of infrastructure, or land-titling, do not live up to residents' expectations. To achieve a degree of success, the upgrades should be comprehensive toward the built

environment, socio-economic conditions and environmental conditions, for example, Favela-Barrio in Brazil, KENSUP in Kenya, and PRIMED in Columbia.

However, reviewing the literature on intervention strategies within different case studies, their level of success varies from one case to another. The common theme today is community participation in the upgrading process. However, this was not implemented successfully in different programmes like the Indonesian experience with the PNPM programme, whose main objective was to empower the poor and improve their quality of life. Participation was only sought at the early stages of the programme (Roitman, 2016). The same outcome was noted for the Kenyan experience in the KENSUP programme, where community participation was very weak in reality compared to what had been publicised (Anderson & Mwelu, 2013). Also, the Favela-Barrio programme lacked community participation because of mistrust between the community and the government. The lack of participation weakened the programme to satisfy the needs of inhabitants and affected the efficiency and the speed of implementation and long-term maintenance. However, the programme succeeded in treating the Favelas as unique areas that needed improvement and suffered from physical and social exclusion; also, they did not enforce formal city regulations. On the other hand, in the South African experience in eThekwini municipality, they let inhabitants elect a Community Development Committee (CDC); the CDC acted as middlemen between the inhabitants and the municipality. After the project, it remained and changed its role to monitor and regulate the settlement.

The main goal of intervening in informal settlements is sustainable development, preserving the way of life and residents' social and economic networks. The organisations and institutions responsible for the intervention should act as a facilitator and communicate with residents to understand and preserve the dynamics of the settlements. The intervention is not about formalising the informal but the sustainable upgrading and the physical and social integration with the formal city. However, most, if not all, upgrading projects are only concerned with the current situation of the settlements without taking into consideration the future growth of informal settlements where *informal* urbanisation has become the main mode of urbanisation and

accounts for more than half of all urban developments and the only option for af-fordable housing for low- and even middle-income city residents.

4.5 CONCLUSION

The review showed that the creation of informal settlements resulted from the rapid increase in population, increased opportunities and better quality of life in urban ar-eas, combined with the lack of and increasing demand for affordable housing. This problem is mainly in the global south's middle- and low-income countries. In other cases, it is home to refugees and internally displaced people by wars, natural disas-ters, etc.

The settlements have different typologies, which come with different physical, eco-nomic and social characteristics. The typologies of informal settlements are *squatter settlements*, *illegal subdivision of suburban lands*, d*eterioration or change of use of formal housing*, and *overcrowded, dilapidated housing in the city centres*. The char-acteristics differ from one country to another (Table 4.2). As shown in Figure 4.4, the general characteristics are found in most informal settlements around the globe. They are characterised as unplanned and overcrowded, with poor infrastructure and urban services. They developed near economically active areas for better access to employment. Also, their development is always incremental and adapts to their in-habitants' needs. The densely built environment creates environmental problems as-sociated with poor natural lighting and ventilation. On the other hand, they are areas of efficient land use, walkable, and efficient use of materials and resources through recycling and reusing.

Economically, the informal economy is crucial to inhabitants' survival and income generation. Also, they are not exclusive to the no- or low-income urban population but could house middle- and high-income inhabitants. However, the settlement is a form of dead capital because residents cannot access the credit system or loans. Whilst socially informal settlements house most of the labour force in low-and mid-dle-income countries, combined with poor urban services, this creates a high illiter-acy rate or poor educational levels. So, the people tried to compensate for these

deficiencies by creating self-organising, governing services that led to a well-established social network, a unique characteristic of informal settlements.

So, based on the relational approach, the built environment characteristics are all connected. The urban form is shaped according to the socio-economic characteristics of residents. The presence of strong social networks helps to attract new families as well as meet their day-to-day needs. Also, the informal economy is vital for income-generating activities where they alter the built environment. Plus, informal-formal relations are present, and social and economic reciprocity occurs between both. Consequently, the framework (Figure 4.5) was developed through an in-depth analysis of the different physical, social and economic characteristics. This framework represents the different relations between the characteristics.

Furthermore, the investigation showed that informal settlements are of poor quality but have the potential to be upgraded to elevate the standard of life. This is a reason for an urgent intervention to control the rapid growth of informal settlements and elevate the quality of life. Over time, different interventions have been implemented, which are: (1) eviction and demolition, (2) direct public housing, (3) indirect public housing, (4) site-and-services and aided self-help, (5) regularising and (6) upgrading. The leading strategy now is upgrading, as other types of intervention showed inadequacy. But the upgrading is still not flawless, as it showed there are successful projects, but no single case study showed it stopped the proliferation of informal settlements or the full integration of the settlement into the formal fabric of the city (Table 4.4).

In sum, upgrading must ensure the following: the recognition of informal urbanisation as a tool for providing affordable housing; the interventions are tailored for each settlement because the characteristics and conditions differ from one area to another; the main target of the intervention is the physical and social integration to the formal city; the recognition of the importance of the informal economy to the livelihood of inhabitants and the formal economy; the growth of the informal settlements; they should be supported and managed to allow future expansion; the preservation

of a way of life and social and economic networks; to avoid resettlement unless it is unavoidable because of health risks, and respect the cultural rules and norms because the rules in the informal settlements are set by it, unlike the formal city.
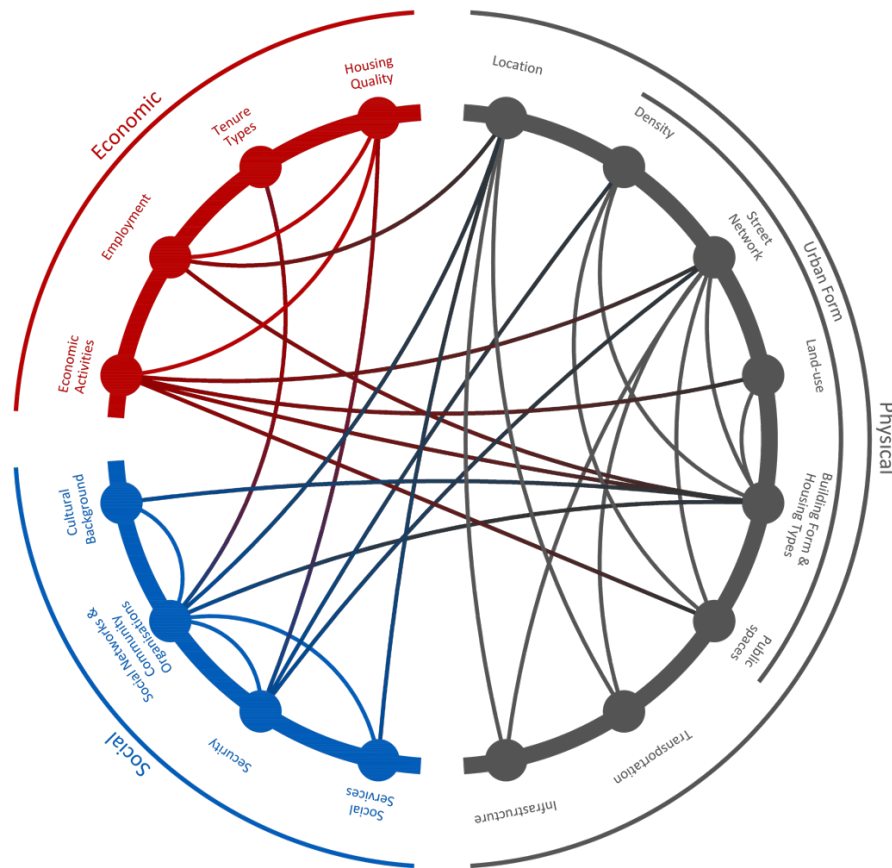
FIGURE 4.5: THE NETWORK OF RELATIONS BETWEEN DIFFERENT PHYSICAL, SOCIAL AND ECONOMIC CHARACTERISTICS

Chapter 5. CHARACTERISATION OF INFORMAL SETTLEMENTS: BELGRADE, SERBIA

5.1 INTRODUCTION

In the previous chapter, the focus was on informal settlements in cities of the Global South. It identified the causes of the emergence of informal settlements, typologies, characteristics and intervention strategies implemented in different cities. In this chapter, the focus shifted to Serbia, the context of the exploratory case study of Belgrade, Serbia. The review focused on the same categories as the Global scale. It started by matching the typologies of these settlements with those of the global context, understanding the causes behind the appearance of informal settlements, and identifying the physical, social and economic characteristics and different intervention strategies through various case studies.

Belgrade is the largest city and capital of Serbia and the territory of the former Yugoslavia. It reached a population of 1.6 million, or 22.5% of the country's population (Mitrovic & Antonic, 2013), with 43% of its total residential areas living in informal areas (Radulović et al., 2013). Due to urbanisation and industrialisation, Belgrade proliferated between 1945 and the 1990s. Rapid urbanisation resulted in informal growth as the dominant form of city development. Informality in Belgrade ranged from the extra-legal and informal extension of formal buildings, illegally constructed houses for the wealthy, and squatter settlements amongst the ethnic minority of the Romanipen. It demonstrates diversity in size, urban structure, the quality of buildings and the socio-economic structure of settlements.

5.2 THE DIFFERENT TYPOLOGIES

Since the 1990s, informal development has dominated the urban expansion of the city of Belgrade (Radulović et al., 2013). Nevertheless, the country does not have an official categorisation for its informal settlements. According to the literature and the experts in the country, they have two general typologies: illegal construction on

agricultural lands on the periphery of the city and Roma settlements – named after its residents. The two typologies show different characteristics physically, economically and socially.

5.2.1 SQUATTER SETTLEMENTS ON PRIVATE OR PUBLIC LANDS

Squatter settlements in Serbia are also called Roma Settlements and are occupied mainly by the European minority of Romanipen ethnicity. According to Grbić and Nikezić (2017), Roma communities inhabit 262 settlements. The majority are on the periphery of Belgrade, with few settlements in the city. The Roma settlements usually occupy public lands not planned for residential use or hazardous sites, such as the Lazari and Okretnica 75 settlements. According to Housing Centre – an NGO in Belgrade – they occupy an area under high-voltage electric lines, and there are also plans for new major roads in the location of the settlements.

Grbić and Nikezić (2017) have classified the Roma settlements into three categories. First, *slums* – sometimes referred to as Karton Siti – are usually far from the city centre and hidden in abandoned areas close to communal and industrial areas. The slum residences are in very poor condition, with houses made of makeshift materials and no infrastructure (Figures 5.1 & 5.2), while the main economic activity is the collection of secondary raw materials. Second, *insanitary settlements* usually occupy non-built areas with no planning documentation. The houses are of decent build quality, made from permanent materials and located on the city periphery, with a somewhat regular borderline to connect to the city's urban fabric. The residents have diverse economic activities, ranging from the collection of secondary materials to low-income jobs and temporary jobs in western European countries. Finally, the *transformed planned settlements* started as planned settlements on the city periphery but informally expanded because the formal houses were not designed for the needs of the Romani, so they were extended and modified illegally. The inhabitants have the same economic activity as the residents of insanitary settlements.

FIGURE 5.1: VUKA VRČEVIĆA SETTLEMENT NEAR DANUBE RIVER, AN EXAMPLE OF KARTON SITI

FIGURE 5.2: VUKA VRČEVIĆA SETTLEMENT NEAR DANUBE RIVER, AN EXAMPLE OF KARTON SITI

5.2.2 ILLEGAL SUBURBAN LAND SUBDIVISION ON LEGALLY OWNED LANDS

They are settlements built on former agricultural lands, subdivided and built as de-tached houses. There are good-quality buildings and three- or four-storey buildings with large floor areas. The buildings are strong and reliable, but the infrastructure is not constant within the settlements, with some connected to power and water. They are self-built with help provided by friends and relatives. They are housed by refu-gees, IDPs, or migrants from former Yugoslavia territories (Pihler, 2007). From 1993 to 2020, it is estimated that the Belgrade Metropolitan Area lost around 53,000 ha of agricultural land (Zeković et al., 2015). A well-known example of this typology is the

Kaludjerica Settlement on the southeastern periphery of Belgrade (Figure 5.3). It is the oldest and largest informal settlement in Europe (Radulović et al., 2013).

FIGURE 5.3: THE LOCATION OF ILLEGAL SETTLEMENTS AROUND BELGRADE (GOOGLE EARTH, 2019)

5.3 CAUSES OF INFORMAL SETTLEMENTS

5.3.1 RAPID URBANISATION

With the rise of capitalism, rapid urbanisation was key to the proliferation of informal settlements because the population of Belgrade tripled over 23 years. Thus, the urbanisation process became out of control due in part to the underdeveloped state of the country that occurred during WWI. It meant that between WWI and WWII, half of the urban population in major Serbian cities lived in slums and informal settlements (Antonić & Djukić, 2018). Also, during the 1990s, the country had to accommodate a large number of immigrants from Croatia, Bosnia & Herzegovina and Kosovo (Zeković et al., 2015).

5.3.2 POLITICAL & ECONOMIC CHANGES

The country has undergone several political and economic changes, accompanied by changes in the legal framework, housing policies and privatisation. During the inter-war period, the division and enrichment of housing models continued to develop near industrialised areas and major urban centres. Two main types emerged during this period, centrally located multi-story apartment buildings and the transformation of areas around the city centre into residential areas with huge plots following the garden city movement. It created a housing crisis which led to the development of illegal housing and informal settlements and meant that about half of the population lived in illegal settlements before WWII (Antonic, 2016).

In 1948, the country adopted the self-management socialist model (Kušić & Blagojević, 2013). It incorporated some elements of the market economy, decentralised at all levels, and opened to the West. However, the state faced a housing problem created by the severe damage incurred during the war, when 75% of the population lived in overpopulated and underdeveloped rural areas. The state assisted the fast urbanisation process, further worsening the housing problem. Later, the housing policy was decentralised in the 1960s and based on a model of apartments with tenant rights; this left the state with some control. The country could not keep up with the high demand for housing. Thus, illegal settlements continued to develop on the periphery of the main cities, on lands planned for another use (Antonic, 2016).

In the 1970s, state policies focused on concentrating and centralising industries, businesses, administration, and other activities. However, the pressure on housing increased with a great number of labourers looking for accommodation. By the 1990s and at the start of a transition towards a global economy, there were economic crises and high poverty, which directed the market toward private ownership and the establishment of a real estate market. At the same time, the public sector stopped the supply of houses, which created a decline in the number of dwellings built per year. So, the housing market was privatised, and prices continued to increase. At the same time, the high unemployment rate made informal settlements the only option for most citizens and new migrants to the city (Mitrovic & Antonic, 2013). The post-

industrialisation and capitalist era brought a new type of illegal construction; multi-family, illegal constructions in inner-city locations and the reconstruction of former legal buildings (Antonić & Djukić, 2018).

5.3.3 URBAN POLICIES

The master planning of Belgrade has gone through many changes. The Belgrade Master Plan in 1972 was shaped by socialist power to modernise and follow current global trends, specifically with the idea of 'a city within a sea of greenery'. This plan neglected informal settlements that already existed, and this neglect continued in the Master Plan of 1985 despite their continued growth. The 1985 plan acknowledged the outskirts of the city as a location for mid- to high-density satellite settlements.

In 2003, The Belgrade Master Plan 2021 aimed to create a more dynamic environment to support the existing situation. One of its aims was to move towards the regulation, legalisation and integration of the informal settlements on the city outskirts. Nevertheless, the representation of informal settlements in the master plan was inaccurate due to a lack of information. The interest in regularising informal settlements on the outskirts is being undertaken by introducing commercial and industrial areas and decreasing the agricultural zone. In 2016, they updated the master plan to show a more realistic situation of the informal areas and introduced 'legalisation through regulatory plans' (Mitrović et al., 2018).

5.4 EXPLORING INFORMAL SETTLEMENTS CHARACTERISTICS

5.4.1 PHYSICAL

Illegal and Roma settlements in Serbia have been built incrementally and spontaneously by following the need for housing. Illegal settlements were built on agricultural lands on the city periphery, where inhabitants owned plots or bought them informally. They were irregularly formed, with narrow streets and followed the previous agricultural parcels' borders. The infrastructure ranged between poor and basic, depending on the settlement location and the availability/lack of basic infrastructure and urban services (Radulović et al., 2013). According to one local in Kaludjerica

settlement, the houses built tried to maximise the use of the whole plot area while leaving a small portion which later resulted in narrow, unpaved streets. She added that the houses had numbers and addresses and had informal connections to electricity and water. Whilst the availability of some communal facilities and connection to public transportation were inadequate. Meili (2012) stated that these settlements are sometimes referred to as dormitory settlements or parasitic cities. They lack public spaces, facilities or commercial services and depend on the city for everything. Furthermore, the houses are mainly single-family residences that accommodate the core family and can sometimes accommodate the future generations of the family.

Like illegal settlements, they lack infrastructure and urban services and facilities. The houses in Roma settlements range in quality. They could be temporary houses built from wooden beams and planks with only 15 square meters of area and a maximum of 1.8 meters tall because of the limitations of the material. The houses expanded incrementally when the needs of the family arose. On the other hand, some houses were built of permanent materials with the usual construction techniques. They could be more than one floor, but the outside was often incomplete. Also, they were incrementally expanded as the family grew (Grbic, 2015). They were classified into slums, insanitary settlements and transformed planned settlements, with the main difference being the quality of the houses.

5.4.2 SOCIO-ECONOMIC

The socio-economic status of the informal settlers differed from one area to another. They were urban poor, rural-urban migrants, refugees or urban rich who built their dream homes without the restrictions of building regulations and standards. Meili (2012) stated that the social stratum spectrum of informal settlements was broad and similar to legal housing. *"The duality of globalization is easily visible at most of the informal settlements of the Belgrade."* (Radulović et al., 2013, p. 11). Squatter settlements of Roma communities hold the lowest status because the economic and political systems did not contribute in any way to improving their lives. Also, the education levels and illiteracy rates are very high due to a lack of urban services and a high unemployment rate because of poor education and skills development

programmes. Their economic activity is mainly on recycling and the reuse of garbage dumps (Šabić et al., 2013).

> *"According to a 2007 living standards measurement study, their unemployment rate was 32 per cent compared to the general unemployment rate of 14 per cent. Romani are 7.5 times more at risk of poverty than the general population and their life expectancy is 48 years compared to a general average of 72 years"* (Vuksanović-Macura, 2012, p. 687).

5.4.3 SPATIALLY

Informal settlements in Serbia suffer from spatial exclusion from urban areas, especially the squatter settlements of Roma communities. They are excluded from maps and documents and hidden from the eyes of city visitors (Šabić et al., 2013); years of marginalisation have caused this situation. The Roma designed the spaces based on their everyday needs. Their familial pattern tended towards a collective lifestyle to protect and secure themselves. This pattern was reflected in the groupings of five to seven houses surrounding a courtyard (Figure 5.4).
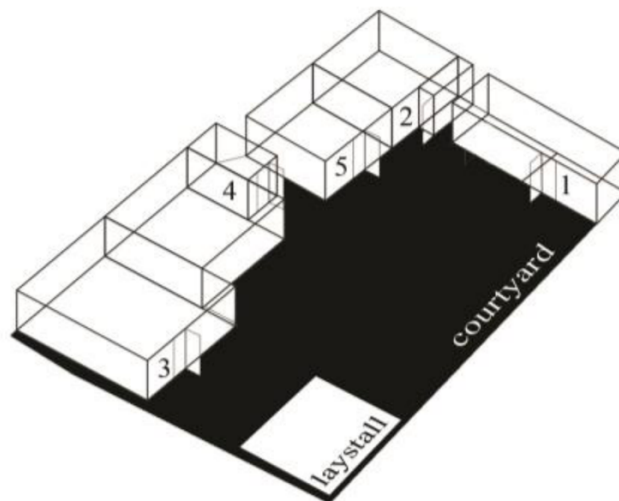
FIGURE 5.4: SCHEMATIC VIEW OF THE DISTRIBUTION OF HOUSES AROUND A COURTYARD (GRBIC, 2015)

> *"This specific socio-cultural micro ambience showcases the most visible characteristics of Romanipen which make possible the mutual support in fighting everyday challenges, such as taking care of the young children, collecting secondary resources or sharing knowledge and skills regarding building and fixing homes"* (Grbic, 2015, p. 67).

5.5 Case Studies for Intervention Strategies

5.5.1 Jatagan-mala

Jatagan-Mala is a squatter settlement in Belgrade that emerged in 1919 after WWI. Residents built the settlement on municipal land in the valley of a stream; within two months of the first house being built, the settlement had 70 houses, and after a year, it had 150. The houses were made of timber and boards, and the residents divided the land and created the streets by themselves. By 1924, it became a home for 1,900 inhabitants living in 490 houses. The inhabitants were all citizens of Yugoslavia but from different ethnicities; they had the same rights as those living in legal settlements. Despite the illegality of the settlement, the inhabitants used to pay property taxes. Socio-economically, the people were from different professions *"ranging from servants and musicians to railroad workers, coachmen, workers, day laborers, and the widest variety of craftsmen and people of other profession, and there was also a court recorder"* (Vuksanović-Macura & Macura, 2018, 762). The income rates were too low to pay for an apartment in the city; thus, Jatagn-Mala became the only option for housing (Vuksanović-Macura & Macura, 2018).

Konstantinovic – a physician and specialist in social medicine – recommended the eviction and demolition of the settlement, but residents opposed this because, without any help, they had solved their housing problem. The inhabitants had no faith in that the municipality would provide alternative housing, so they started taking care of the settlement by themselves to elevate their quality of life by solving problems related to hygiene and the built environment. They issued a local newspaper, formed an association to communicate with the municipality to provide basic infrastructure and hired an architect to develop regulations for the settlement (Vuksanović-Macura & Macura, 2018).

In 1924, a new General Regulation Plan for Belgrade showed the expansion of a hospital complex and the faculty of medicine and the construction of a faculty of veterinary sciences in the area occupied by the settlement. In 1931, the gradual demolition of the settlement started with the removal of 60 houses, which were razed to build

a boulevard and sewage collector; another 165 houses followed this in 1938. The municipality compensated inhabitants with money, but the money at the time was too little for residents to afford to build a house, let alone buy the land (Vuksanović-Macura & Macura, 2018).

The settlement went through two phases. First, the 1920s was marked by its development as the number of residents grew and housing and services improved. Residents' social cohesion marked this phase as an internal development factor. The second phase, in the 1930s, saw the municipality's gradual removal and relocation of residents. Social cohesion decreased, which led to its complete removal by the end of the 1960s and the building of a highway in the early 1970s. The people were relocated to a new settlement called Ledine, on the outskirts of Belgrade (Vuksanović-Macura & Macura, 2018).

5.5.2 GAZELA

Gazela was a slum called 'Karton Sitis'; it was inhabited by the Roma community, who were usually located close to large developments. Gazela was located under Corridor 10, an important hub of global container traffic. Roma, who settled there for their livelihood, depended on the management, disposal and recycling of urban waste. The residents were evicted and relocated to adapted shipping containers. The containers used to be temporary accommodations for labour working in agriculture and construction industries that depended on seasonal labour (Kilibarda, 2011).

The residents tried to resist relocating from the urban centre to the semi-rural areas. The containers were small in size, lacked facilities, with irregular access to food and high-cost transportation. In addition, leakage occurred in most units, along with loose electric wiring, while neighbours were hostile, and the municipality failed to provide new jobs. Furthermore, the site was far from schools and hospitals, and durable goods were destroyed during the relocation (Kilibarda, 2011).

5.5.3 MALI LESKOVAC

Mali Leskovac is a Roma Settlement in Palilula municipality east of Belgrade (Figure 5.5). The Romani community, who are the majority, live there, having migrated from Southern Serbia from Leskovac city; hence, the name's translation is little Leskovac. The settlement developed spontaneously on a hill, with no plans for future development. It is reflected in the organic urban (Figure 5.6) arrangement that follows the hilly nature of the land's topography. Besides being neglected land, the people choose the area for its natural extension of Belgrade and connection to public transport. The presence of a bus stop is observed near the entrance of the settlement.

FIGURE 5.5: MALI LESKOVAC LOCATION ON THE PERIPHERY OF BELGRADE (GOOGLE EARTH, 2019)

FIGURE 5.6: MALI LESKOVAC SETTLEMENT, SHOWING THE ONLY ENTRANCE (GREEN ARROW) FOR THE SETTLEMENT AND THE SLUM AREA (RED AREA) (GOOGLE EARTH, 2019)

The settlement comprises single-family houses that vary in quality. Overlooking the main street, the first row of houses is of good quality, like the formal houses, because they are the oldest (Figure 5.7). While the newer houses uphill are of lesser quality, with the residences made of makeshift materials like in the slums (Figure 5.8). This settlement was divided into illegal housing and slums (Figure 5.6).

The settlement has only one main street being the only access point, which then branches out into narrow one-car wide streets, some of which are lit. (Figures 5.8 & 5.9). Also, some streets uphill are lined with waste due to the absence of formal or informal waste disposal services (Figure 5.10). The whole built-up area is residential, with no other uses present. The community give the houses their addresses and numbers. According to the local guide, the area has no formal infrastructure except for the houses on the main formal street, which sell their electricity informally to other houses over the hill. Residents mainly engage in informal work, ranging from low-paid jobs to recycling and reusing materials. But as observed, the houses closer to the

FIGURE 5.7: THE HOUSES ARE TWO- TO THREE-STORY SINGLE-FAMILY HOUSES

FIGURE 5.8: UNPAVED ROAD, INCOMPLETE HOUSES AND THE USE OF MAKESHIFT MATERIALS

FIGURE 5.9: NARROW STREETS THAT CAN BARELY FIT ONE CAR

FIGURE 5.10: WASTE IS THROWN ON THE SIDE OF THE STREETS

main streets are built incrementally and of better quality, with some of them having painted facades. Also, the illegal houses – like the single-family formal housing (Figure 5.7) – and in contrast to the uphill lower quality houses reflect the diverse socio-economic status of the residents (Figure 5.8).

TABLE 5.1: SUMMARY OF BELGRADE'S CHARACTERISTICS

Typologies	Characteristics		
	Physical	Socio-economic	Spatial
Squatter Settlement on private or public lands	- Incremental and spontaneous building process - Lack of infrastructure - Range from makeshift poor to good-quality houses - Transportation depends on the location	- Mainly occupied by Roma ethnicity - Recycling waste materials - Lack of services - High literacy - High unemployment - Poor educational level	- Spatial exclusion from urban areas - Design the spaces based on their needs - Pattern of the family highly influences the house design - Grouping of five to seven houses surrounding a courtyard
Illegal Suburban Land Subdivision on legally owned lands	- Incremental and spontaneous building process - Built on agricultural lands - Urban form follows former parcels' borders - Poor to basic Infrastructure - Poor transportation - No public spaces - Single-family houses	- Land owned by the residents - Lack of services - Wide spectrum of socio-economic status - Rural migrants	- Spatial exclusion from urban areas - Design the spaces based on their needs

5.6 DIFFERENT INTERVENTION STRATEGIES IN SERBIA

5.6.1 EVICTION AND DEMOLITION

In Serbia, the main intervention used is the eviction and demolition of squatter settlements and their relocation to areas on the periphery of cities. The relocation creates many problems for inhabitants in terms of lost social and economic networks, which is why this strategy is the least favoured. Relocated sites are typically far from employment and sometimes services; in the case of the Gazela settlement, it violates human rights (Kilibarda, 2011). Conclusions from experts in the field dealing with informal – and especially Roma – settlements state they do not have a legal status for the land; thus, municipalities choose to evict the people.

5.6.2   LEGALISATION

The other strategy implemented in Serbia is the legalisation of settlements, but this strategy is exclusive to illegal settlements based on good-quality buildings. Legalisation in Serbia appeared in the 1990s by enacting three laws to legalise illegal construction, but they all failed (Zeković et al., 2015). These laws were updated over time to ease the requirements to legalise. Even so, illegal residents do not want to go through the hassle associated with legalisation because it is a complicated and expensive process, and there are no consequences for the illegal status of the buildings. In November 2015, the law of Legitimation of Buildings came into action, the main goal of which is to legalise as many buildings as possible and impose preventive actions to stop the emergence of illegal settlements (Davinic, 2016).

The law created a list of illegal buildings, while buildings with no previous request to legalise will receive a decision to demolish. The owner and the authority for the legitimisation of buildings receive notice to start the structure's legalisation procedure. The law works outside the power of owners (Davinic, 2016). The problem with the legalisation process in Serbia, and especially Belgrade, is that there are disputes on the ownership of the land due to illegal subdivision and an informal real estate market between people outside any formal arrangement.

5.6.3   GIS SYSTEM & PROVISION OF INFRASTRUCTURE

In recent years, the government of Serbia has implemented a GIS system to create a database for informal settlements. The system started with an enumeration of informal settlements all over the country. It is used to understand the housing, infrastructure, ownership of the lands and demographic data for each settlement. The system is used as a first stage to prepare urban plans for the settlements. From this, it is possible to determine the best place to start, whether legalise the houses or prepare an urban re-arrangement plan to introduce the communal infrastructure (Živković, 2016).

5.7   CONCLUSION

In Belgrade, informal urbanisation became dominant from the 1990s onwards. Informal settlements result from rapid urbanisation, political and economic changes and urban policies. According to the typologies discussed in chapter 4, in-formal settlements can be classed under two types, an illegal subdivision of suburban land and squatter settlements on public lands. The characteristics of the two types are different. A good quality building with inconsistent connection to utilities and lacks public services characterises the illegal suburban land subdivision. It is usually home to middle- and high-income groups of people. They built single-family houses that can be home for future generations. Whilst squatter settlements Grbić and Nikezić (2017) divide them into three classes: slums, unsanitary settlements, and transformed planned settlements, and are usually home to the Roma community. First, slums are the poorest of them all. They are made of makeshift materials, with no services and infrastructure, and are inhabited by low-income people who are unskilled and poorly educated. Second, unsanitary settlements have better quality buildings with permanent materials but still have poor infrastructure. Lastly, transformed settlements which are initially planned but expanded informally because they did not meet the needs of the community.

Informal settlement characteristics in Belgrade are similar to informal settlements globally. They are incrementally and spontaneously built, with poor infrastructure connections and a lack of public facilities. The urban form is dense, which leads to compactness. However, the houses are of the single-family type with small private green spaces. Another aspect similar to informal settlements in the Global South is that they occupy neglected lands inside the city or on the periphery. Socio-economically, they have a wide spectrum of people groups, from literate poor residents to highly educated rich residents.

Moving on to intervention strategies, there are two main strategies implemented eviction and demolition and legalisation. The preferred method for squatter settlements is the eviction of people to poor-quality areas on the city's periphery, which

proved its failure due to many aspects. The other strategy for illegal construction has been to enact laws that allow people to legalise buildings but with no form of area upgrading in terms of infrastructure, public services and public spaces. It legalises the structure, although most residents do not undertake the process because it is long and expensive. Recently, the country implemented a GIS system to build a database for the status of each informal settlement. The system is used to determine whether to start with the legalisation of houses or design a re-arrangement plan for the provision of infrastructure.

According to the relational approach, Belgrade's informal settlements emerged due to non-spatial and spatial reasons. Rapid urbanisation coupled with a lack of affordable housing, privatisation and state of war, as well as neglecting informal settlements until recently, are all interconnected causes behind the proliferation of informal settlements. Moving on to informal settlement characteristics, the built environment is shaped based on the relations between socio-economic and physical characteristics. Also, the resident's dependence on formal areas to access social services and employment further proves the presence of informal-formal relations. All leads that the relationships between the characteristics present in the Characterisation of Informal Settlements Framework (CISF) (Figure 4.5) are present in Belgrade. In the next chapter, the study goes into more detail about the two cases of Greater Cairo. The study will investigate two informal settlements, thus, testing and adapting the CISF.

Chapter 6.   CHARACTERISATION OF INFORMAL SETTLE-

MENTS: EGYPT

6.1   INTRODUCTION

Ashwa'yat is the name of the informal areas in Egypt, an Arabic word that means random or disordered. In 2016, 48% of the population lived in informal settlements (3 of the 30 mega slums in the world are in Egypt) (Nassar & Elsayed, 2017), which is around 15.5 million inhabitants (Hegazy, 2016). Greater Cairo's population reached over 20 million inhabitants (approximately 20% of the country's total population) (United Nations, Department of Economics and Social Affairs, 2018), with 65% of its population housed in informal settlements (Magdi, 2018). While Alexandria, the second-largest city in Egypt, houses 5 million residents (United Nations, Department of Economics and Social Affairs, 2018), a third of them live in informal settlements. Thus, the housing market is divided into two. The formal market supplies luxurious and gated communities for upper- and upper-middle-income groups, and the informal market supplies for low- and middle-income groups (Khalil, 2012).

The morphology of informal settlements is based on three phases. First, the *settlement phase* started in the 1960s with the youth migrating from rural areas who contributed by building their dwelling; this phase had no physical structure. Second, the *proliferation phase* occurred after the socio-economic conditions improved, when residents brought their families and relatives to help them find jobs and build their dwellings. Third, the *familiarisation phase* starts when new settlers bring their families; the development of physical structure takes shape during this phase according to the social relations between groups and their strengths. The inhabitants' needs, interactions, and correlation define the streets. They develop the social relations and networks of the urban fabric (Eldefrawi, 2013).

According to the global categorisation of informal settlements, Egypt has three main typologies. They are *illegal suburban land subdivisions on legally owned lands*, *squatter settlements on private or public lands*, and *overcrowded, dilapidated housing in*

the city centre. In Cairo, there is an additional unique typology, *Cemeteries or Cities of the Dead*.

6.2 CHARACTERISATION OF INFORMAL SETTLEMENTS

6.2.1 THE DIFFERENT TYPOLOGIES

The development of informal settlements started in the 1950s. They are found in different locations in and around big cities like Cairo (Figure 6.1), Giza and Alexandria. Based on conditions and location, there are four typologies of informal settlements in Egypt: *Illegal Suburban Land Subdivision, Squatter Settlements, Deterioration or Change of Use of Formal Housing* and *Cemeteries or City of the Dead*.
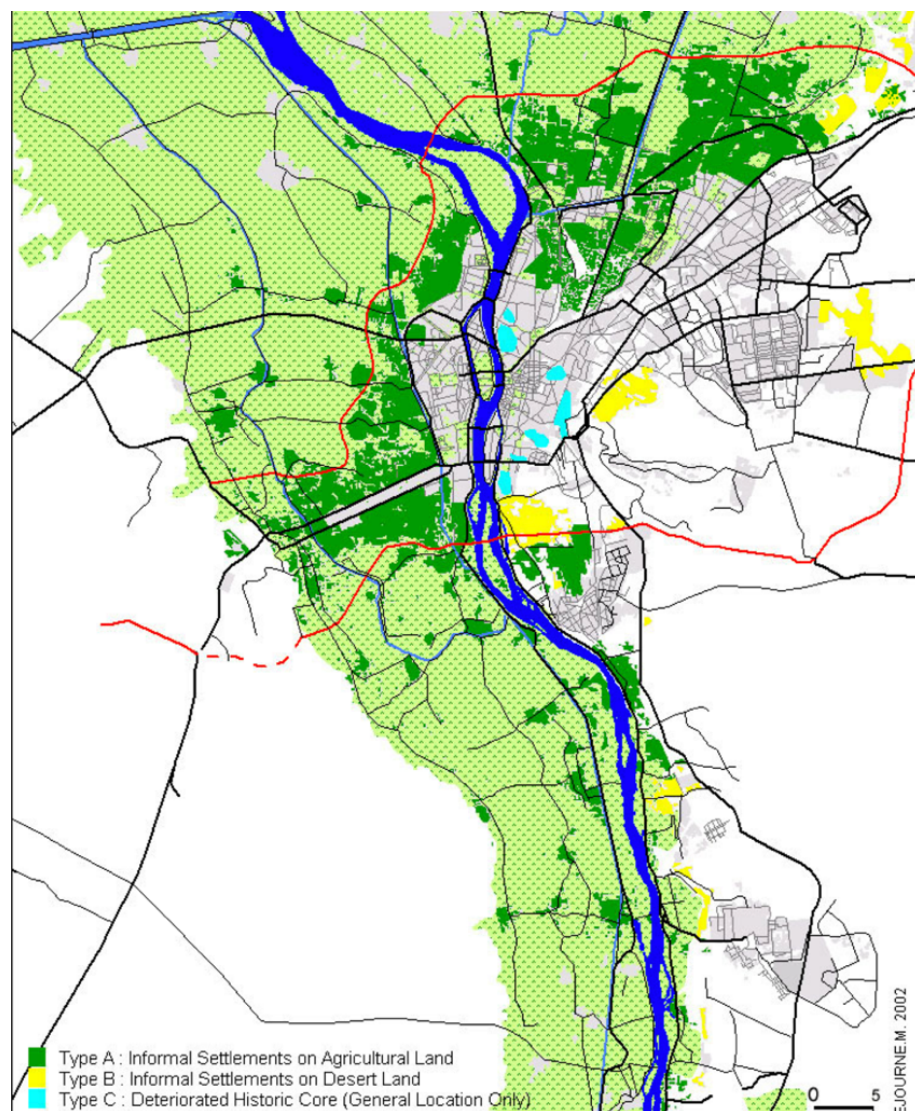
FIGURE 6.1: MAP OF GREATER CAIRO SHOWING THE DISTRIBUTION OF THE THREE MAIN TYPOLOGIES (SIMS ET AL., 2003). IT SHOWS THAT SQUATTER SETTLEMENTS DEVELOPED NEAR THE CITY CENTRE AND THE EASTERN PERIPHERY OF CAIRO, WHILE ILLEGAL SUBDIVISION ON AGRICULTURAL LAND CONCENTRATED ON THE WESTERN AND NORTHERN PERIPHERY

I. Illegal Suburban Land Subdivision on legally owned lands

It occurs on the urban fringe. This growth has consumed a sixth of the country's agricultural lands. Boulaq Al-Dakrour and Al-Waraq (Figure 6.2) are examples of this typology and used to be agricultural land that sold and built houses. The streets are long, narrow and straight; the pattern results from following the old pattern of drainage canals (Séjourné et al., 2009). This typology has good building quality, with three to five stories of cement structures and access to most services. They represent 80% of all informal urbanisation. The growth happens mostly on agricultural lands as large families seek private agricultural land to build for investment (commonly as savings from working in oil-rich countries). It is a better option for those who can afford it for several reasons. It is easy to be illegally connected to any public network (especially a water connection as it already exists), easy to access, suitable to develop in a place nearby the city centre, activities or industrial places, and low-cost transportation like microbuses or metro. Also, much of the desert land is sold to private investors to develop new cities and gated communities (Khalifa, 2011).

II. Squatter Settlements on public lands

Squatter settlements represent an alternative for those who cannot afford agricultural land. They build on deserted state-owned lands or buy them illegally from local brokers. The initial nucleus is usually formal and then expands informally. This type has a range of building qualities ranging from one-storey poor material buildings to six to eight storeys of high-quality reinforced concrete. Most have electricity, but water and sanitation vary from one area to another. It represents 15% of informal urbanisation (Khalifa, 2011). Typical examples are Ezbat El-Haggana and Manshiet Nasser (Figure 6.2). Soldiers and their families established the former, and the latter is known for housing the Zabaleen Community (Séjourné et al., 2009).

III. Deterioration or change of use of formal housing

This typology is used to denote formal houses like old historical districts (Figure 6.2), public housing, units under rent control, or the addition of unlicensed extra floors or

huts on top of formal buildings. These huts are called 'roof-toppers' and account for around 700,000 inhabitants in Cairo and Alexandria (Soliman, 2007).

IV. CEMETERIES OR CITIES OF THE DEAD

This typology is unique in Cairo. It is a typical form of the grave; an open courtyard with an underground chamber to bury the dead and a room that overlooks the yard for a guard to live in and take care of the grave. They have electricity and water, but social services are entirely absent. The employed guard takes care of the grave and, over time, brings their family, has children and grandchildren. It is the destination for the poorest immigrants (Khalifa, 2011). This typology is found in the large cemetery at the foot of Manshiet Nasser, where mausoleums have been there for hundreds of years (Figure 6.2) (Séjourné et al., 2009).

FIGURE 6.2: FROM TOP LEFT TO BOTTOM RIGHT: AL WARAQ IS AN ILLEGALLY SUBDIVIDED AND BUILT AGRICULTURAL LAND, MANSHIET NASSER IS A SQUATTER SETTLEMENT ON PUBLIC LAND, AL DARB AL AHMAR IS AN EXAMPLE OF OVERCROWDED, DILAPIDATED HOUSING IN THE CITY CENTER & CITY OF THE DEAD IS A UNIQUE TYPOLOGY FOUND IN CAIRO ONLY (GOOGLE EARTH, 2018).

6.2.2 CAUSES OF INFORMAL SETTLEMENTS

The emerging informal settlements started in the 1950s and now house almost half the population. There are several reasons for their emergence: the rapidly increasing rate of the population and urbanisation, changes to the economic and political scene, urban policies, and state failure to contain and intervene.

I. POPULATION GROWTH

During the last century, the population increased tenfold and, specifically, in Cairo, increased 30 times because of natural increases and rural-urban migration (El-Batran & Arandel, 1998). This increase created a massive load on the housing market, becoming unaffordable to most of the population.

II. POLITICAL AND ECONOMIC CHANGES

In 1952, the Nasser socialist government issued different laws to increase social justice. It started by controlling the rent of houses built before 1944; these laws gave residents rights over their rented units and limited the owners' power. The market shifted from rental to owner-occupied, which led to the deterioration of the rental units as the owners did not want to invest in maintenance. Besides, the industrialisation shift during the 1960s created employment opportunities around the cities, which increased rural-urban migration and, finally, the construction of low-cost public houses on the outskirts of Cairo (Khalifa, 2015). From 1967 to 1973, investment in public housing dropped sharply because of the state of war. Cairo and Alexandria had to accommodate over 1.5 million people evacuated from Suez Canal cities (Soliman, 2007), and all private sectors were mainly aimed at high-income people. After 1973, the Sadat policy of Open-Door Economy changed the economy from a state-controlled to a liberal market where the private sector only supplied for the middle- and upper-income classes and the public sector provided for the low-income. The government did not change the controlled rent laws, and the supply they built was not for rent, so those seeking affordable housing had to head to informal settlements (Khalifa, 2015).

III. URBAN POLICIES

In 1965, the government created industrial poles (Helwan, Shubra Al-Kheima and Imbaba) but only increased the attractiveness of Greater Cairo and helped its growth. In 1970, to keep up with increasing demand, a masterplan was proposed to limit the growth of Greater Cairo by the ring road, restrict the physical expansion, contain the city, and allow new satellite towns to absorb the population (El-Batran & Arandel, 1998). New towns are divided into two categories: independent new towns to be self-sufficient communities and satellite new towns located near large urban centres to provide housing and stay dependent on Greater Cairo (Arandel & El-Batran, 1997). The new towns are a southern industrial extension of Helwan, 6th of October, Badr, El-Obour and a west bank project that was cancelled. After the cancellation, more distant towns were added to the Delta and the east, namely Sadat City and 10th of Ramadan.

In the 1980s, most of the investment was in new cities, and housing provision was based on site-and-services or self-help concepts, which were unaffordable for the low-income group. By 1981, the government launched the 1983 master plan. The plan had four objectives. First, it aimed to meet the needs of population growth. Second, it stipulated the protection of agricultural land by developing ten new settlements on eastern and western desert lands (Figure 6.3). Third, it included reorganising older built-up areas to reduce central Cairo's concentration of people and services. Fourth, the plan outlined upgrading infrastructure and facilities by introducing the ring road and new metro (Sutton & Fahmi, 2001). All these plans failed for several reasons, which are:

> *"[the] lack of appropriate public transport facilities; the lack of a sound urban economic base; the scattered morphology of the urban environment; the functional segregation of land uses and the mono-functionality of neighbourhoods; high land and house prices; and insufficient incentives for the population to move into these new locations"* (Acioly Jr, 2000, pp. 130-131).

In 1996, the government initiated the Mubarak Youth Housing, which aimed to build 70,000 affordable units; although it succeeded, the supply was much lower than the demand (Khalifa, 2015).
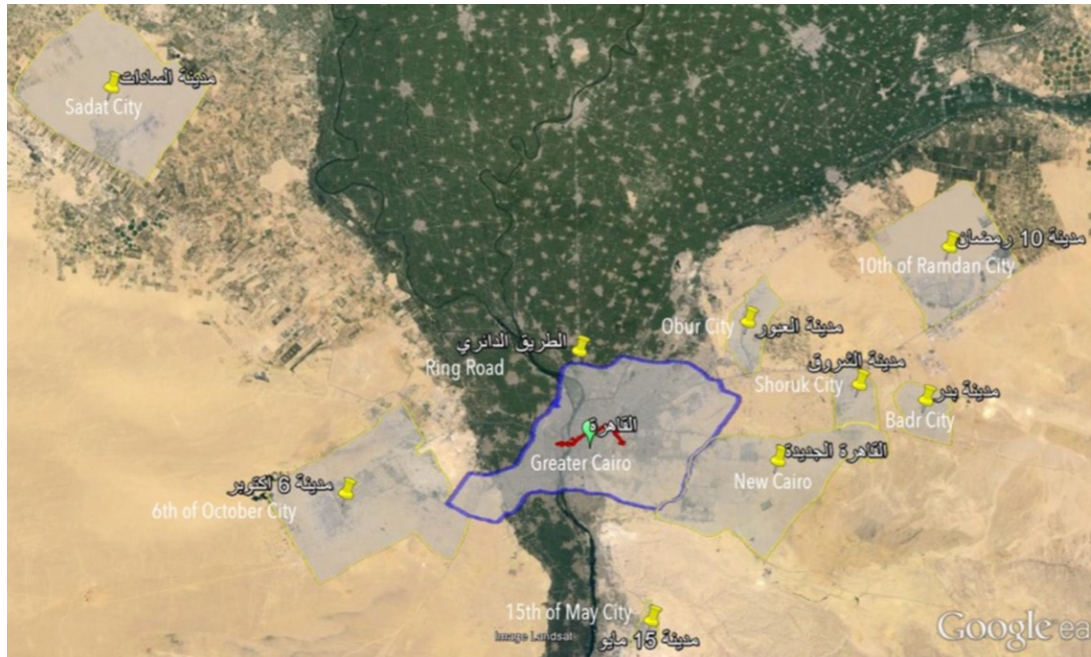
FIGURE 6.3: NEW TOWNS SCATTERED AROUND GREATER CAIRO (GOOGLE EARTH, 2018)

Hence, people still preferred informal settlements due to their affordability and the wide range of housing choices offered under all kinds of tenure arrangements. They also offered social benefits through nearby networks, while the developed rules and cultural norms could not be established in formally planned areas. Furthermore, there were strong spatial reasons for their suitability, including walkability, self-suffi-ciency, convenience and home-work proximity, safety in the residential streets, and participation in the provision of public amenities (Hassan, 2012).

Consequently, Cairo's informal settlements kept growing, and in the 1990s, the gated communities developed in new towns, fragmenting the city's urban fabric into clus-ters of urban areas. The divide led to conflict between the informal settlements and gated communities and between formally deteriorated central and inner-city areas. The disintegration of the socio-economic community caused increased fragmenta-tion, creating segregation between the upper- and lower-income groups (Mekawy & Yousry, 2012).

IV. SOCIO-ECONOMIC ASPECTS

Informal settlements are the only affordable option and give people different choices under all kinds of agreements. Furthermore, buying land is a much safer investment than industry or cash in uncertain times. Also, the announcement of official planning allowed the poor to occupy areas near these schemes in order to be close to new job opportunities (Soliman, 2002). Socially, families could relocate near other family members or friends coming from the same part of Egypt. They had social ties that could not be found in formally planned areas. They had their own social rules, social networks and cultural norms (Hassan, 2012). Also, several reasons contribute to the acceleration of informal settlements today. The subdivision of inherited agricultural land has made it uneconomic to farm. Landlords who own large plots and are employed in other sectors rent their lands. While the proximity of agricultural land near urbanised areas makes farming difficult because of overshadowing by adjacent buildings, children and domestic animals, which spoil crops (Soliman, 2002).

6.2.3 EXPLORING INFORMAL SETTLEMENTS DIFFERENT CHARACTERISTICS

I. PHYSICAL CHARACTERISTICS

The physical characteristics are part of the progressive and incremental construction process. Urban features are determined and followed by existing streets, buildings, typography, and natural and man-made features. They lack facilities, amenities, services and infrastructure (Arandel & El-Batran, 1997). Informal settlements on agricultural land are of better quality and located on the urban fringe (Figure 5.4). However, those on desert lands can range from low-quality one-storey buildings to better quality 6-8 storey buildings (Figure 6.4). The services for agricultural lands are better situated than those on desert lands. Also, in some informal settlements, the growth of the built-up area is faster than the population growth rates. Thus, there is a large stock of empty buildings or at least vacant dwellings. The average density is 680 inhabitants/Ha compared to the average of the whole city at about 385 inhabitants/Ha. Older districts are even denser, as they can reach 1500 inhabitants/Ha (Denis & Sejourne, 2002). As a result, they have a high level of use across a limited space as the high density allows the land to be used to its full potential; this system adds more

units to the housing stock than all public housing efforts combined. They provide a much greater range of plots, houses and apartment sizes, and the location and service characteristics have more variety than the formal sector (Arandel & El-Batran, 1997).

FIGURE 6.4: FROM LEFT: BIRDSEYE VIEW OF BOULAQ EL DAKROUR, AN ILLEGAL SUBURBAN SUBDIVISION (SABRY, 2009, P. 32) & EZBET BEKHIT, A SQUATTER SETTLEMENT (SIMS ET AL., 2003, P. 7)

II. SPATIAL CHARACTERISTICS

The physical structure took shape according to the type and strength of the social relations between groups. Families' needs and interactions defined the street width and plot patterns, demonstrating how the social aspect shaped the development of the urban fabric. The spaces differ from one place to another based on family closeness and how much they are integrated. Residents stress the value of community and social solidarity. Residential streets are narrow to restrict strangers, control the traffic and allow for multiple activities like socialising, celebrations, extended workspaces, extended cafés, and playgrounds (Figure 6.5). At the same time, the plot and building patterns in the settlements form a compact pattern and respect the proximity of services, work and home, as the distances between them are walkable. Walking every day has a social impact, as people meet and see each other daily. Furthermore, shops and markets are close to residential buildings, making them very accessible (Eldefrawi, 2013). The compact and dense urban fabric with mixed residential and commercial uses are the spatial characteristics of informal areas. This results in benefits for residents, such as walkability, self-sufficiency and convenience, in terms of

availability of daily needs, home-work proximity and safety in the residential streets (Ibrahim et al., 2018).

FIGURE 6.5: THE NARROW STREETS OF INFORMAL SETTLEMENTS ARE USED BY PEDESTRIANS AND EXTENDED SPACE FOR SHOPS (SIMS ET AL., 2003, P. 10)

III. SOCIAL CHARACTERISTICS

The community participates with each other to provide public services such as garbage collection, street lighting, street cleaning, and public landscaping (Eldefrawi, 2013). Informal settlements provide incentives for saving and investment, allow gradual expansion, growth, changes, adaptations to family needs and resources, and an opportunity to include income-generating spaces like shops, workshops and rental units in the residential environment (Arandel & El-Batran, 1997). It has created a social coherence in marginalised communities that have been forced to take matters into their hands to solve problems, take care of each other, and compensate for the lack of services (Ibrahim et al., 2018). Informal areas house low- and middle-income families, educated families, university students and public sector employees (Séjourné et al., 2009).

IV. ECONOMIC CHARACTERISTICS

Residents of informal settlements cannot be generalised as the term 'poor' indicates poor living conditions in these areas. Socio-economic studies show that households include a remarkable range of incomes which are not much lower than the average

across Greater Cairo. Also, informal economic activities are the source of employ-ment for many people, and the informal economy is essential in sustaining the formal economy. They are home to micro, small- and medium-sized enterprises (Hendawy & Madi, 2016). Small industries, urban farming and handmade crafts, with all their associated capital and labour, do not exist anywhere else in the city, and all are linked with the formal economy (Ibrahim et al., 2018).

6.3   CASE STUDIES FOR INTERVENTION STRATEGIES

6.3.1   EZBET HARIDY

Ezbet Haridy is an inner-city slum in El Waily district (Figure 6.6), Cairo, with an area of 5000 m^2 and land owned by Al Awqaf. It has 195 families, houses made of brick and wood and shared bathrooms. In 2006, the Future Generation Foundation, in co-operation with the Cairo governorate and Al Awqaf, signed a protocol to develop this slum. The project was backed by the political power that hurried the planning and construction because the Future Generation Foundation was supervised by Gamal Mubarak (son of former President Hosni Mubarak) (Abouelmagd, 2014).
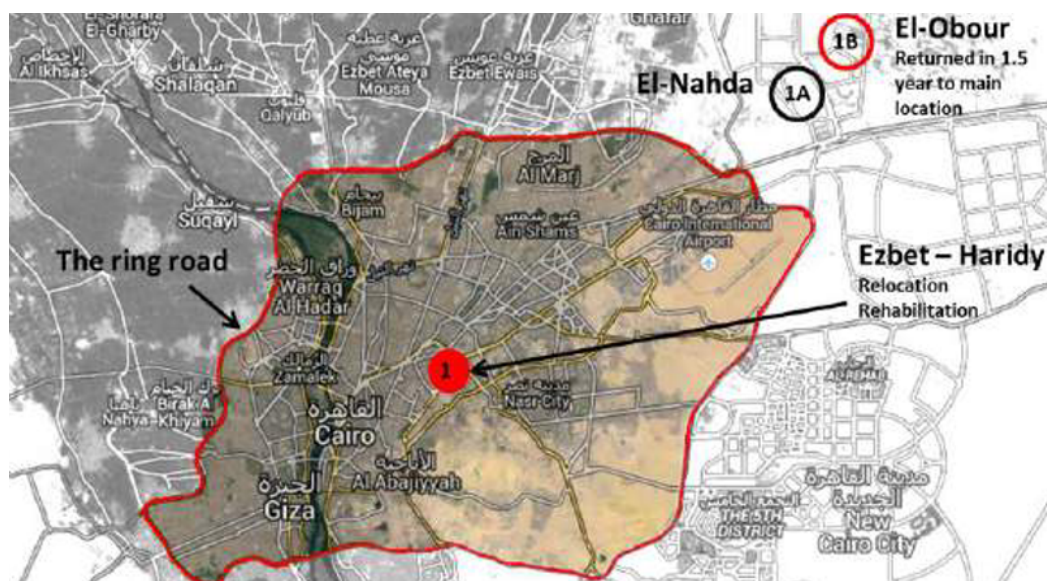
FIGURE 6.6: EZBET HARIDY'S LOCATION IN THE CITY AND THE RELOCATION AREAS OUTSIDE THE CITY (ABOUELMAGD, 2014, P. 7)

At first, the state started a survey to determine the number of residents and their social and physical conditions. After the survey, they temporarily evacuated 108 fam-ilies to El Obour city, and 87 families permanently moved to El-Nahda. The situations of El Obour and El Nahda differed. El Obour apartment buildings were ready for

families to settle in with no obligations to pay rent or utility bills. In contrast, the buildings in El Nahda were still unfinished and made families move in under those conditions. The El Nahda families had to pay utility bills for houses under construction and instalments for 20 years to own the apartment; those who could not afford it would be evicted (Abouelmagd, 2014). The economic status of the relocated people of El Nahda deteriorated, like any relocation project of informal settlements. The residents lost their jobs near Ezbet Haridy because of a lack of transportation to their old jobs and no new jobs in the new area.

El-Obour families returned to a newly upgraded area. The upgraded area had six buildings; each family had an apartment with a renewable rent contract every three years. The developed area has green areas between the buildings, a new clinic, a development centre for children, and four schools; meanwhile, 38 shops were given to the owners of previous shop owners. Five of the six buildings were occupied. The physical capital improved, but inhabitants still faced many problems. Residents lost their social networks after the upgrade, the apartment area was insufficient for some families, the green areas deteriorated, and residents and shop owners used open spaces as storage areas, parking and areas for raising animals. The relocation to both areas meant residents lost their human, social and economic capital, even among families who returned to their area after development (Abouelmagd, 2014).

The project's failure reflected the problems of total redevelopment and relocation. The redevelopment happened in a way that ignored people's ways of life. The responsible organisation wanted to deliver a project that looked good without understanding the social or economic networks which were destroyed in the process. Also, the upgrade was purely physical, with no associated social or economic programmes. Even so, the physical upgrade deteriorated with time because there had been no analysis of the people's needs. Therefore, residents started to re-purpose spaces or insert new features to meet their needs. In addition, the people who relocated permanently suffered from being in a distant location, with no adequate transportation, incomplete housing units and no services.

6.3.2   ASMARAT DISTRICT, MASPERO TRIANGLE & IMBABA AIRPORT

Asmarat district is a newly developed social housing initiative that relocated informal residents of various unsafe settlements. It aimed to develop new residential areas with all the services for relocating informal residents to a suitable location in the Mokattam area. The Asmarat district project has three phases (Wahed & Abd El Monem, 2019). The first has 6258 housing units of a ground floor and five typical floors per apartment building on 65 feddan. ISDF and the Cairo Governorate funded this phase. The second phase has 4722 housing units, like the first phase, alongside hospitals, schools and public facilities on 61 feddan; the 'Long Live Egypt' fund funded this phase.

Finally, the third phase is still under development, with 7440 housing units occupying another 62 feddan. The apartment buildings of this phase will be of a ground floor plus nine typical floors. Also, it will include a vocational high school, playgrounds, parks, a commercial market and parking areas. The housing units in all phases are 65 m^2, and some buildings' ground floors will be used commercially and rented to residents for income-generation activities (Wahed & Abd El Monem, 2019). Wahed and Abd El Monem (2019) found that commercial services were far from the apartment buildings, which is not what residents preferred. Also, they stated that the lack of skills training programmes to help them find jobs and the relocation programme did not meet the expectations of residents in terms of their needs. In addition, the living situation started to deteriorate, there was unsafe tenure due to the lack of official house ownership, and the site was far from jobs, relatives and friends (Wahed & Abd El Monem, 2019).

Another total redevelopment project is the Maspero Triangle area, home of the Radio & Television Building, the Ministry of Foreign Affairs and the Italian consulate. It is located on the Nile Corniche and covers 74 feddan near Cairo's downtown. The state wants to develop the area to utilise its economic and tourism potential. The government's strategy is to redevelop the deteriorated area. They pressured residents to choose one option: securing financial compensation and relocating to the Asmarat district or temporarily relocating for three years and returning to the developed area.

If they chose to return, they had to pay rent or accept a small apartment (Wahed & Abd El Monem, 2019).

The project has two aims: first, community development through educational, health and cultural aspects. Second, the removal of deteriorated buildings and the development of the area according to new modern plans following good health and environmental standards. After a series of meetings and workshops to understand the needs of the area, communicate with the residents and harness the potential of local resources. The residents rehousing team analysed the current conditions and needs, the needs of residents and the rehousing programme. The team's work resulted in the development of 20,000 m^2 for residents who wanted to continue living in the area after development. They will build 28 apartment buildings between six to twelve stories high and give them two options when coming back. First, residents can pay 750,000 EGP to cover the new unit in whole or for smaller units ranging between 350,000 to 450,000 EGP over three years. The compensation money will account for the deposit and the rest over the next 30 years. The second option is to rent the unit with no time limits on the contract for 600 EGP per month. The rehousing team compensated residents with 40,000 EGP to pay against rent until they received their new homes or 60,000 EGP per room if they chose to leave the area permanently (Wahed & Abd El Monem, 2019). Like any redevelopment project, residents do not feel secure because no ownership contracts exist, while the compensation money cannot enable them to secure a decent place in a nearby area. Those who accepted the relocation were moved to the Asmarat district, far from the downtown area where they used to be.

Imbaba Airport (Figure 6.7) is one of Egypt's most populated unplanned areas, housing 700,000 inhabitants. They planned the project area of 204 feddan over three phases; the first was the airport land development as an action plan, the second was West Mounira as a local urban plan, and the third was the regional level for North Giza at the action planning level. The project comprises a residential area of 54 feddan for 5000 families, public gardens of 38 feddan, 69 feddan of economic investment and service centres of 26.6 feddan. It provides basic infrastructure and services,

playgrounds, youth centres, a student sports city, public parks and green areas (Magdi, 2018).

FIGURE 6.7: IMBABA AIRPORT BUILDINGS AND STREETS (MAGDI, 2018, P. 324)

Asmarat district was concerned with the morphological and physical dimensions but neglected the social, environmental and economic dimensions. Whilst the Imbaba Airport project showed that some projects are part of political propaganda with no effect on the quality of life or community needs (Magdi, 2018). Also, the Maspero Triangle drew the government's attention because of its terrific location and financial value in Cairo's centre. Additionally, the relocation of residents was undertaken like previous projects, which saw people move to distant locations that were difficult to access and meant the loss of social and economic networks.

6.3.3   HAI EL-SALAM

Hai EL-Salam is the first informal settlement upgrading project in Egypt conducted through the provision of sites-and-services; the project is in Ismailia city. The idea behind the project is that when there is a security of tenure and access to basic services, thus households will improve their houses. The Ismailia Master Plan (IMP) proposed the following policies (Matteucci, 2006):

- The provision of land to low-income populations included:
  - The control of land supply ensures that it constantly matches the pattern of demand. The plan particularly emphasised the role of public administration in granting access to affordable land for low-income households.

- A mix of leasehold and freehold tenures, where freehold rights should be allowed exclusively to families of owner-occupants or owner-builders.

- A selection of those assignees should enjoy subsidised leasehold (or freehold) conditions by enforcing the requirement of owner-occupancy.

- A staged provision of infrastructure starts with a minimum level of accessibility to everyone. An incremental enhancement of utility supply that should always follow effective demand, sharing the cost of gradual improvements with residents.

- The improvement of the supply and distribution of building materials to allow wider access to modern technologies.

- The creation of a micro-credit system to help low-income households finance the incremental construction of their dwellings.

- The simplification of construction standards and procedures so that building permits could be easily accessible to all and low-cost traditional technologies could be accepted at least as a temporary solution.

The project analysis concluded that extended families of owner-builders incrementally constructed and occupied most buildings. The low-income households of old El-Hekr have plots and dwellings, indicating they are benefiting from the project. However, not all households have experienced improved economic conditions, as there are still pockets of poverty in the old quarter. People with enough resources invested in the new development and increased their income; the population of the sites-and-services area are on average wealthier than that in the upgrading zone. The poverty levels registered in the old quarter do not exist in the new one, but even tall constructions built with good quality standards are much more common in the second than in the first. Also, the project reached the proposed target population in the upgraded area. Wealthier housing sectors have prevailed in the sites-and-services zone, displacing the poorest assignees (Matteucci, 2006).

The project created similar problems to other projects. The benefit of the project was its flexibility in housing regulations which allowed houses to be legal in the site-and-services area. But still, it had the same problem with other site-and-services in Egypt, making it possible for families with a better economic status, thus missing its targeted population. Thus, it created segregation between the low-income families in the old El-Hekr area and the wealthier who afforded the plots and building in the site-and-services area. Furthermore, they could not provide social and economic programmes to help enhance the economic status of the upgraded area.

6.3.4 ZABALEEN COMMUNITY

The 'Zabaleen' community included garbage collectors and recyclers that settled in temporary settlements on the east and north of Cairo (Figures 6.8 & 6.9). They maintained ties with their rural origins to preserve the community by remarrying and living in extended family situations. They came to Cairo in the 1930s and 1940s and collaborated with other migrants. The 'Wahiya' people were the middlemen between the households and 'Zabaleen'. They collected the garbage with donkey-pulled carts or pickup trucks with their children and siblings. Females and younger siblings sorted the garbage into 16 different types of trash to be recycled and used as organic waste to feed pigs. The pig meat was then sold to touristic facilities, and the sorted materials were sold to middlemen (Fahmi & Sutton, 2010).

In 1989, both communities agreed to establish a waste collection company called the Environmental Protection Company, which was one of the world's most efficient resource recovery and recycling systems. Later, the authorities launched plans for a local solid waste collection in Cairo by multinational corporations. This privatisation could affect the socio-economic sustainability of the 'Zabaleen community'. Also, they plan to relocate their activities further outside the city, increasing the travelling and services costs (Fahmi & Sutton, 2010).

The relocation was 25 km away in Katameya, the same location for the relocated residents of Medieval Cairo and eastern cemeteries. The relocation impacted the community because most had no official documents to prove their ownership. In

addition, residents raised questions about where they were to be located, accessibility to employment, who would be eligible and what services were there. The conditions in the new site were poor; there were no local employment opportunities and very few services. The lengthy travel distances from the proposed new settlements in Eastern Cairo threatened this recycling system. Faced with increased travel costs, poor garbage collectors may abandon their sustainable traditional economic system and join Cairo's underemployed poor (Fahmi & Sutton, 2010).
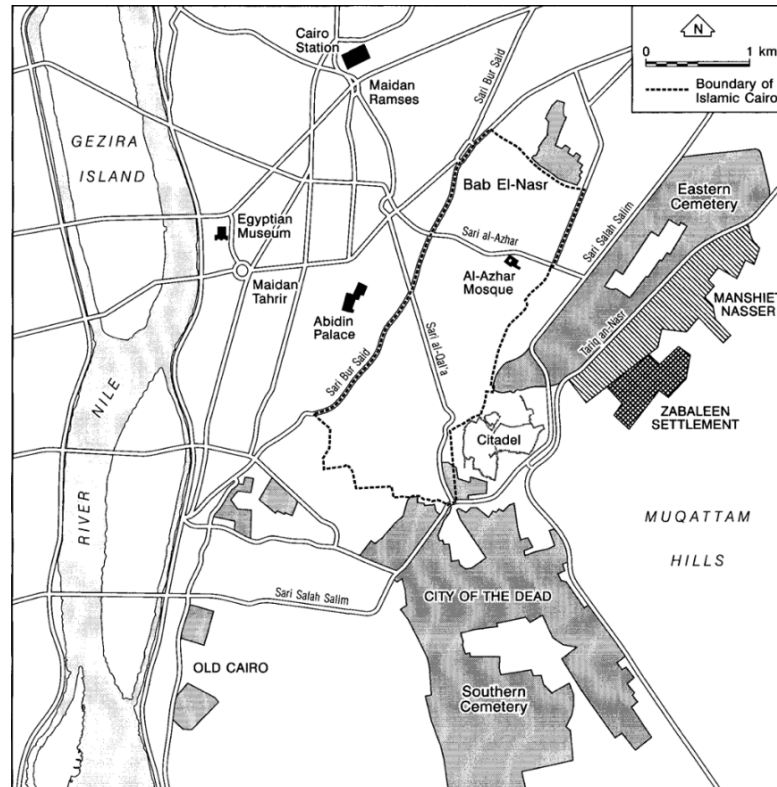
FIGURE 6.8: ZABALEEN GARBAGE CITY (FAHMI & SUTTON, 2010, P. 1769)

The relocation projects further prove their unsustainability and negative impacts on the community. The community had to face social and economic difficulties because of it. The new areas are far from the city centre with no transportation, services or jobs. The state implemented an easy solution by removing the settlement and moving the people. Also, they introduced a private company that rendered them unemployed. It could have been much better to introduce a comprehensive upgrade plan to allow people to continue living in the same area and to introduce programmes that enhance their waste collection and recycling work.

FIGURE 6.9: ZABALEEN SETTLEMENT IS PART OF MANSHIET NASSER (FAHMI & SUTTON, 2010, P. 1770)

6.4 INTERVENTION STRATEGIES

6.4.1 DIRECT PUBLIC HOUSING

In Egypt, there have been different public housing policies. The first policy, in 1952, was to construct low-cost public houses on the outskirts of Cairo to relocate the people from the cleared slum areas in the city. However, due to the war between 1965 and 1975, the investment sharply drooped because of militarisation (El-Batran & Arandel, 1998). The second attempt to provide public houses was made in the 1970s when Sadat initiated the New Towns policy. Part of the new towns was intended to house the residents' informal settlements that developed on agricultural lands to public houses on the desert fringes. However, many units were left empty because of the high prices, remoteness and inadequate supply of services (Amer, 2015).

Another attempt was the Mubarak Youth Housing project in 1996, which aimed to provide 70,000 affordable units. The beneficiary of the project is the youth of the low-income group. It was completed in December 2000 and provided units in around 15 new cities. The project offered different areas (63-70-100 m2) where the density

was 120 persons/acre and a maximum of five floors to allow for green spaces, parking spaces and social services. The objective is to mobilise more resources from capable/wealthy groups to support the youth of disadvantaged groups. In 1998, two years after the initiation of the previous project, an NGO called The Society of The Future was established to supervise The Future Housing Project. It provided 70,000 units with an area of 63 m2 per unit that was implemented in three phases over six years. The private sector provided half of the cost through fundraising, and the government provided the other half alongside infrastructure and basic services (Afify, 2005).

All public housing projects from the urban planning perspective failed to show the importance of location and reciprocity in low-income conditions and informal economies (Abouelmagd et al., 2013).

6.4.2 INDIRECT PUBLIC HOUSING, SITE-AND-SERVICES & AIDED SELF-HELP

From the 1980s, most of the investment was made in new cities, and housing provision was based on site-and-services or self-help concepts; this was beyond the affordability of low-income residents. In the 1990s, the government issued an incomplete housing strategy by selling incomplete housing units that only provided a skeleton, a partition of mud and bricks and a source of utilities and left the finishing to the residents. The goal was to encourage self-build and give residents the freedom to tailor it to their needs. In 2006, the 'Build Your House' new policy was issued, also based on self-help, and it allocated 50 sites over 13 new towns with 90,000 plots of 150m^2. However, residents must obey regulations like not exceeding 50% of the build-up area and a maximum height of ground and two typical floors. Also, the state provided interest-free loans. It had significant concerns like the project being very expensive for the government, and the current global economic crises contributed to a slowdown in the unprecedented increase in the price of building materials (Soliman, 2012).

6.4.3 UPGRADING

In 1992, the government launched a national fund for urban upgrading and started a systematic approach to upgrading informal settlements. It started with a national

survey of all the settlements in Egypt. There were 1221 informal settlements, 1201 upgradeable, and the rest were classified for removal and relocation of residents. After the survey, the programme was initiated and divided into two stages. The first stage was the Informal Settlement Development Programme which aimed to provide basic services and infrastructure. The second stage was the belting programme, which used the support of the local government to create plans to stop the growth of informal settlements (Khalifa, 2015). The programme upgraded 350 informal settlements but failed to consider the socio-economic factors, the urgency of community participation in the planning and implementation phases and the legalisation of properties. It was not based on any scientific urban appraisal methodologies (Ibrahim et al., 2018).

In 2008, the government established the Informal Settlement Development Facility (ISDF). The ISDF made a paradigm shift by replacing the term "Slums", "Informal Settlements", or 'Ashwa'yat' with two terms: "Unsafe Areas" and "Unplanned areas". Unsafe areas were characterised by being subject to life threats, inappropriate housing, or exposure to health or tenure risks. Unplanned areas are known for their non-compliance with planning and building laws and regulations. Unplanned areas comprise 60% of the urban areas, a density of 500 people/feddan, building heights of 4 – 10 floors, providing a basic level of safe housing and needing long-term development. The unsafe areas comprise 1% of urban areas, with a density of 200 people/feddan and building heights of 1 – 2 floors; furthermore, there is no safe housing, and the area needs immediate intervention (Elrahman & El-khateeb, 2009). ISDF (2009) divided unsafe areas into four grades, each assigned a degree of risk (Table 6.1). Unsafe areas comprise 50% of its housing areas and meet one or more conditions in terms of the degree of risk and therefore require greater urgency in terms of intervention (Khalifa, 2011).

TABLE 6.1: ISDF FOUR GRADES AND DEGREE OF RISK OF EACH

Grade	Degree of risk
1	Areas that threaten life including those located: - Under or above sliding geological formations. - In floodplain areas; or - Under threat from railways accidents

2	Areas of unsuitable shelter conditions including: - Buildings made of make-shift materials, e.g., shacks. - Sites unsuitable for building, e.g., solid waste dump sites; Or - Ruined buildings.
3	Areas exposed to health risks including those: - Lacking accessibility to clean drinking water or improved sanitation. - Located in the vicinity of industrial pollution; or - Located under electrical power lines.
4	Areas of instability due to insecurity of tenure: - Areas located on the territory of state-owned land. - Areas located on the territory of sovereign quarters; or - Areas located on the territory of endowments (Awqaf).

Note. From "Redefining slums in Egypt: Unplanned versus unsafe areas", by M. Khalifa, 2011, *Habitat International*, 35(1), p. 45.

6.5 FACTORS OF SUCCESS OF INTERVENTION STRATEGIES

The Egyptian government has tried to intervene in informal settlements, whether by the state itself or through different national and international NGOs. Nowadays, the government decided to relocate all living in unsafe areas to newly developed areas or conduct some infrastructural work in unplanned areas. But according to the various experts interviewed, different factors need to be taken into consideration to enable better intervention strategies.

6.5.1 POLICY ADJUSTMENTS

There are policy problems that need to be addressed first before developing a new intervention strategy. First, decentralisation of decision-making and differentiation between different roles of the central and local government. Elfouly (2012) stated that overlapping and duplicated tasks and responsibilities exist. Participant HE mentioned the same problems in the decision-making process and overlaps between institutions' roles and responsibilities. Elfouly also added a weak political will to intervene at the governorate level because there is no mention of informal settlements in the Unified Building Law (Elfouly, 2012).

Second, it must change the government's budgeting system from a sectoral to a locational budget system. According to Participant HK (professor at Cairo University), the sectoral budgeting system stopped the completion of many planned interventions because the intervention plan, for example, had a school as part of the plan,

which was funded from the budget of the Ministry of Education. This stopped many intervention plans from being fully realised.

Third, Participant HE (researcher at Berlin Technical University, with experience working on Ezbet El Haggana) discussed the problem that the law obliges any development project to have a Strategic Plan and Detailed Plan (which only includes street widths and building heights). However, there are no Land Area Development Plans for land use because there is no legal position on it, and there is a need to decrease the time taken to certify strategic plans, which currently take up to 4 or 5 years.

Fourth, according to Participants HK and HE, the law for the Local Popular Council is disabled, rendering areas with no formal or legal representation from the community. So, any development plans for an area are not presented to the community. Also, Participant HK stated that even before the law was disabled, reports of representation were not accurate or reliable because members tried to manipulate the plans according to their own needs to increase the likelihood of being re-elected.

6.5.2 PRE-PLANNING STAGE

Experts with experience in dealing with informal settlements stated the factors that need to be addressed. First, most of the interviewed participants indicated the need to develop a comprehensive intervention strategy. Participant MA (Manager of International and Local Funding of ISDF) said that all ISDF interventions in unplanned areas only deal with physical aspects. The projects either introduce or upgrade existing infrastructure networks of water, electricity and sewage and street paving and lighting. Also, Participant HK said that the government sees any socio-economic projects in informal settlements as NGOs' responsibility.

Second, while developing a comprehensive intervention strategy, there is the need-to-know residents' needs and priorities and reflect on the development plan. Many participants mentioned this as one of the factors of success, while Participant HE noted the 'Participatory Needs Assessment (PNA)'.

Third, Participant HG (Researcher with experience working in Ard El Lewa and faculty member at Cairo University, also a resident of Ard El Lewa) stated the need to have well-managed resources to achieve a good balance between housing density, available services and the quality of public networks and infrastructure. To maintain transparency, it is necessary to communicate every detail of the project with residents.

6.5.3   PLANNING STAGE

According to Participant NA (assistant professor at Arab Academy, with experience in researching intervention strategies, especially in unsafe areas), a comprehensive intervention must ensure the upgraded area will not change the way of life and maintain existing social ties and economic networks. Also, there is a need to shift from a modernist concept of mono-zones and wide streets to more compact and mixed-use, which are more sustainable and closer to the way of life in informal settlements.

Another critical factor is establishing and implementing a governance and management system for the intervention project. It will manage the project implementation and later be responsible for the maintenance of the area.

6.6   CONCLUSION

In Egypt and, especially, Greater Cairo, informality became the main mode of urbanisation. Informal development comprises over 65% of the total urban development (Magdi, 2018). In Egypt, two main typologies account for almost all the informal settlements; the *illegal subdivision of privately owned agricultural land* and *squatter settlements on public lands*. The illegal subdivision occurs on agricultural land on Greater Cairo's western and northern periphery. This form of informal urbanisation happened because of its proximity to the city. Squatter settlements occurred on empty land near the city centre and eastern periphery because most of the vacant desert land is located in the east. The development of informal settlements occurred due to population growth, rapid urbanisation and industrialisation, accompanied by political and economic changes. It confirms the *informal-formal dialogic model of the relational approach* and *quite encroachment*, which are the informal theories this research is based. The informal urbanisation process started in the 1960s and will

continue. It is related to the transformation factors leading to informal growth. The non-spatial factors of political and economic policy changes sparked informal development and expansion. Also, the spatial factors of the ring road and the development of new cities attracted more people to the city who wanted to locate near them.

Moving on to intervention strategies, several strategies were implemented to deal with the phenomena of informal settlements. First, there were several attempts to provide public housing. Still, they all failed because of their far location on the outskirts of Cairo, high prices, inadequate supply of services (Amer, 2015) and the importance of reciprocity in low-income conditions and informal economies (Abouelmagd et al., 2013). Second, the supply of incomplete public houses was based on site-and-services and self-help concepts and was unaffordable for the low-income class (Soliman, 2012). Finally, the upgrading of informal settlements went through two phases, the provision of basic services and infrastructure and belting programmes (Khalifa, 2015). Nevertheless, it did not consider the socio-economic factors, the urgency of community participation in the planning and implementation phases and the legalisation of properties as it has not been based on any scientific urban appraisal methodologies (Ibrahim et al., 2018).

Nowadays, there are different projects on different scales initiated by NGOs and the government. The latest initiative is the establishment of ISDF (Informal Settlements Development Fund), which categorises informal settlements between *unplanned areas* and *unsafe areas* (Soliman, 2012). The key issues are, first, little to no interaction between the ISDF and the community, and the leading strategies are the total redevelopment or the eradication of the site and relocation of informal inhabitants to social houses on the periphery of the city (Magdi, 2018). Some projects included government upgrading through the provision of infrastructure. The country needs to stop total redevelopment following the obsolete model of mono-zone land uses and wide streets and accept the nature of informal settlement and move toward comprehensive upgrading. Second, the main strategy is either the eviction of unsafe areas or the physical upgrade of unplanned areas, which is more of a beautification project. Until now, no comprehensive model or framework exists to upgrade or integrate

informal settlements and the informal urbanisation process within the city's urban planning. Finally, the maintenance of upgraded areas is almost non-existent, whether by the government or NGOs (Hussien et al., 2020).

The development of informal settlements is influenced by a network of reasons that are still present. Formal urban developments are primarily suitable for upper-middle- and high-income groups of people, while informal settlements are the affordable option for middle- and low-income groups. The network of reasons allowed the development of two main typologies of informal settlements. Those typologies are more suitable to inhabitants' needs and are well located in relation to transportation corridors and access to the formal city. Also, different intervention strategies like public houses and site-and-services did not respond to the needs of the people, which made the government change its strategy to upgrading. The shift started with recognising informal areas and their categorisation as unplanned and unsafe areas by ISDF. The ISDF currently focuses on unsafe areas from which they evict and relocate people to public houses. Academics and experts in the field have criticised this strategy. In comparison, unplanned areas are getting physical upgrades in their infrastructure provision and street paving, with no social or economic programmes.

In summary, intervention strategies are still far from realising the needs and priorities of informal communities. It needs a major overhaul to understand informal settlements and their communities better. The review of the characteristics of the built environment proved a relationship from a global perspective and developed the Characterisation of Informal Settlements Framework (CISF) (Figure 4.13). However, it needs to be adapted to the Egyptian context to investigate the dynamics of informal settlements better. Also, the Characterisation of Informal Settlements Framework (CISF) will provide a better understanding of built environment dynamics and their transformation factors, leading to better formulation of intervention strategies. Intervention strategies can integrate informal settlements into the urban planning process and control their growth. The chapter outlines the investigation of the two case studies and adapts the Characterisation of Informal Settlements Framework (CISF) to the Egyptian context.

Chapter 7.   CHARACTERISATION OF INFORMAL SETTLEMENTS AND CISF TESTING: GREATER CAIRO

7.1   INTRODUCTION

The previous chapter focused on Egypt's informal settlements. It explored the reasons behind the emergence of informal settlements and their different typologies and characteristics. Later, it investigated different case studies to understand the intervention strategies employed in Egypt. This chapter focuses on two case studies: Ezbet El Haggana and Ard El Lewa. Each case is investigated to understand the physical, social and economic characteristics. The Characterisation of Informal Settlements Framework (CISF) is implemented for testing on both case studies and adapting to the Egyptian context. Testing and adapting the Characterisation of Informal Settlements Framework (CISF) is essential because it is one of the pillars of the Control & Integration Model that is concerned with settlement analysis.

The chapter starts by describing the two case studies and their different characteristics. Later, the first tier of the Characterisation of Informal Settlements Framework (CISF) is implemented to understand the relationships between the characteristics. After that, the second and third tiers of the Characterisation of Informal Settlements Framework (CISF) are implemented to explore the factors of transformation and to cross-examine the settlements with the sustainable urban form indicators, respectively.

7.2   EZBET EL HAGGANA

Ezbet El Haggana is one of many informal settlements in and around Greater Cairo. It was built on state-owned land in the eastern desert of Cairo near Nasr City (established by President Gamal Abdul Nasser in the 1960s) ('Izbit Al-Haggāna, 2015). Haggana is one of the largest informal settlements in Egypt. Its name, "Ezbet El Haggana", means the village of camel corps; the name is related to the first settlers and their families who were allowed by the military to settle there (Al-Shehab Institute, 2006,

cited in Bremer & Bhuiyan, 2014). There is a debate on when the settlement first started to appear. In Bremer and Bhuiyan's (2014) study, some interviewees stated that the first dwellings appeared in the 1880s, while others estimated that the first settlers appeared in the 1930s when camel corps officers let their soldiers build houses for their families near the camp (Soliman, 2004).

7.2.1   PHYSICAL CHARACTERISTICS

I.   LOCATION

Ezbet El Haggana's location on Cairo's eastern periphery is considered a sub-district of Nasr City ('Izbit Al-Haggāna, 2015). Haggana is strategically located with Nasr City on the west and southwest, the Ring Road and New Cairo to the east and Heliopolis to the North (Figure 7.1). According to participants HK, MA and SA, its proximity to Nasr City created social and economic reciprocity. Residents usually work in nearby areas (ElMouelhi, 2014; 'Izbit Al-Haggāna, 2015) and access services that are otherwise available in surrounding formal areas. Thus, there is a direct relationship between the settlement's location and access to social services like health and education, alongside employment in formal districts (Azouz, 2015).

FIGURE 7.1: EZBET EL HAGGANA BETWEEN NASR CITY, HELIOPOLIS AND NEW CAIRO, AND EASE OF ACCESS TO TRANSPORTATION COR-RIDORS (GREEN LINES)

II. URBAN FORM

II.I DENSITY

As with informal settlements in Egypt, there is no accurate data for Ezbet El Haggana. In their 1996 census, the Central Agency for Public Mobilisation and Statistics (CAPMAS) stated that the area population was 32,652, and in 2000 it reached 412,000 (CAPMAS, 2001, cited in ElMouelhi, 2014). Davis (2006) and Soliman (2004) estimated that it housed over one million residents, while the area of the Ezbet El Haggana comprised around 750 acres (Bremer & Bhuiyan, 2014). The area's population density is approximately 1330 people/acres (Shawky & Abd Elghani, 2018). The high density is related to the limited space, resulting in the vertical expansion (Figure 7.2).

FIGURE 7.2: THE VERTICAL EXPANSION CAN BE OBSERVED ON THE EDGES OF EZBET EL HAGGANA, RESULTING INTO HIGH DENSITY AND COMPACT URBAN FORM

II.II STREET NETWORK

The topographic nature of the desert area affected the street pattern of the settlement, hence its organic nature (Shawky & Abd Elghani, 2018). Increased density and different activities affect the street networks inside the area. The area has three types of streets. The main streets are 10 to 12 meters wide and used by pedestrians and motorised vehicles (Figure 7.4). Secondary streets are 6 to 8 meters wide, while residential streets are 3 to 4 meters wide. Pedestrians are the primary users of secondary and residential streets (Shawky & Abd Elghani, 2018). The streets are

characterised as unlit and unpaved (Figure 7.5). Secondary and residential streets have recreational uses; for example, a children's playground, neighbours' socialising space, extensions for shops and workshops, etc.

FIGURE 7.3: EZBET EL HAGGANA COMPACT ORGANIC URBAN FORM BECAUSE OF 100% PLOT COVERAGE

FIGURE 7.4: ONE OF THE MAIN COMMERCIAL STREETS. ON THE DAY IT HAS MORE ACTIVITY AS IT IS LINED WITH SHOPS

FIGURE 7.5: RESIDENTIAL STREETS ARE NARROW, UNPAVED AND UNLIT. DURING THE DAY, THERE IS ALMOST NO SOCIAL ACTIVITY

II.III LAND-USE

Haggana's land use is mixed. Ground floors mainly comprise commercial uses like workshops, coffee shops and convenience stores (Figures 7.4 & 7.6) ('Izbit Al-Haggāna, 2015). The upper floors are residential, as most shop owners live in the same building or a place nearby. Some commercial uses are recreational, similar to those found in formal areas like internet cafes, billiards and retail shops (ElMouelhi, 2014). The non-residential uses intensify in the main streets, with a linear and clustered distribution pattern (Shawky & Abd Elghani, 2018). The highest mixed-uses are

residential and commercial – accounting for around 11% of the area – and the second highest is residential and workshops (Shawky & Abd Elghani, 2018).

FIGURE 7.6: THE GROUND FLOOR IS EXCLUSIVELY LEFT FOR COMMERCIAL USES, ESPECIALLY NEAR SETTLEMENT EDGES AND ACCESS POINTS. ALSO, THE TUK-TUKS ARE PARKED HERE TO CARRY THE PASSENGERS INSIDE THE AREAS

II.IV BUILDING FORM & HOUSING TYPES

The building form of the area is very compact (Figure 7.3), with a block length range between 70 to 150 metres long (Shawky & Abd Elghani, 2018). There are three residential types: Suessi houses, family houses and apartment buildings (Boules et al., 2020). Suessi house (Figure 7.7) is a one-story home built from mud or red bricks. Most are in poor condition and concentrated in the unsafe area under the high voltage area, with some scattered around the settlement (Boules et al., 2020). It is one of the earliest housing typologies built in the area. People from Suez city, displaced during the 1967 war, constructed them. They build the house around a courtyard, which is the heart of the house. At the end of 2020, the government started evicting and demolishing this area as it was considered an Unsafe area at Grade 1.

Second, family houses (Figure 7.8) are usually home to one extended family. A family house occupies a plot area between 60 m² to 300 m². The buildings are three to five stories high, with visible unfinished columns for future expansion. They usually reserve the ground floor for commercial activity.
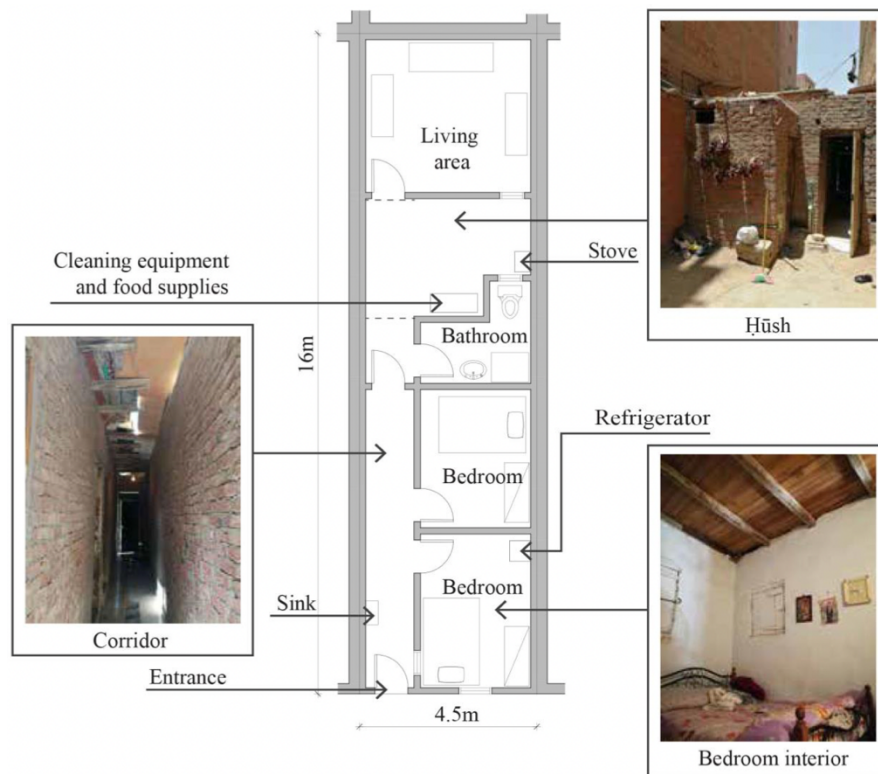
FIGURE 7.7: TYPICAL PLAN OF SUESSI HOUSE TYPOLOGY (BOULES ET AL., 2020)

Third, apartment buildings (Figure 7.8) appeared with the introduction of the part-nership concept. They are column and beam structure buildings with painted facades, marble entrances and elevators, usually over ten stories. Like family houses, the ground floor is for commercial activity (Figure 7.9). Apartment building typology changed the urban fabric from fine-grained to coarse-grained by combining several small plots previously occupied by suessi and family houses. Consequently, this form increases the population density instead of a house used to accommodate one family per plot of land (Boules et al., 2020).
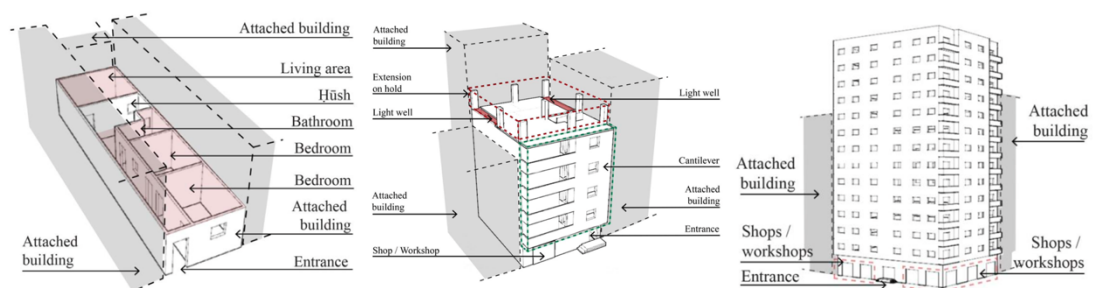
FIGURE 7.8: FROM LEFT TO RIGHT: 3D ILLUSTRATION OF SUESSI HOUSE, FAMILY HOUSE AND APARTMENT BUILDINGS TYPOLOGIES (BOULES ET AL., 2020, P. 1292)

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FIGURE 7.9: THE APARTMENT BUILDING TYPOLOGY SAVES THE GROUND FLOOR AND SOMETIMES THE FIRST FLOOR FOR COMMERCIAL USES

II.V PUBLIC SPACES

"Poorer communities depend on communal activity to generate revenue whether the outside space is extended space for inner or limited indoor space or depend on social interaction to create economic opportunities like work or service exchange" – Participant HK (2020).

Streets are the public spaces available for residents of Ezbet El Haggana, although streets as public spaces are dynamic. Residents, street vendors and pedestrians use streets for different purposes (El-Dorghamy & Mosa, 2016). Socially, families use the space in front of houses to socialise, and children use it as their playground. They meet and play in the streets near their homes after school or all day long on the weekends and during summer vacations. Another social use is weddings and funerals, which professionals are working in the area set up for these events. Economically, they use streets as an extended workspace to supplement the limited inner space of the workshops and grocery shops put out some stands in front of the shops; street vendors also use this space (ElMouelhi, 2014). Another public space used exclusively by men is the "Ahwah" (coffeeshop in Arabic), which is used to socialise and meet for business deals (ElMouelhi, 2014).

III. TRANSPORTATION

The most commonly used method of transportation inside the settlement is walking (El-Dorghamy & Mosa, 2016). The compact urban form and mixed land use of the area make it very walkable. Residents own most, if not all, shops in the area, creating home-work proximity. The next most common is the motorised rickshaw (Figure 7.10) which can easily go through narrow, unpaved streets. Residents use them if in a hurry to get to one of the settlement access points (Figure 6.6), where they can take buses or microbuses to other parts of Cairo. Another makeshift form of transportation used during commuting rush hours is pick-up trucks, where the people get in the truck bed (El-Dorghamy & Mosa, 2016).

FIGURE 7.10: TUK-TUKS SEEN NAVIGATING ONE OF THE SECONDARY STREETS.

IV. INFRASTRUCTURE

Residents can apply to formally connect their houses to water, electricity, natural gas, and sewage (Azouz, 2015). However, Participant HE said that the infrastructure of the formal connection is not designed for this high density, thus rendering it bad quality. The state-supplied water connection extends the utility grid from the nearby formal district of Nasr City, but most houses use an informal connection to the grid (Azouz, 2015). Also, formal electrical connections are available, but residents' registration with the electricity company is a complicated procedure (Azouz, 2015). So, residents either go through this process or use an informal connection. The Town Gas company connected the settlement to the formal grid in 2014, allowing an official connection.

For sanitation, residents depended on septic tanks. According to Wahby (2013), the Sanitary Drainage company installed main pipes only in certain areas. Also, two partnership projects introduced other initiatives; an NGO partnered with a Canadian funding project, and Al Shehab Institution for Comprehensive Development partnered with the Japanese embassy in Cairo. However, residents still face the risks of accumulating at lower levels and pipe explosions (Azouz, 2015).

For waste management, the area has no formal collection system. The garbage is thrown into an empty land or burned, although, in one area, one family collects the garbage and sorts it for recycling (Azouz, 2015). This poor disposal of waste can block some streets and pollute the air by burning it (El-Dorghamy & Mosa, 2016).

7.2.2   Social Characteristics

I.   Social Services

Ezbet El Haggana depends mainly on Nasr City to access social services because there is no such support in the area. The settlement has five mosques and one church, all perceived as landmarks. Poor water and sanitation connections, poorly ventilated houses, and poor health services are some health risks that residents face. The health services consist of charitable health centres and private clinics, while the nearest hospital is 4km away (Mohamed, 2010).

Similarly, educational services are poor. There are two primary schools in bad condition. No preparatory, secondary, or vocational schools lead to a high rate of dropouts. The area has one private school ('Izbit Al-Haggāna, 2015) and educational centres which only middle-income families can afford. Local NGOs sometimes provide education services for children (Azouz, 2015).

The area lacks any police presence and is known for accommodating some of the biggest drug dealers in Cairo. This makes the area insecure from access to outsiders and unsafe for locals to go on certain small streets at night. Community leaders resolve conflicts between the residents (Azouz, 2015). Securing access to social services is essential for residents, which makes the location important, and services are provided by community organisations.

II. SOCIAL NETWORKS & COMMUNITY ORGANISATION

Participants SA and HK mentioned that there are strong social ties between the residents. These strong social ties, alongside the presence of local community organisations, allowed people to mobilise local funds to help low-income residents and provide services outside the formal system (Bremer & Bhuiyan, 2014). Extended families living next to each other are the reason for the development of social ties, and newcomers prefer to live near their friends or people from the same village to establish a sense of security and familiarity (ElMouelhi, 2014). ElMouelhi (2014) study stated that the two most prominent clans are Al-Awameya and Al-Ghawasa, originating from Suhag and Qina (governorates in Upper Egypt). These social relations strengthen over time because marriages occur between different families ('Izbit Al-Haggāna, 2015). Therefore, the presence of community organisations alongside social ties is crucial to provide the missing social services, whether health, education, or security, in the settlement.

III. CULTURAL BACKGROUND

> *"In Ezbet El Haggana, a man arrived then told his family to come and live with him from upper Egypt."* – Participant SA (2020).

The area's development started with people migrating from Upper Egypt, looking for better living conditions and work opportunities in Cairo (Azouz, 2015). The two biggest clans living in Ezbet El Haggana are Al-Awameya and Al-Ghawasa (ElMouelhi, 2014); hence, their cultural background influenced the housing types, specifically, Suessi housing with three to four rooms built around a courtyard, like rural houses. Also, the family house is built for the core and extended family, like in rural areas, where the whole family could occupy one building. Incomplete columns ensure the house can accommodate more family members by allowing for future vertical expansion. Thus, an increased sense of familiarity creates strong social ties in the area. Another cultural aspect is the Christians who migrated from Minya and used to live in semi-closed groups near the church and each other.

By 2009, Ezbet El Haggana became home to 4,500 Sudanese families, Syrians and a small number of Somali refugees ('Izbit Al-Haggāna, 2015). So, the settlement is home to diverse groups of people, directly influencing the strong social ties and establishment of community organisations.

7.2.3   ECONOMIC CHARACTERISTICS

I.   ECONOMIC ACTIVITIES

Ezbet El Haggana residents are migrated families from Upper Egypt searching for better job opportunities. Participant MA mentioned that residents are usually day labourers who do not have fixed incomes. So, the settlement was an affordable and attractive option that enabled migrants to live relative to its location near Nasr City, Sheraton, and New Cairo. Most of the residents work outside the area for informal jobs like housemaids, taxi drivers, salespeople, construction workers, and so forth (Azouz, 2015). The settlement is famous for car repair workshops and skilful construction labour. The settlement location is ideal for construction workers because of its proximity to New Cairo, where most of the construction work in Cairo is happening.

FIGURE 7.11: DIFFERENT ECONOMIC ACTIVITIES (FROM TOP LEFT CLOCKWISE ARE MINI MARKETS STORES, STREET VENDORS & CAR REPAIR SHOPS)

Moreover, car repair workshops provide services for the residents of formal areas (Figure 7.11) (ElMouelhi, 2014). Participant HK added that many of them work in waste recycling, mainly iron. Other local economic activities are services for residents like convenience stores, coffee shops, internet cafes, street vendors, etc. These services are located in the main streets in the area (Figures 7.6 & 7.9), creating mixed land uses within the settlement. Some of these activities are like those found in the formal city. In the end, the employment of residents is closely tied to the formal city, whether they work within the formal area or provide services to formal area residents.

II. TENURE TYPES

Ezbet El Haggana is built on public land and, according to law, is illegally occupied. To some extent, people feel secure because of the size of the settlement and the number of people living there (Participant HK, 2020). Hence, new residents have created their own systems of tenure and ownership. There are two tenure types (Figure 7.12). The first type is where old residents have old contracts that give them the right to use the land for paying 'Awayed'. They keep paying taxes to use the plot, thinking it is proof of ownership, but in fact, it is renting fees. Contractors and new residents invented the second type, where both parties authenticate their signatures in court. Then, they register the contract in the Notarisation and Registration Office. Finally, the owner issues IDs with the address and applies for an electricity connection. In a nutshell, the old residents have old contracts and pay taxes to the state, and new residents validate signatures in court, issue IDs with the address, and pay electricity bills (Azouz, 2015).

The security of tenure is linked to the high population density, although it is not an economically viable solution to evict and demolish the area. It gives a sense of security to residents. Categorised as an unplanned area (except high voltage area) by ISDF means there are no plans by the state to evict and demolish any unplanned settlements.
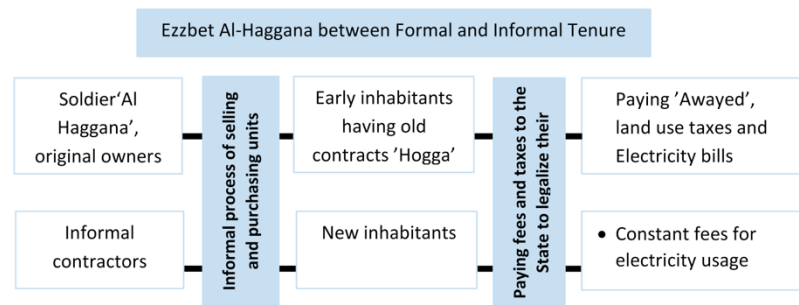
FIGURE 7.12: THE TWO TENURE TYPES IN EZBET EL HAGGANA (AZOUZ, 2015)

III. HOUSING QUALITY

The buildings tend to have a good quality structure, depending on the building type. The suessi house type is the worst as tight finances constrain it and, as such, is usually a red- or mud-brick one-storey house with sand, cement or ceramic floors and plastic sheets supported by wooden beams as a roof. Inside, there is no dedicated kitchen area, and it may have a bathroom or just a toilet (Boules et al., 2020). These types are rendered unsafe and unhygienic because of the limited natural lighting and ventilation that is only let in through the 'hush' space (Figure 7.6). Family houses are better than replacing older suessi houses when finances allow. They are reinforced concrete houses with red-brick walls that rely on one-metre-wide light wells for lighting and ventilation and have painted facades. They dedicate the ground floor to commercial use and leave incomplete columns on the top floor unfinished for future expansion. This typology is better in structure quality and has somehow better natural ventilation and lighting. Finally, the apartment is of the best quality. They are reinforced concrete buildings with painted facades, marble entrances and elevators because they reach more than ten storeys high. Similarly, the family house saves the ground floor for commercial use (Boules et al., 2020). The quality of buildings in Ezbet El Haggana is diverse (Figure 7.13), reflecting the different socio-economic status of the population and how the people and investors feel secure about the area.

7.2.4   TRANSFORMATION FACTORS

I.   NON-SPATIAL SOCIAL, ECONOMIC AND POLITICAL FACTORS

I.I   ECONOMIC GROWTH AND INFORMAL ECONOMY

Ezbet El Haggana's economy depends on three main activities. First, a robust real estate market where new apartment buildings replace old Suessi and family houses. Rural migrants from Upper Egypt started the act of partnership in 2004 when informal contractors partnered with the owners of Suessi houses to replace them with apartment buildings (Boules et al., 2020). Sometimes, the contractor partners with two or three owners to join the plots and construct a bigger building. Second, Haggana is famous for car maintenance workshops which are concentrated on the northern edge of Hedoud street and its branching streets (ElMouelhi, 2014). Third, shops on the ground floor generate income for the owner through renting or opening a shop and working in it.

I.II   INFORMAL POLITICS

Three main things allowed the continuation of investment and expansion of the area. It is categorised as unplanned by ISDF, area size and high population, and state

decision for extending the infrastructure. These reasons make the area more attractive and increase residents' sense of security. Thus, more informal investment in the area has meant that more apartment buildings have replaced Suessi and family house types.

II. SPATIAL

II.I SITUATIONAL FACTORS

The development of Nasr City in the 1960s made Ezbet El Haggana location very attractive for construction workers looking for job opportunities (Bremer & Bhuiyan, 2014). Later on, the construction of the Ring Road and New Cairo (ElMouelhi, 2014) in the 1980s made its location a central position between these new developments and Cairo's city centre (Figure 7.1). These developments made the area very attractive, but Ezbet El Haggana reached its horizontal limits because of surrounding plots owned by the military (El-Dorghamy & Mosa, 2016). So, the expansion focused on vertical expansion, which resulted in the area's densification. Later and after the establishment of Nasr City, it attracted a new type of workforce like small service firms and domestic workers to service surrounding formal areas (Bremer & Bhuiyan, 2014).

II.II SITE FACTORS

The area developed illegally on desert land, where the military allowed soldiers of the camel corps to build houses. In the early days, the land had no value because it was on the eastern outskirts of Cairo. The soldiers took advantage of building houses and bringing their families to live with them. Nowadays, informal real estate contractors perceive it as a good opportunity for investment because of its location and cheap land. They invented the partnership concept. They partner with earlier residents to replace their old houses with new apartment buildings, with contractors and landowners becoming partners.

II.III CIRCULATION CONFIGURATION

Ezbet El Haggana follows a compact and organic urban form. The buildings are close to each other, with very small or no gaps (Figures 7.2 & 7.3). The people want to take advantage of each square meter per plot. Also, the compactness and tying of

commercial and pedestrian streets created a walkable area. Also, narrow residential streets created a secure place because they prevented outsiders from going inside unnoticed.

7.3   ARD EL LEWA

Ard El Lewa is an exemplary settlement of illegally subdivided agricultural land located on the western periphery of Greater Cairo (Shawky & Abd Elghani, 2018). The urbanisation of Ard El Lewa started in the 1970s, as the majority of its population are rural migrants (Eissa et al., 2019). The area has similar characteristics to other informal settlements of Greater Cairo, like high density, inadequate infrastructure, and a lack of public services (Nagati & Elgendy, 2013).
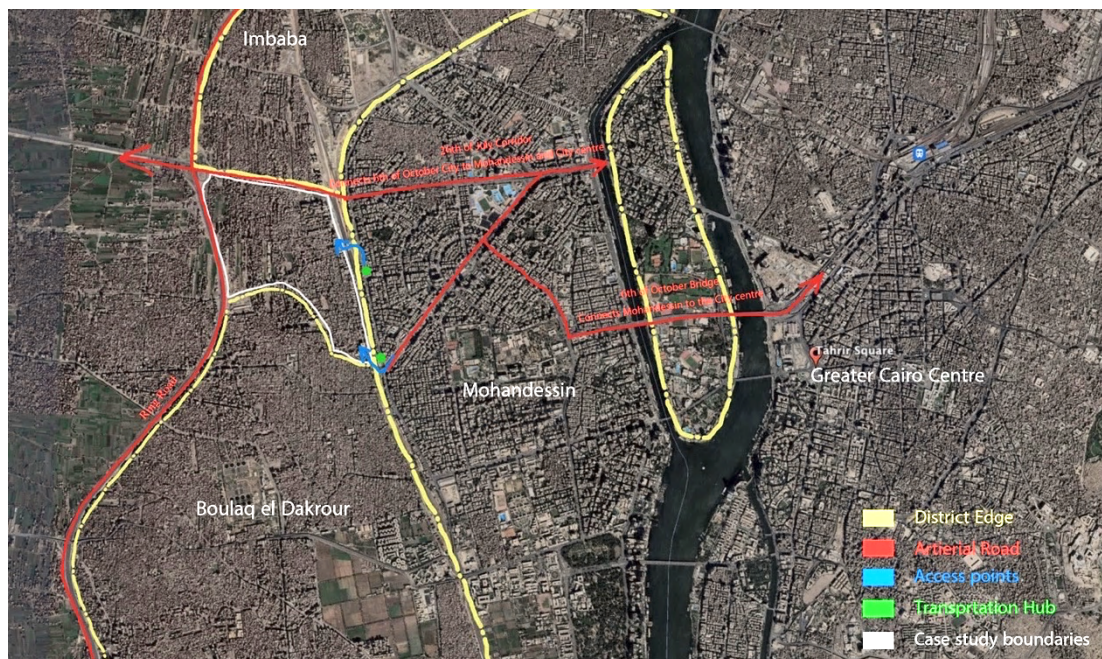
FIGURE 7.14: ARD EL LEWA ON THE WEST OF MOHANDESSIN, AND EASE OF ACCESS TO TRANSPORTATION CORRIDORS (GREEN LINES)

7.3.1   PHYSICAL CHARACTERISTICS

I.   LOCATION

Ard El Lewa is located on the western edge of Mohandessin. The settlement has defined boundaries. The 26th of July Corridor and Ring Road are the northern and western borders, respectively. Boulaq El Dakrour on the south and a railway on the east separate it from Mohandessin formal district (Figure 7.14). According to Participants MA, SA, HK and HG, Ard El Lewa's location gives residents access to job opportunities

and public services in Mohandessin. They live in a cheap area with good access to services in the formal city and good transportation links to the rest of the city.

II. Urban form

II.I Density

The settlement occupies 470 acres of previously agricultural land. Over time, the owners illegally subdivided their plots to sell or build, then rented or sold the apartments, depending on their financial situation. The owners built on their whole plot, with the settlement boundaries limiting the expansion of the settlement. This meant it expanded vertically, thus, increasing the population density of the settlement. Ard El Lewa has a population of around 300,000 residents, with a density of 638 persons/acre (Elgendy & Frigerio, 2018).

II.II Street Network

The feddan of land is 100-300 m long by 6-17 m wide of farmland and has 4 to 6 wide circulation paths running on the perimeter of the feddan, which later became residential streets (Malterre-Barthes, 2020). Then, the irrigation canal grid is filled and used as streets. The streets are unpaved and very narrow. The main streets are 12-18m wide, secondary streets are 8m, and residential streets are 4-6m wide (Elgendy, 2013). The hierarchy of the streets allows shops and workshops to be located on the main streets (Figure 7.15) so they can accommodate vehicles which means they are not easily walkable (Participant HG, 2021). The narrower secondary and residential streets (Figure 7.16) allow them to be more pedestrian-friendly and an extension of homes, compensating for the limited indoor spaces and lack of public spaces.

FIGURE 7.15: ONE OF THE MAIN STREETS SHOWS THAT THE GROUND FLOOR IS EXCLUSIVELY USED FOR COMMERCIAL USES

FIGURE 7.16: ARD EL LEWA'S STREET. THE LEFT IMAGE SHOWS ONE OF THE SECONDARY STREETS, WITH THE GROUND FLOOR RESERVED FOR COMMERCIAL USES. WHILE THE RIGHT ONE SHOWS ONE OF THE RESIDENTIAL STREETS THAT ARE VERY NARROW WITH LIMITED ECO-NOMIC ACTIVITIES

II.III LAND-USE

The development pattern of Ard El Lewa is mixed-use, with commercial uses intensified on the ground floor of buildings on the main streets (Participant HG; Participant HK). The inner streets are home to wood and metal workshops because most owners live in the same building or nearby (Participant HG, 2021). The non-residential uses intensify in the main streets, with a linear and clustered distribution pattern (Shawky & Abd Elghani, 2018). The highest mixed-use is residential and commercial, accounting for 18% of the area (Shawky & Abd Elghani, 2018). The mixed land uses are directly related to employment, where people invest for income activity, which affects the building form.

II.IV BUILDING FORM & HOUSING TYPES

Ard El Lewa's urban form is very compact, following the agricultural and irrigation grids and creating a highly dense and compact urban pattern (Figure 7.17) (Nagati & Elgendy, 2013). The building footprints range between 75 to 125 m^2 with one to two

apartments per floor; a standard building footprint also resulted from the subdivision of feddan (Malterre-Barthes, 2020). The buildings are usually five-storey high (Elgendy & Frigerio, 2018). Similar to other informal settlements, the building process is incremental, depending on the owner's financial situation (Elgendy, 2013). When finances allow, they build it for their children and rent it for extra income until they grow up (participant HK). In the 1990s, a new phenomenon of residential towers appeared in well-located locations near the formal area (Figure 7.18). These high-rise buildings can reach heights of 15 storeys, and their footprint ranges from 250 to 450 m^2 (Elgendy & Frigerio, 2018). This new typology is built in one stage and then put up for sale or rent (Sims, 2011). According to Sims (2011), this indicates how well-located the settlement is in relation to the formal city, which makes the area a good place for investment.
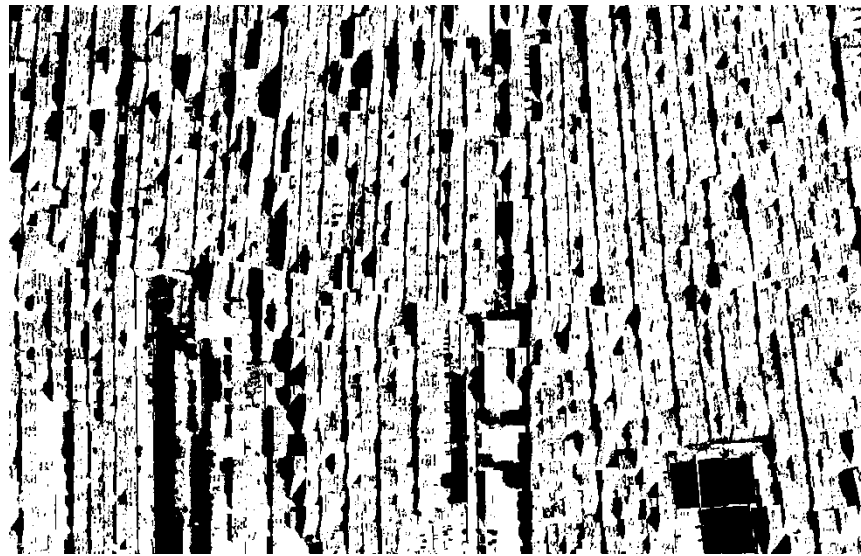
FIGURE 7.17: ARD EL LEWA COMPACT URBAN FORM WITH GRID STREET PATTERN FOLLOWING THE FORMER FARMLAND

FIGURE 7.18: THE HIGH-RISE APARTMENT BUILDING THAT ARE ON BUILT IN ONE STAGE ARE LINING THE EDGES OF ARD EL LEWA

Streets are the only public space available for residents. Residential streets act as an extension of homes where women socialise and children play (Elgendy, 2013). It allows for strong social ties and natural surveillance (Séjourné et al., 2009). While in commercial streets, activity relates to a shop or workshop, compensating for the lack of space inside (Participant HG, 2021). This is also appropriated by street vendors in certain areas, especially near access points (Eissa et al., 2019; Nafeh, 2015).

Another public space is building rooftops. Residents use it for different social and economic uses. They are home to animal breeding, pigeon towers, or the storage of unused items. During the day, women use it to hang laundry, feed animals, and socialise. On vacations and after school, they are used by children as a playground. While during the night, men take to their rooftops to train pigeons and socialise with friends (Nafeh, 2015). In summary, public spaces directly relate to the street network, economic activities, and social ties.

III. Transportation

The compact urban form and high connectivity between commercial and residential streets have made Ard El Lewa a walkable area. Residents walk within the settlement or to one of the access points to move outside the area. Another method is motorised rickshaws (Figure 7.19), in which residents ride them to move around the settlement or reach one of the access points to get on a microbus to other areas (Nafeh, 2015). The informal transportation stops are located under the bridges that connect Ard El Lewa with Mohandessin. There are two main access points: vehicles access through

FIGURE 7.19: The pedestrian bridge that connects Ard El Lewa to Mohandessin (Left). The motorised rickshaws used by residents to move around or to one of the access points

Boulaq Bridge and pedestrian bridges through Sudan street in Mohandessin (Figure 7.19) (Nafeh, 2015).

IV. INFRASTRUCTURE

Water, electricity, sewage and natural gas are available in the area. However, water and electricity suffer from regular cuts because of illegal connections and system overloading with more users than capability. In comparison, solid waste is managed informally through individuals who collect it once a week and dispose of it under bridges, water canals or empty lands (Nafeh, 2015).

7.3.2 SOCIAL CHARACTERISTICS

I. SOCIAL SERVICES

Ard El Lewa lacks any form of educational or health facilities or any form of social services. It has no schools; residents depend on Mohandessin to access education. Also, it has no hospital or public health centres. The residents compensated for this by developing private health centres (Ashraf et al., 2020). Although Ard El Lewa has a police station, the sense of security stems from strong community ties (Participant HG, 2021). The area's only forms of social service are the youth centre and football complex (Ashraf et al., 2020).

II. SOCIAL NETWORKS & COMMUNITY ORGANISATION

Social ties between community members are one of the main reasons for living in the area (Participant HG, 2021). The spatial configuration of narrow streets helped to build community ties. These strong social networks and traditional cultural norms inherited from village traditions set the rules for the community (Elgendy & Frigerio, 2018). Moreover, community members depend on each other to start their businesses and compensate for the lack of services (Participant HG, 2021). Thus, Participant HG indicates different community and youth organisations. They work on resolving problems faced by the community, helping low-income families and communicating with officials.

III. Cultural Background

The residents of Ard El Lewa are on a broad spectrum of socio-economic levels. Most of the residents are rural migrants who moved to Cairo, searching for job opportunities and a better standard of living (Eissa et al., 2019). The village traditions and norms provide the organisational bases for the community (Elgendy, 2013). Thus, the presence of pigeon towers, animal breeding on the rooftops of buildings and meeting and socialising in the streets and on rooftops (Nafeh, 2015).

7.3.3 Economic Characteristics

I. Economic Activities

Elgendy and Frigerio (2018) indicate that the socio-economic profile of Cairo's informal settlements is broad. It starts with street vendors and day labourers and includes shop owners, engineers and government employees. Participant SA, a professor at Cairo University, mentioned that she has colleagues living in Ard El Lewa. According to Participant HK, many residents work within the area because their livelihoods rely on strong social ties and an existing urban pattern. They set up their businesses to compensate for the lack of existing services (Participant HG, 2021). Participant HG said commercial services line the main streets (Figure 7.16), while wood and metal workshops are the most common business on the inner streets. Another economic activity practised by plot owners, who do not have the financial means to build or wait for a rise in value, is the conversion of land to car parking (Figure 7.20), whether self-managed or rented to others. The car park lots sometimes offer repair and wash services (Nafeh, 2015).

FIGURE 7.20: ONE OF THE EMPTY LANDS THAT ARE CONVERTED TO CAR PARKING

II. TENURE TYPES

Residents own the land of Ard El Lewa but illegally subdivided and built. The owners either build and then sell or rent the houses through informal contracts or subdivide their land and sell part of it. Thus, this offers a more secure tenure (Participant HK, 2020; Participant MA, 2021). The area has different tenure types, which are owner-occupied, rented, or informal contracts. Informal contracts are a mix of old and new rental law contracts invented by the residents. However, Nafeh (2015) indicated that renting is most common because of high demand; the owners realise it is an investment opportunity and wants to keep properties in the family.

III. HOUSING QUALITY

In general, the quality of the buildings is good. They are built from a reinforced concrete skeleton frame, with red brick walls and mostly un-plastered facades (Malterre-Barthes, 2020). However, in the older core, some houses include load-bearing walls and concrete slabs. Also, the houses are built incrementally (Elgendy, 2013). In the 1970s, development started as one-storey houses with a floor area of 75 to 125 m^2. It had one or two apartments. This typology was for one family, although later, in the 1990s, a one-off appeared (Figure 7.18) in good locations within the settlement. They have a larger footprint that could be 450 m^2, heights of up to 15 floors, and are fully finished (Elgendy & Frigerio, 2018).

7.3.1 TRANSFORMATION FACTORS

I. NON-SPATIAL SOCIAL, ECONOMIC AND POLITICAL FACTORS

I.I ECONOMIC GROWTH AND INFORMAL ECONOMY

Participant HK revealed that the informal real estate market has changed. There are many buildings with empty apartments. Contractors have appeared and built and left the building empty until the prices rise, then sell or rent. There have been changes in the urban pattern of the older core. Old buildings that used to have commercial ground floors have been demolished and replaced with shopping malls. Sometimes, they demolished two small adjacent buildings and replaced them with one building with two or three commercial floors and the rest as residential. The pattern of

development is changing and no longer responds to needs. In summary, housing supply exceeds demand, and the development pattern is changing, where bigger apartments and commercial uses are increasing on the main streets. The economy matured and provided a higher level of services.

I.II INFORMAL POLITICS

All interventions in unplanned areas include the provision of infrastructure, street paving and street lighting (Participant MA, 2021), and Ard El Lewa is no different. They have infrastructure which makes residents feel more secure, and the infrastructure is an unofficial recognition of the area. In the last couple of years, the state introduced the reconciliation law. The law allowed residents of Ard El Lewa to legalise because they own the land (Participant MA, 2021).

II. SPATIAL

II.I SITUATIONAL FACTORS

Three transportation corridors limit the horizontal expansion of Ard El Lewa. The 26th of July on the north, Ring Road on the west, and Railway corridor on the east separate Ard El Lewa from Mohandessin formal district. They limit the expansion but mean that the settlement is well located. Residents can access missing services in Mohandessin and look for job opportunities. Also, it has good transportation links to the city centre and the rest of Greater Cairo. The formal development had two effects on Ard El Lewa. First, the limitation of any horizontal expansion and, second, the increased population density due to vertical expansion.

II.II SITE FACTORS

The former agricultural nature of the settlement influenced the urban form. The rectangular pattern of farmland allowed for the subdivision to areas as small as 175 m^2 (one Kirat) and produced, to some extent, a standard plot and the apartment building's size. The small irrigation channels become narrow residential streets, while larger streets and drainage canals are filled and converted into main commercial streets (Nagati & Elgendy, 2013).

II.III Circulation Configuration

Ard El Lewa has a compact and grid urban form. The area development followed former irrigation canals and agricultural plots, thus creating main, secondary, and residential streets. They line the main streets with commercial shops because they can accommodate transport vehicles and pedestrians. In comparison, narrow residential streets ensure privacy, control strangers' entry and mean less car use except for private cars and tuk-tuks.

TABLE 7.1: CHARACTERISATION OF EZBET EL HAGGANA & ARD EL LEWA

Characteristics			Ezbet El Haggana (Squatter Settlement)	Ard El Lewa (Illegal Subdivision on agricultural land)
Physical	Urban Form	Location	North: Suez Road East: Ring Road West: Nasr City South: Nasr City	North: 26th of July Corridor East: Mohandessin West: Ring Road South: Boulaq El Dakrour
		Density	Very High Density (1330 person/feddan)	High density (638 person/feddan)
		Street Network	Organic/Topography shaped the streets Main streets: 10 – 12 m Secondary streets: 6 – 8 m Residential streets: 3 – 4 m	Grid/Agricultural plots and irrigation patterns shaped the streets Main streets: 12 – 18 m Secondary streets: 8 m Residential streets: 4 – 6 m
		Land-use	Mixed land use Linear and clustered non-residential uses with the ground floor on main streets used as commercial space.	Mixed land use Linear and clustered non-residential uses with the ground floor on main streets is commercial, while inner streets have wood and metal workshops.
		Building Form	Compact development pattern with three housing typologies present. Suessi houses are one-floor, poor, and in unsafe conditions (High Voltage Area) Family houses are incrementally built on an average plot area of 60–300 m^2 and reach heights of 3–5 floors with a commercial ground floor. Apartment building are apartments with areas of 120 m^2 or more, more than ten floors and commercial ground floors.	Compact development pattern of apartment buildings of 175 m^2 average plot areas, with average heigh of 5–8 floors. Later, high-rise buildings on the threshold of the formal city, up to 15 floors with 250–450 m2 footprints.
		Public Spaces	Streets are the only public space Extension of homes, workshops, socialising, children playground, etc.	Streets and rooftops are the only public space Streets are extensions of homes, workshops, socialising spaces, children's playgrounds, etc. Rooftops are used for micro-economies and animal breeding and to store unused items. Socialising space for women during the day and for men at night.
	Transportation		Compact urban form made the area walkable Tuk-tuks are used very frequently within the area, and pick-up trucks are used in rush hour, while microbuses connect the residents with formal areas. Four main points of access	Compact urban form made the area walkable Tuk-tuks are used very frequently within the area, and microbuses connect residents with formal areas. Connected Mohandessin with a limited number of crossings.
	Infrastructure		Water, electricity and natural gas are all available, but water and electricity suffer from regular cuts. Sewage is of very bad quality; it surfaces a lot. No formal solid waste collection: usually, it is thrown on empty land or burnt. One family collects and classifies garbage for recycling but only in some areas.	Water, electricity and natural gas are all available, but water and electricity suffer from regular cuts. No formal solid waste collection but there is an informal collection by individuals. Possible dumping areas are under bridges, al Zomor canal or on any empty land.

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Social	Social Services		Charitable health centres and private clinics Two primary schools are in bad condition. One private school afforded by the middle-class only Home for drug dealers and unsafe at night Conflicts resolved by community leaders	They lack any social services provided by the state. Residents depend on Mohandessin and neighbouring areas to access social services It has a police station, but the sense of security stems from strong community ties
	Social Networks		Strong social ties Community organisations try to help the poor and provide missing services.	Strong social ties. Community depends on others to start their own businesses to compensate for the lack of services Community organisations help in resolving community issues, poor families and communicating with officials.
	Cultural Background		Diverse cultural background. Al-Ghawasa and Al-Awameya Upper-Egypt migrants, migrants from Suez during the 1967 war, Christians from Minya, and a small number of Sudanese, Syrians and Somali refugees.	Residents are mostly rural migrants; thus, village traditions and norms are the organisational bases. Also, the presence of pigeon towers, animal breeding on rooftops, and meeting and socialising on streets and rooftops all stem from customs in rural life.
Economic	Economic Activities		Day labourers like construction workers, domestic workers, etc. Car repair shops. Waste recycling, especially iron. Street vendors.	The area has street vendors, day labourers, local shop owners as well as engineers and governmental employees. Presence of metal and wood workshops in inner streets. Car park, wash and repair in empty plots.
	Tenure Types		Old residents with old contracts give them the right to use and pay taxes. New residents with informal contracts, issued IDs with addresses and pay electricity bills.	The area has owned properties, rented apartments and 'Khalaw ragl', which is a mix of old and new rent contracts.
	Housing Quality		Suessi house is of poor and unsafe quality. Family houses are of better quality with reinforced concrete column and beam structure system. Apartment buildings are very similar to formal city buildings.	The building quality is good, made from a reinforced concrete column and beam structure system, but the older core still has some houses bearing walls and concrete slabs. Newer high-rise buildings are of the same structure quality, but they are finished.
Transformation	**Non-Spatial**	Informal Economy & Economic Growth	Main activities are informal real estate market, car maintenance workshops, and commercial shops providing services to residents	Main activities are informal real estate market, commercial shops providing services to residents while older buildings are rebuilt with extra commercial floors or all the buildings is a shopping mall, and wood and metal workshops are located on inner streets.
		Informal Politics	Categorised unplanned area where no eviction should take place. Provision of infrastructure	Categorised unplanned area where no eviction should take place. Provision of infrastructure and introduction of reconciliation law

Spatial	Situational Factors	Nasr City development has made the area attractive and the later Ring Road & New Cairo. Location relative to formal areas where services and job opportunities	Mohandessin development and later the Ring Road made the area attractive. The area is limited, which means it could only expand vertically Location is relative to formal areas where services and job opportunities can be found
	Site Factors	In the beginning, the military allowed camel corps soldiers to build houses and live on the land. Later, the location became very attractive for informal investors and residents looking for affordable housing.	Former agricultural plots and irrigation canals influenced the urban form and standardised the plot and apartment sizes.
	Circulation Configuration	Compact organic urban form in addition to tying commercial streets with pedestrian ones to create a walkable and mixed-use area. Also, narrow residential streets created secure areas.	Compact grided urban form created a walkable and mixed-use area. Main streets are lined with commercial shops because they are wider and can accommodate transport vehicles and pedestrians. Also, narrow residential streets created secure areas.

7.4   EXPERTS INTERVIEWS

The interviewees are experts in the informal settlements of Greater Cairo; they are academics, architects and urban planners. Throughout the interviews, informal settlements were discussed, and information was gathered about their characteristics, focusing on Ezbet El Haggana and Ard El Lewa. The research identified gaps in the data after the literature review phase, especially in the two cases. The questions were about the factors that influenced informal growth, the reasons for choosing informal over formal areas, and the state governance of the informal settlements. Another topic was about intervention strategies on the governmental level concerning the decision-making process, how the state perceives informal areas and residents' preferences toward any intervention. Finally, the researcher asked the interviewees about the best practices for dealing with informal settlements and the main factors behind successful interventions.

I.   INFORMAL CHARACTERISTICS

The interviews discussed the different characteristics and confirmed that most, if not all, settlements have poor infrastructure networks. The settlements are connected to different utility networks, but the quality is lacking. Participant SA mentioned that they have electricity and water, but higher floors face problems with low pressure or no water at all. Participant HE added that utility networks, when introduced, were not designed for the high population density, unlike formal areas such as Nasr City. Another aspect is services. Informal areas lack public services. Participant HG said that residents could fill gaps by starting a business to compensate for the lack of services. Also, Participant HK found that in Ezbet El Haggana, people were working in recycling, especially iron.

Moreover, the location of informal settlements is vital. Almost all participants mentioned that informal settlements emerged in good locations to access jobs and services in the formal city. They all mentioned that Ard El Lewa and Ezbet El Haggana locations are essential to people's livelihoods. Participants HK and SA said that most informal residents work in the nearby formal areas as domestic workers, shops,

salespeople, etc. Therefore, the informal-formal relations are very strong. Informal residents need formal areas to work and access education and health facilities, while the surrounding areas cannot function without the workforce of the informal areas. Also, women in informal communities play a significant role in providing social services in formal areas. They provide cleaning services, care for children and the elderly, nurses in hospitals and health facilities, etc.

Life is very different in the informal areas from formal ones. Social ties and networks are very important for everyday life, so residents hold on to their areas. Residents know each other, which compensates for the lack of services. Also, these strong ties are established because of the compactness of the urban form. The first settlers moved in and then brought their families. Later, relatives and friends moved in to live near each other. We can assume that the compact urban form responded to their way of life and vice versa. Also, the social ties were strengthened because of the rural origins of the residents. They had the same traditions and values, which were reflected in how the spaces were governed. The streets are the only open spaces in informal settlements which are used for different activities. Families and neighbours use streets as socialising spaces while shops and workshops use them to extend their limited inner spaces. According to Participant HE, if it is not against their values and traditions, they can set streets to accommodate special occasions like weddings.

Participant HK mentioned that the informal market has been changing and becoming more mature in the past ten years. She mentioned that old buildings are replaced by shopping malls, or they may replace two adjacent buildings with one. The new one is different as it has bigger apartments, and the first two or three floors are for commercial use. In summary, the urban fabric is changing and upgrading. They build better and bigger apartments and increase commercial uses.

II. INTERVENTIONS

The second topic discussed was intervention strategies. The current cabinet focuses on unsafe areas. They address it through the total redevelopment of the area or by evicting and relocating the people. In unplanned areas, the interventions are

primarily physical, like street paving and lighting and the provision of infrastructure (Participant MA). Besides, reconciliation law allowed owners to legalise their buildings; however, only those on agricultural land built before a specific date (Participant MA) were eligible. Moreover, squatter settlements like Ezbet El Haggana needed to legalise the land first, then reconcile. It starts when the governorate issues a plan for the settlement and provides utilities and services, increasing property value. They paid the difference in instalments over the years between the old and new evaluations of the properties (Participant MA).

In comparison, unsafe areas are evicted and redeveloped, or the people are relocated to newly built public housing. Newly built areas or redevelopment plans are unsuitable to the people's needs and way of life. New housing units are assigned randomly, destroying social and economic networks; plus, the designs follow obsolete models following mono-zone and wide streets concepts. These new areas differ substantially from the compact, walkable, mixed-use nature of old, unsafe areas.

III. FACTORS OF SUCCESS

The third topic discussed in the interviews was the problems associated with intervention strategies. Participant HS said that an in-depth assessment of the community's needs and priorities is essential, which participants HE, MA and NA confirmed. She added that the sustainability of interventions is crucial because changes could be successful at the beginning but could later face institutional, financial or management problems. Another important aspect is the involvement of related governmental organisations to ensure all permissions are met or there is no overlapping of the work (Participant HS). Participants HE and HK mentioned community participation. Community participation in intervention projects is not undertaken in the right way because the Local Popular Council law is frozen. This led to the planning and implementation of interventions without presentation to community representatives. Also, reports of community representation in some projects may not be accurate. According to participant HK, she was part of a project where some officials were trying to halt the participation of the community and steered interventions toward political gain. Interventions need to be comprehensive. Almost all participants confirm the need to

move away from a physical upgrade and to include social and economic aspects. All said that interventions in unplanned areas deal with the provision of infrastructure, street lighting and street paving.

7.4.2   INTERVIEWS CONCLUSION

In the end, the interviews contributed to the investigation. They supported the data according to the three research themes. After analysing the interviews, the investigation into the relationships between the characteristics was enhanced and adapted to the Egyptian context (see section 6.5.1). Also, it helped to develop an understanding of the non-spatial and spatial factors that influence informal growth (see section 6.5.2). Moreover, the discussion about the factors of success created a conceptualisation of what needs to be introduced in the Control & Integration Model (chapter 8). Nevertheless, discussions on the intervention strategy, which are no less important than the factors of success, gave an indication and supported the different sections of the Control & Integration Model.

7.5   CHARACTERISATION OF INFORMAL SETTLEMENTS FRAMEWORK

There are relations between the different characteristics identified (physical, economic and social). In chapter two, the relational approach acknowledges the presence of informal-formal relations and their effect on the built environment. While in chapter four, the investigation concluded that the relations between the different physical, social and economic characteristics shape the built environment, and thus, produce the characterisation framework. So, the investigation into Ezbet El Haggana and Ard El Lewa proved those relationships. Based on the empirical investigation framework, the Characterisation of Informal Settlements Framework (CISF) is a three-tiered framework. The first tier deals with the relationships between the physical, social and economic characteristics. The second tier investigates the factors of transformation to understand the reasons behind the continued growth of informal settlements. Finally, the third tier cross-examines the case studies with sustainable urban form indicators.

I.   Physical Characteristics

I.I   Location

The location of the informal settlement is essential to residents' lives and livelihoods. Ezbet El Haggana and Ard El Lewa are near formal areas and important transportation corridors (Figure 6.1 & 6.14), which easily connects them to transportation links and means they can access important transportation corridors and extend basic infrastructure. Also, their location near formal areas allows access to social services and jobs unavailable in the settlement (Figure 7.21).
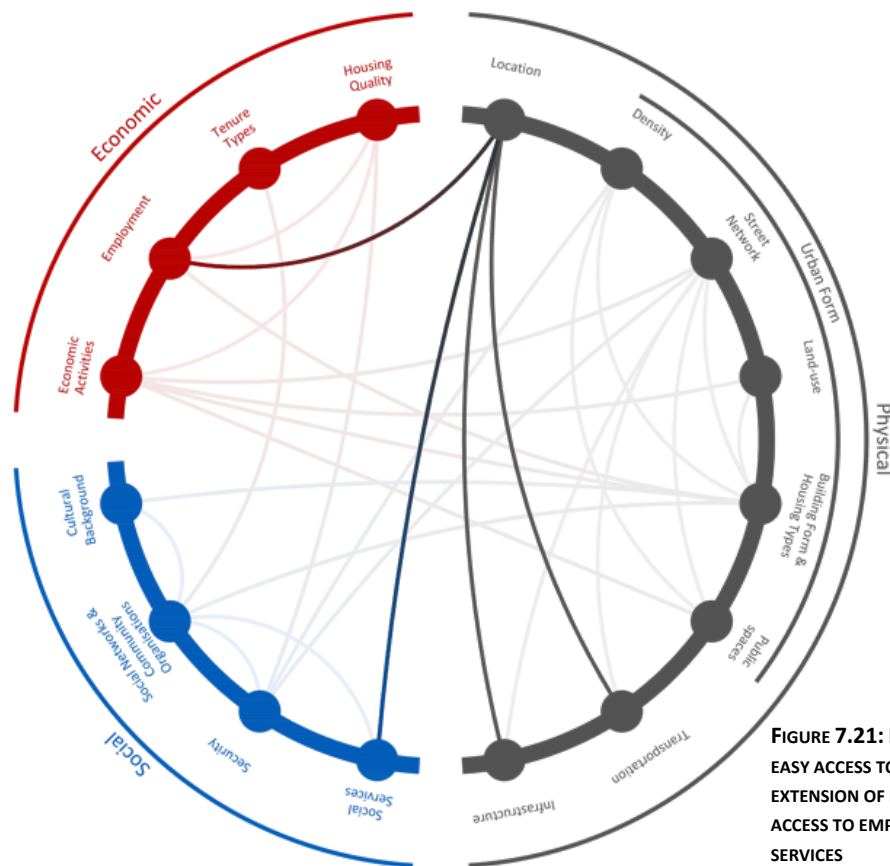
Figure 7.21: Location is related to easy access to transportation, the extension of infrastructure and access to employment and social services

I.II   Urban Form

I.II.I   Density

High population density defines Ezbet El Haggana and Ard El Lewa. The increased density was due to the attraction to a good location, affordability, and opportunities to live near family and friends (Figure 7.22). The high density shaped the building form and housing types. Thus, most buildings are attached, and vertical expansion

occurs to accommodate more people. Furthermore, the high density was affected by the limited availability of public spaces as increasing numbers of people wanted to live in the area. They tried to accommodate more housing units in a limited space.
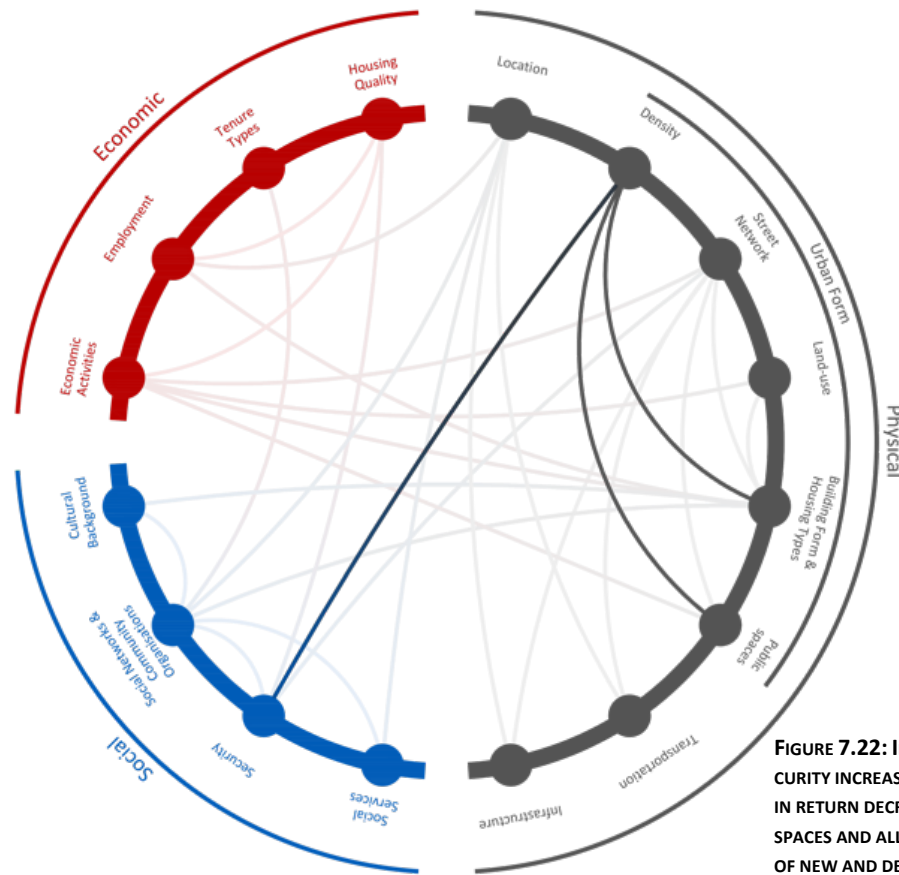
FIGURE 7.22: INCREASED SENSE OF SE-CURITY INCREASED THE DENSITY, WHICH IN RETURN DECREASED THE PUBLIC SPACES AND ALLOWED THE EMERGENCE OF NEW AND DENSER HOUSING TYPES

I.II.II   STREET NETWORK

The compact building form and mixed land use affect the street network of both case studies (Figure 7.23). The compactness and high density of the built environment created narrow shaded streets due to the height of the buildings relative to the street's width. Also, the multiple uses of streets are due to the limited availability of public spaces. Street vendors, workshops and shops use the streets for extra space, a playground for kids to play, and neighbours to socialise, enhancing social ties. These different uses allow for constant monitoring of the street, which gives a sense of safety and security. Another effect of the street network is the transportation within the area. The narrow streets make walking the preferred method for residents to move around, with the tuk-tuks the only other option because of their small size.

FIGURE 7.23: NARROW STREET NET-WORKS ARE INFLUENCED BY THE BUILDING FORM AND THE PUBLIC SPACE. ALSO, IT INFLUENCES THE WALKABILITY AND SENSE OF SECURITY
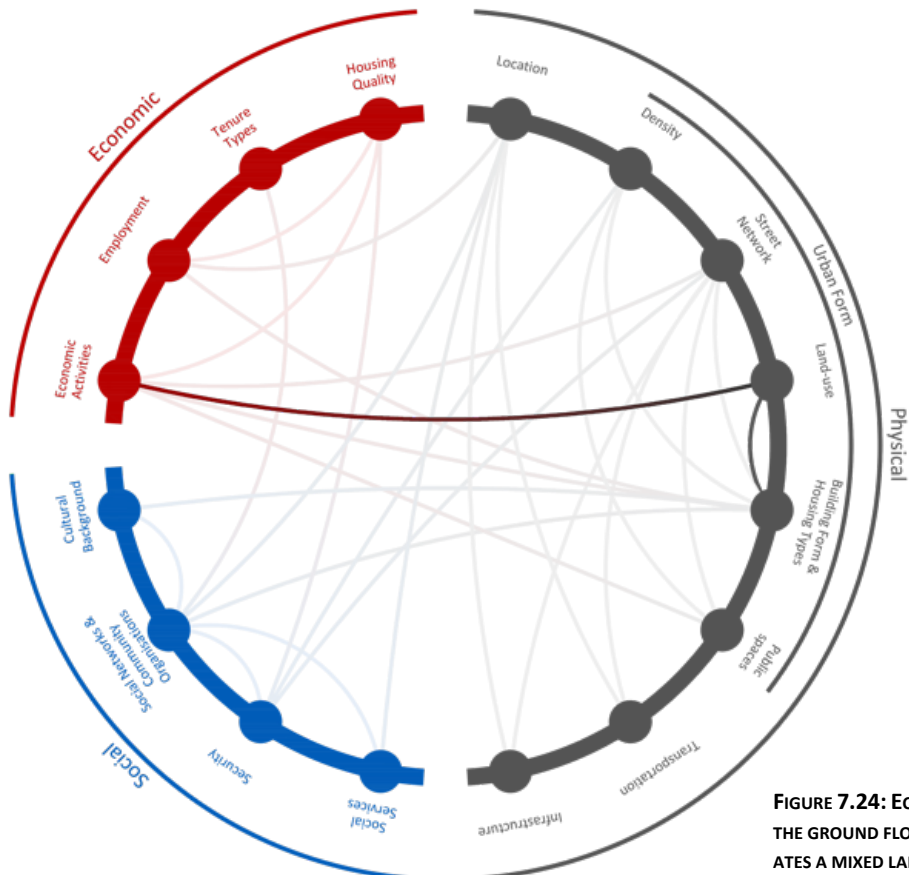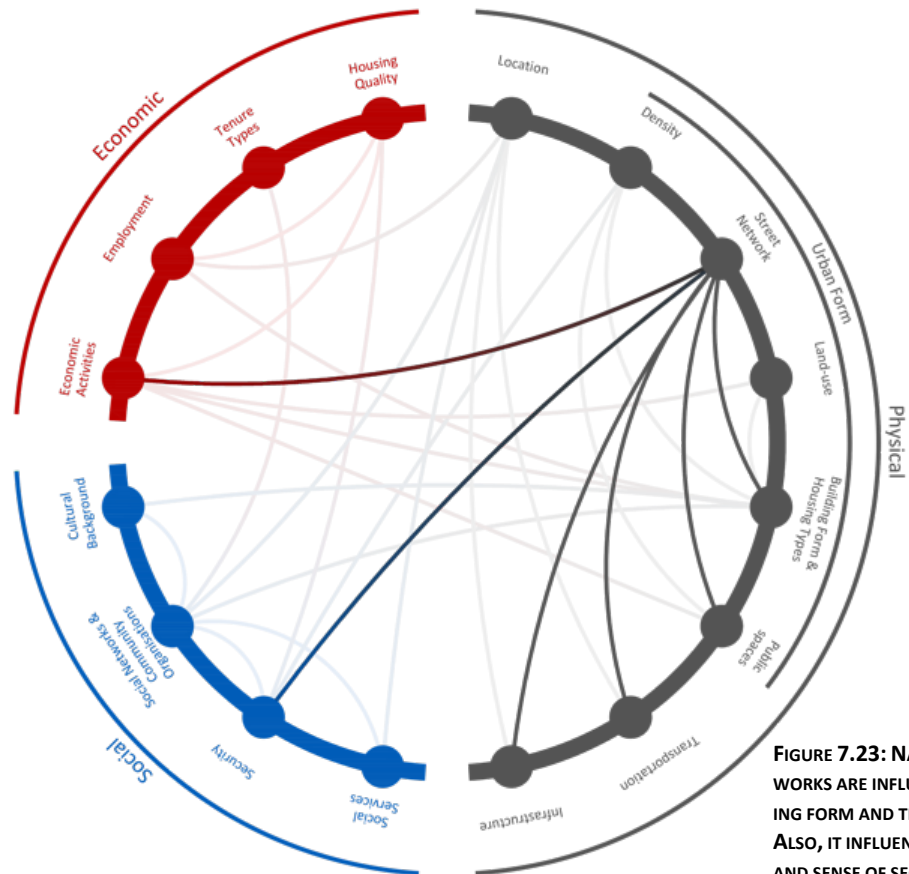
FIGURE 7.24: ECONOMIC ACTIVITIES ON THE GROUND FLOOR OF BUILDINGS CREATES A MIXED LAND USE

The compact building form and preserving the ground floor for commercial uses create mixed land uses (Figure 7.24). The commercial ground floor generates income for the owner by renting or starting his own business. The compact form and mixed land use stress the area's walkability by living near a place of work and finding everyday needs.

I.II.IV BUILDING FORM & HOUSING TYPES

High population density and mixed land use created a compact urban form. This compactness strengthened social ties between neighbours, hence increasing a sense of security. The housing typology in the area responded to the cultural background of residents. Residents build their houses with extra floors for future generations or rent them to relatives, which helps to enhance the social ties between residents (Figure 7.25).
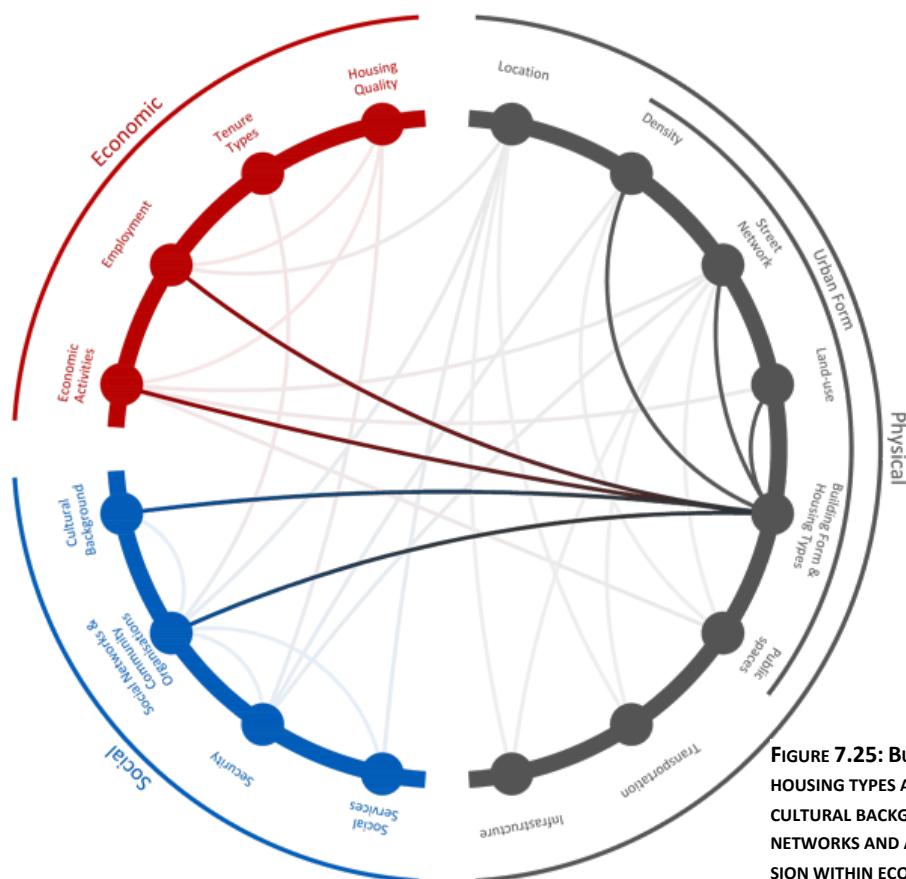
FIGURE 7.25: BUILDING FORM & HOUSING TYPES ARE AFFECTED BY THE CULTURAL BACKGROUND AND SOCIAL NETWORKS AND ADAPTED FOR INCLUSION WITHIN ECONOMIC ACTIVITIES

The public spaces in both case studies include streets and rooftops, especially streets. They use streets for movement, social and economic activities, meaning they are the only public spaces. The use of public spaces is governed by rules stemming from residents' cultures, where it can occur if it is deemed acceptable (Figure 7.26).
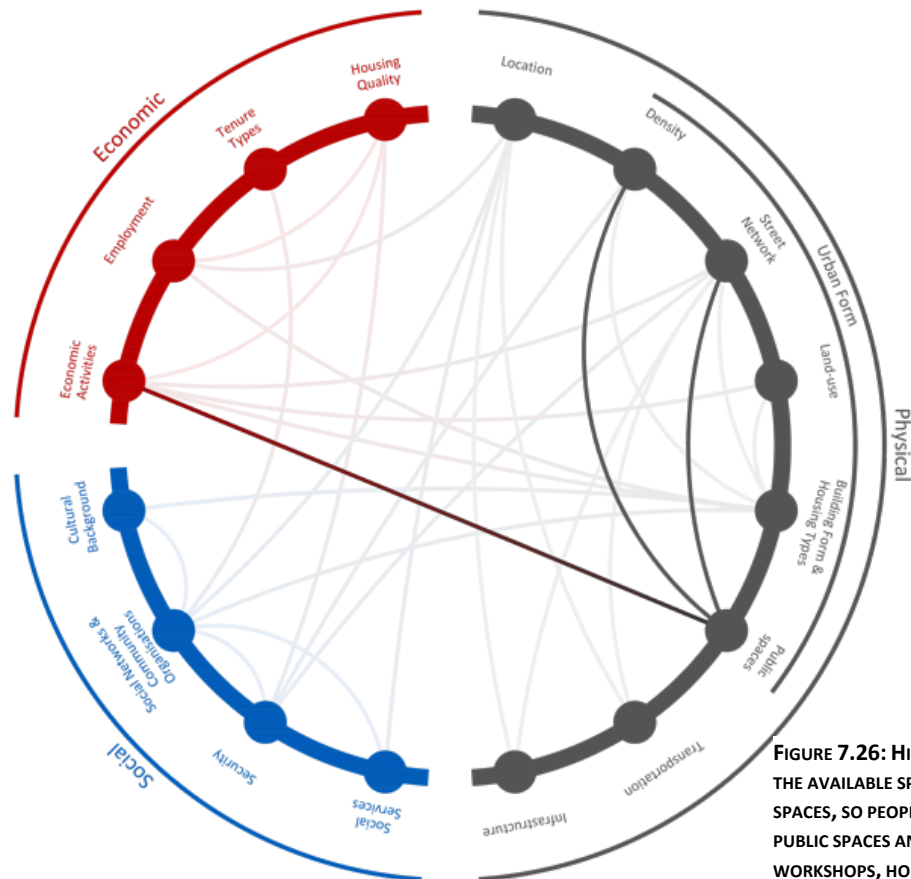
FIGURE 7.26: HIGH DENSITY LIMITED THE AVAILABLE SPACE FOR PUBLIC SPACES, SO PEOPLE USE THE STREETS AS PUBLIC SPACES AND AS EXTENSIONS FOR WORKSHOPS, HOMES, ETC.

I.III TRANSPORTATION

The locations of both settlements have good links with regional transportation networks as they are close to major transportation corridors and next to formal areas. The transportation links allow both areas to attract more people. Walking is the preferred method for moving within the settlements. The narrow streets and compactness make this the best way to move around (Figure 7.27).
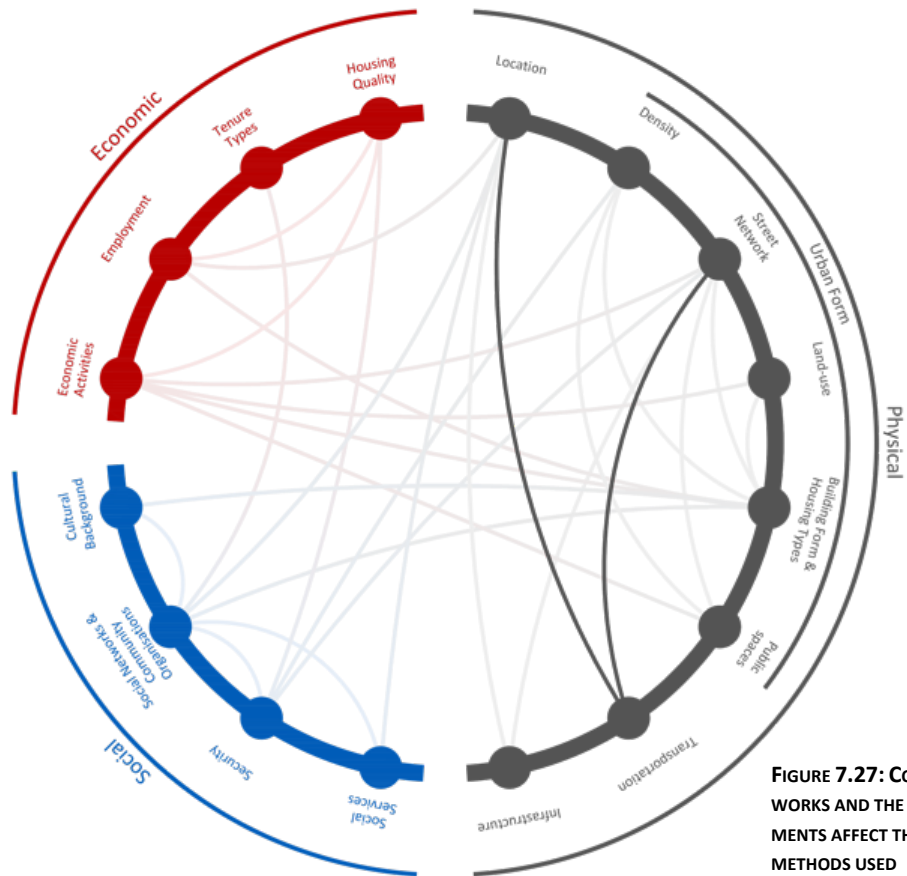
FIGURE 7.27: COMPACT STREET NETWORKS AND THE LOCATION OF SETTLEMENTS AFFECT THE TRANSPORTATION METHODS USED
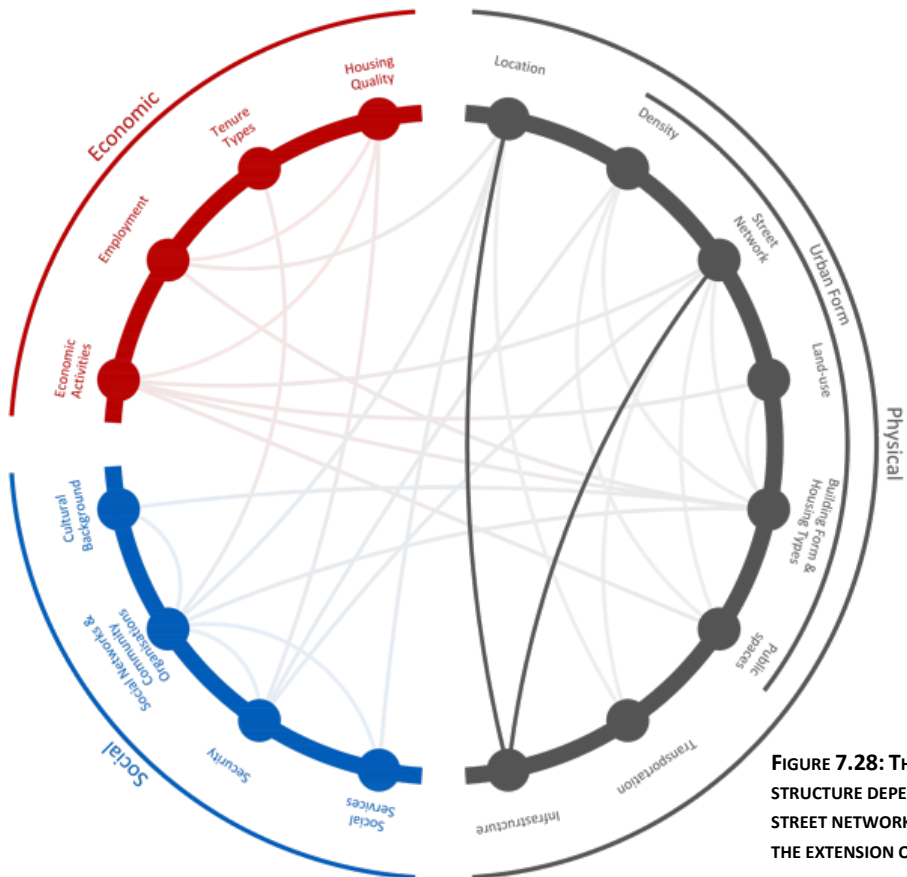
FIGURE 7.28: THE PRESENCE OF INFRASTRUCTURE DEPENDS ON LOCATION AND STREET NETWORKS THAT ALLOW FOR THE EXTENSION OF THOSE NETWORKS

I.IV INFRASTRUCTURE

Both settlement locations are near formal areas and allow for the extension of different utility infrastructures. The location plays a role in extending the utility network from nearby areas to the informal settlement. Also, the presence of infrastructure increases the attractiveness of both settlements to wider socio-economic groups, hence, the increasing population (Figure 7.28).

II. SOCIAL CHARACTERISTICS

II.I SOCIAL SERVICES

Both areas have inadequate or lack social services, so residents depend on formal areas to access those. Therefore, the location is essential, as well as links with the transportation network of the city (Figure 7.29). Another important aspect of providing services in the areas is the CBOs, NGOs and social ties. Residents depend on each other to ask for help from relatives or friends. Also, local NGOs and CBOs help to compensate for the lack of services by providing them instead. They can achieve this by communicating with the community and understanding their needs. Also, the
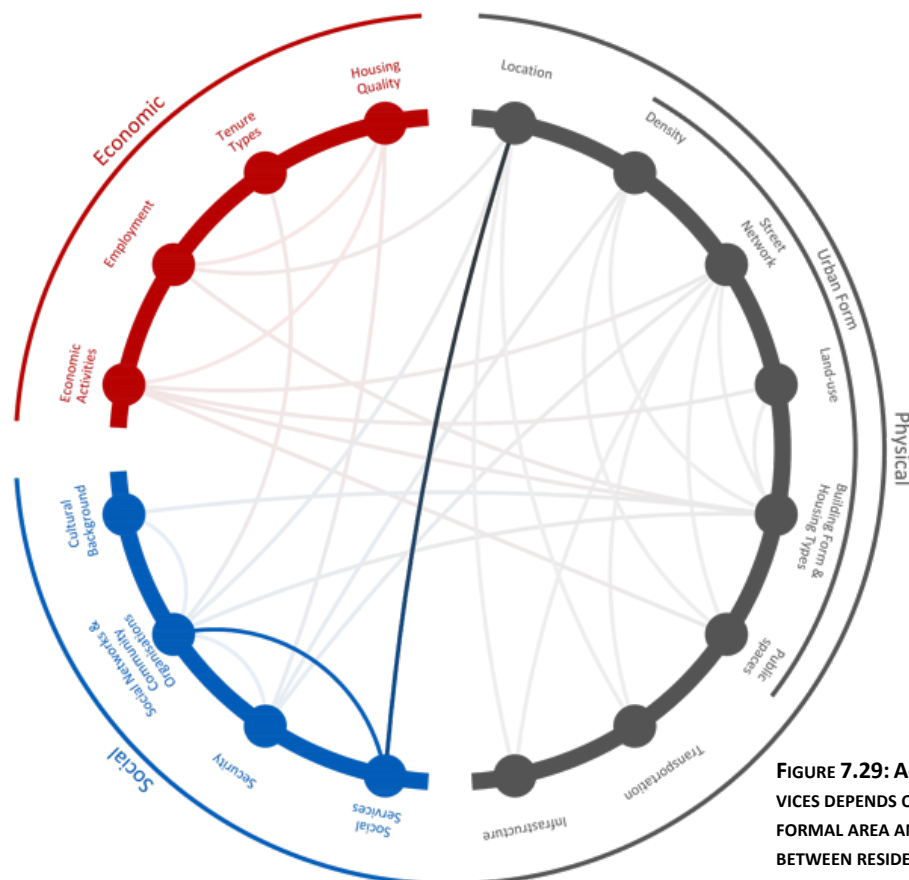
FIGURE 7.29: ACCESSING SOCIAL SERVICES DEPENDS ON CLOSENESS TO THE FORMAL AREA AND STRONG SOCIAL TIES BETWEEN RESIDENTS

residents of informal areas provide social services like cleaning services and caregiving to formal area residents. Thus, the informal-formal social reciprocity.

II.II Security

Strong social ties and narrow private residential streets increase the sense of security in the area. Strong social networks allow residents to know their neighbours. Also, the presence of different uses and the use of streets as public spaces mean that there is greater natural surveillance of the street, making the entrance of any outsider more noticeable. Additionally, residents have some sense of tenure security because both settlements are too big to eradicate; plus, people own the land in Ard El Lewa. Hence, due to this security and commitment, the houses are of good structural quality (Figure 7.30).
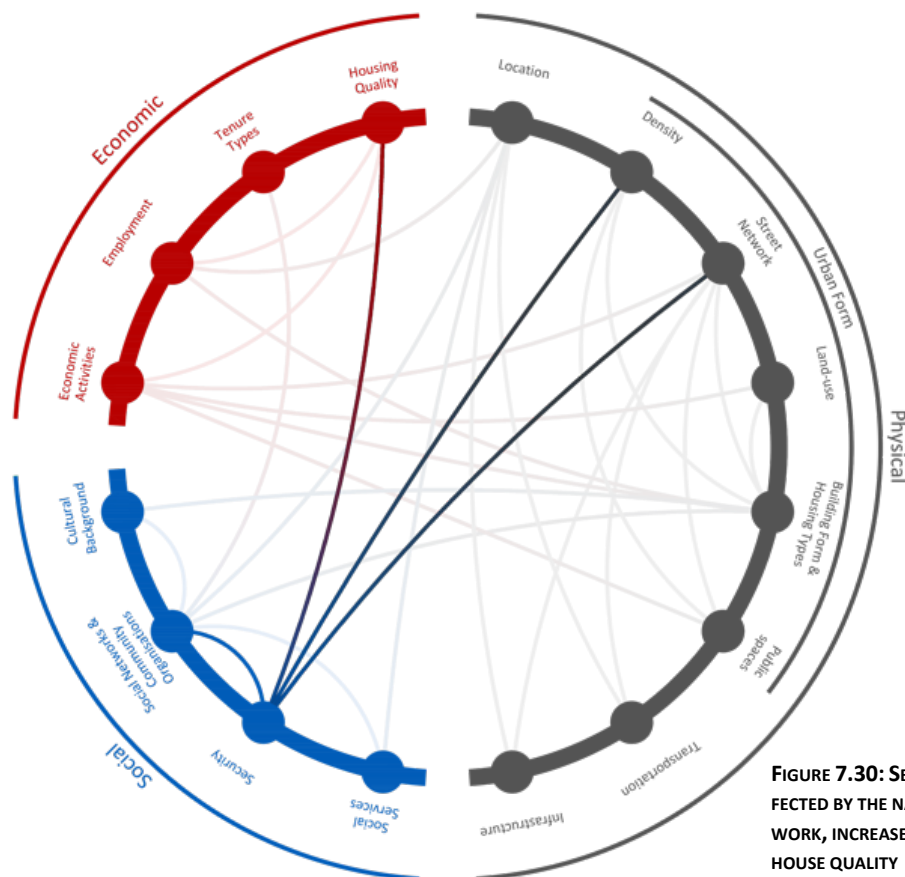
FIGURE 7.30: SENSE OF SECURITY IS AFFECTED BY THE NARROW STREET NETWORK, INCREASED DENSITY AND BETTER HOUSE QUALITY

II.III Social Networks & Community Organisation

Social networks are created and well-established because most residents originate from the same rural areas, with the same cultural background, and share the same values. It increases the sense of security felt when living in the area. Also, compact building forms preserve these networks, while strong social networks and the establishment of community organisations support the community by providing some of the social services they lack (Figure 7.31).
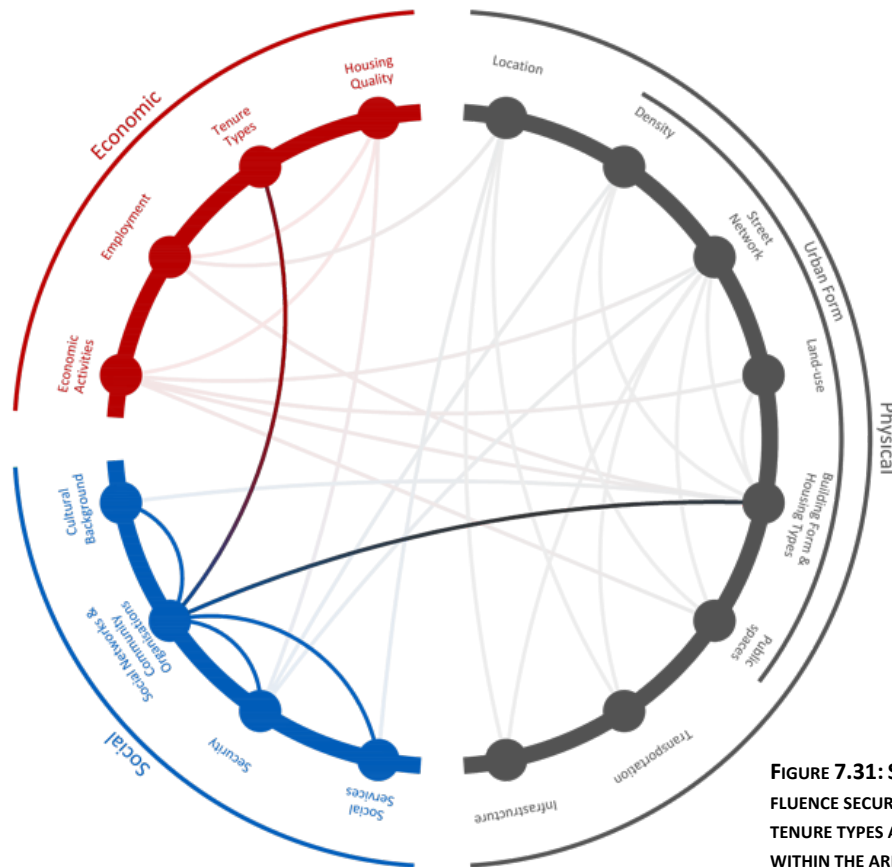
FIGURE 7.31: SOCIAL NETWORKS INFLUENCE SECURITY, HOUSING TYPES, TENURE TYPES AND SOCIAL SERVICES WITHIN THE AREA

II.IV Cultural Background

The shared cultural background of rural migrants established social networks in both areas. Also, their cultural backgrounds have affected their housing types; thus, the presence of family houses and vertical expansion helps accommodate future generations and migrating relatives (Figure 7.32).

FIGURE **7.32:** COMMON CULTURAL BACKGROUND HELPS TO ESTABLISH STRONG SOCIAL TIES AND INFLUENCES HOUSING TYPES
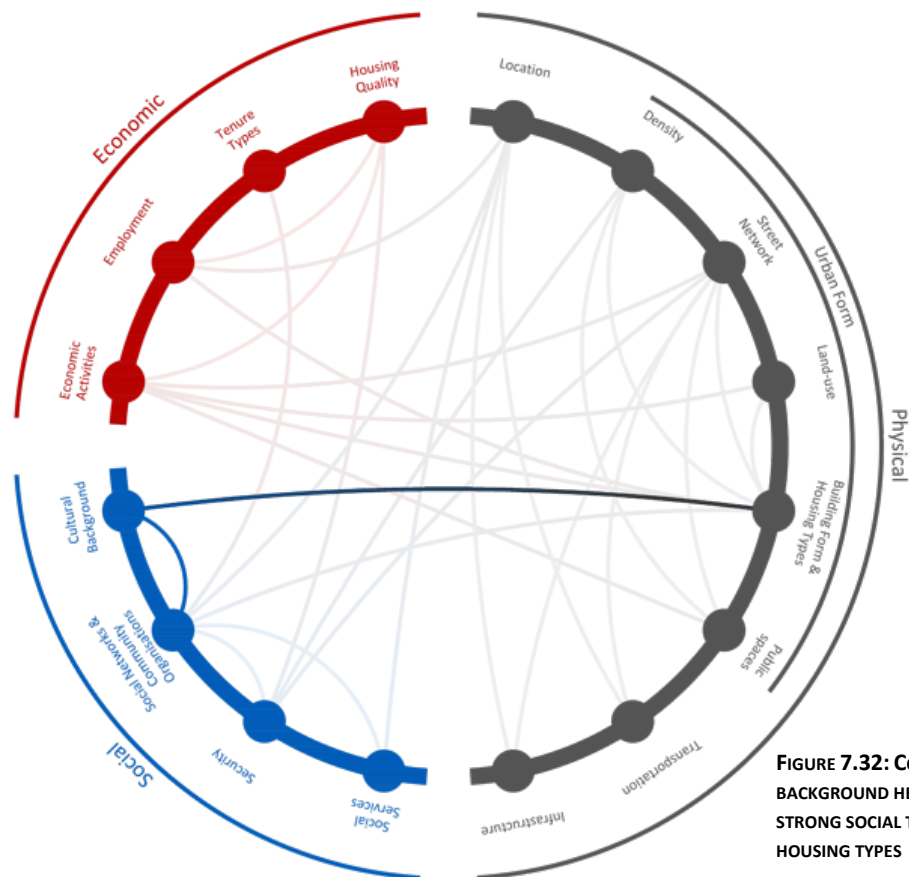
III. ECONOMIC CHARACTERISTICS

III.I ECONOMIC ACTIVITIES

Economic activities inside the informal settlements result from the mixed-use of buildings as they generate income and provide residents services. Also, the economic activities expand to the front public spaces of streets because of the limited space inside. In addition, the income from these activities affects the quality of the houses enabling upgrades and improvements (Figure 7.33).

III.II EMPLOYMENT

The location of the settlements is very important for finding work. Living nearby formal areas allows residents to find job opportunities. In Ezbet El Haggana, they work in Nasr city, Sheraton and New Cairo, while Ard El Lewa residents work in Mohandessin or other nearby informal areas (Figure 7.34).
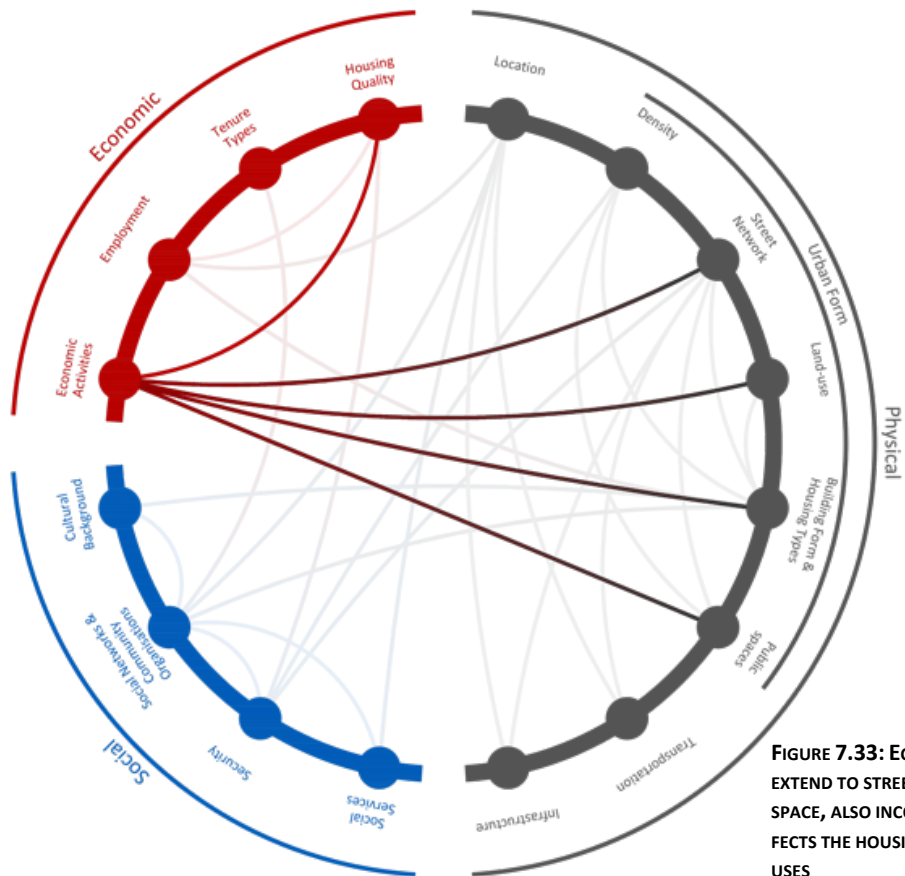
FIGURE 7.33: ECONOMIC ACTIVITIES EXTEND TO STREETS AS THE ONLY PUBLIC SPACE, ALSO INCOME-GENERATING AFFECTS THE HOUSING TYPES AND LAND USES
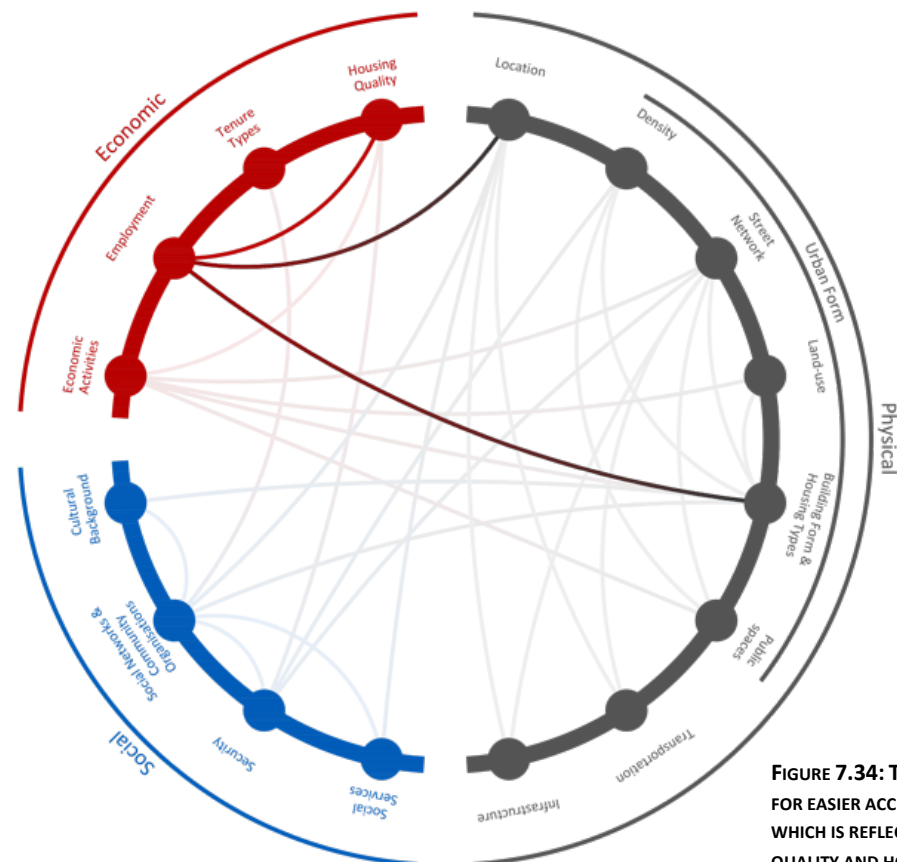
FIGURE 7.34: THE LOCATION ALLOWS FOR EASIER ACCESS TO EMPLOYMENT WHICH IS REFLECTED IN THE HOUSING QUALITY AND HOUSING TYPES

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III.III Tenure Types

The case studies have different tenure types, from room rental to building ownership. All these types of tenure are found and governed by the people and by informal contracts, ensuring everyone's rights (Figure 7.35). Social networks play a role in honouring and governing these contracts. The network of relations and the sense of familiarity increase the trust in the community, which makes these informal contracts trustworthy.
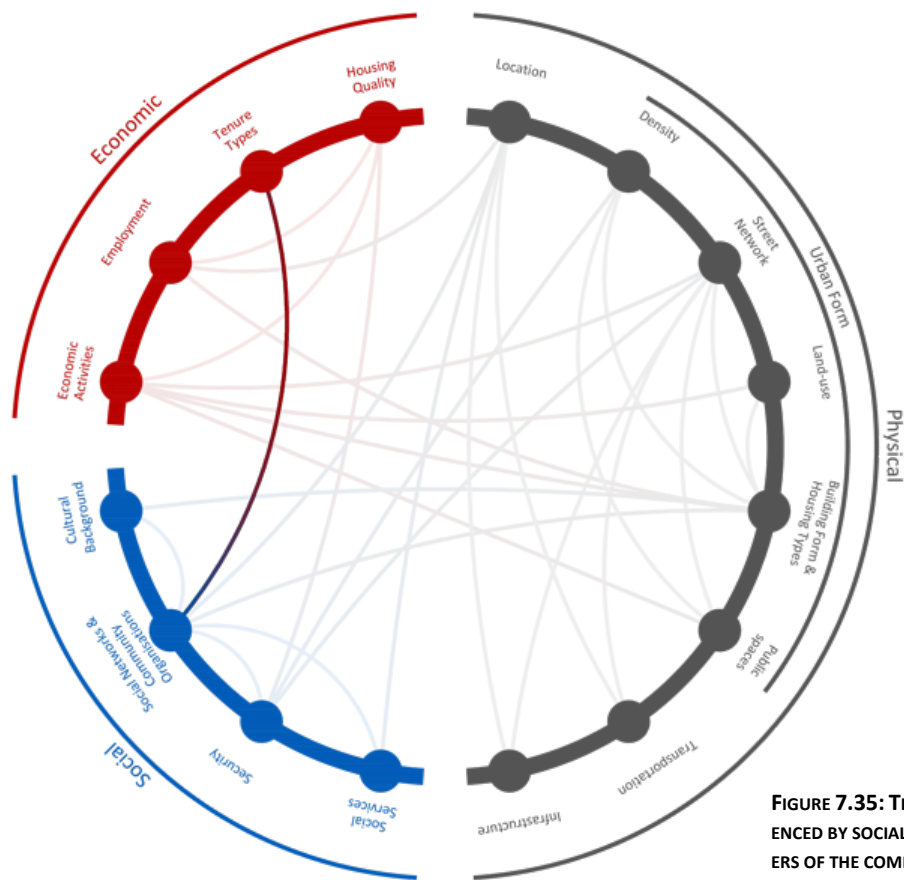
FIGURE 7.35: TENURE TYPES ARE INFLUENCED BY SOCIAL NETWORKS AND LEADERS OF THE COMMUNITY

III.IV Housing Quality

The good quality buildings in both areas depend on three major factors. First, people who have engaged in the informal economy and later upgrade their houses. Second, living near formal areas and accessing jobs generates income to own better housing. Finally, the sense of security and knowing that the government will not evict them because of the size of the settlements and being categorised as unplanned areas (Figure 7.36).

FIGURE 7.36: BETTER HOUSING QUALITY MEANS A GREATER SENSE OF SECURITY, BETTER EMPLOYMENT AND GREATER ECONOMIC ACTIVITY
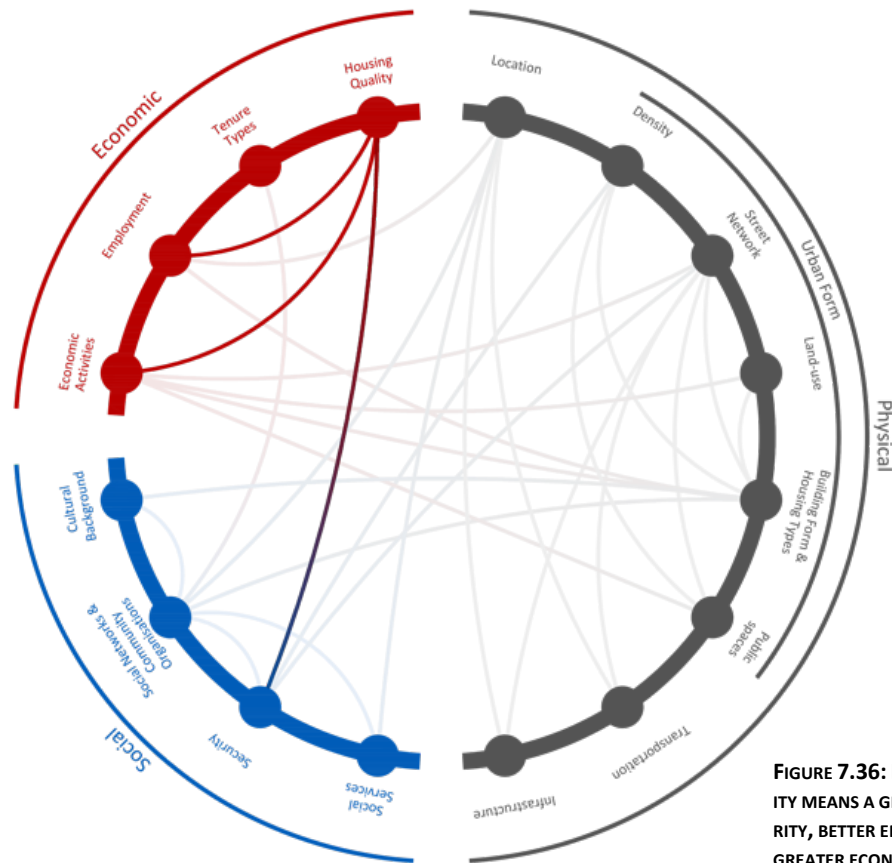
7.5.2 TIER 2: FACTORS OF TRANSFORMATION

I. NON-SPATIAL

I.I ECONOMIC GROWTH

The changing pattern of development results from economic growth (Figure 7.37). Both settlements have a strong informal real estate market. In Ezbet El Haggana, the act of partnership appeared in 2004. Informal contractors partnered with Suessi house owners to replace this accommodation with apartment buildings. This resulted in better quality houses and proved that it was a good place to invest. While in Ard El Lewa, the demolition of old buildings occurred either to change their use or to build better housing. The new build includes bigger apartments or increasing the commercial use from one to several floors, or sometimes the whole building. It leads to bigger apartments and increasing commercial use on the main streets. In sum, the economic growth of informal settlements can be traced back to the activities of the real estate market, the housing quality of the area, changing land use and changing building form.
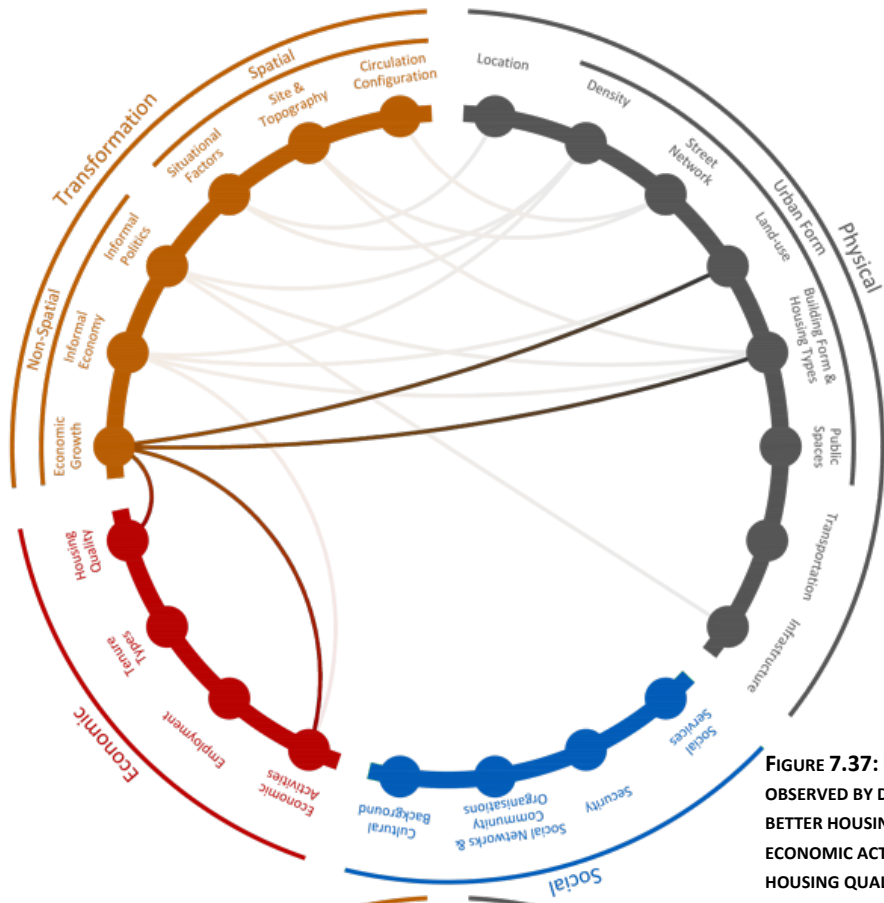
FIGURE 7.37: ECONOMIC GROWTH IS OBSERVED BY DIFFERENT LAND USES, BETTER HOUSING TYPES, INCREASED ECONOMIC ACTIVITIES AND BETTER HOUSING QUALITY
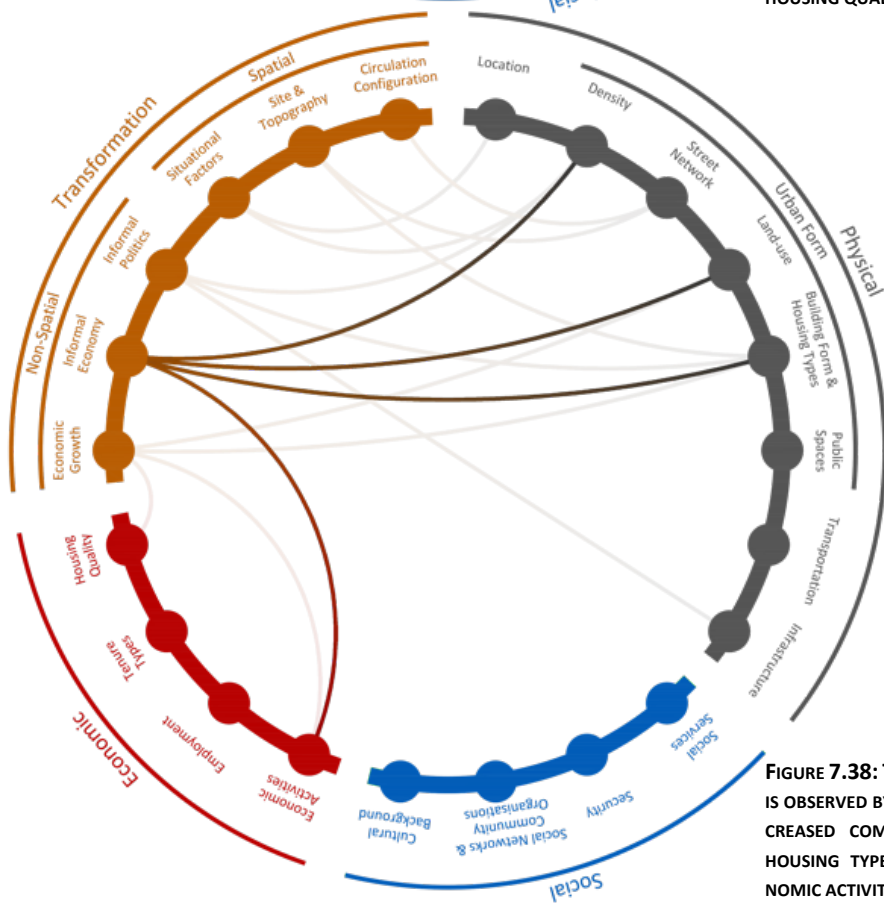
FIGURE 7.38: THE INFORMAL ECONOMY IS OBSERVED BY INCREASED DENSITY, INCREASED COMMERCIAL USES, BIGGER HOUSING TYPES AND INCREASED ECONOMIC ACTIVITIES

I.II   INFORMAL ECONOMY

Case studies and other informal settlements are home to informal workers and work-shops that are not registered. The areas house domestic workers, construction work-ers, day labourers and salespeople working in the shops of formal districts, etc. The flourishing informal economy can be traced back to all economic activities in the in-formal settlements. Workers living in informal settlements create and sustain the in-formal economy, and the mixed-use urban form allows for different commercial uses on the ground floors of a building, which increase over time (Figure 7.38).

I.III   INFORMAL POLITICS

The politics of the government deal with informal settlements and affect the growth of both settlements. This started by extending the infrastructure network of different utilities to the area, which means a recognition of the area and the rights of the peo-ple to live there. Later, the ISDF developed the categorisation of both areas, namely unplanned. This especially applies to Ard El Lewa, where the reconciliation law allows
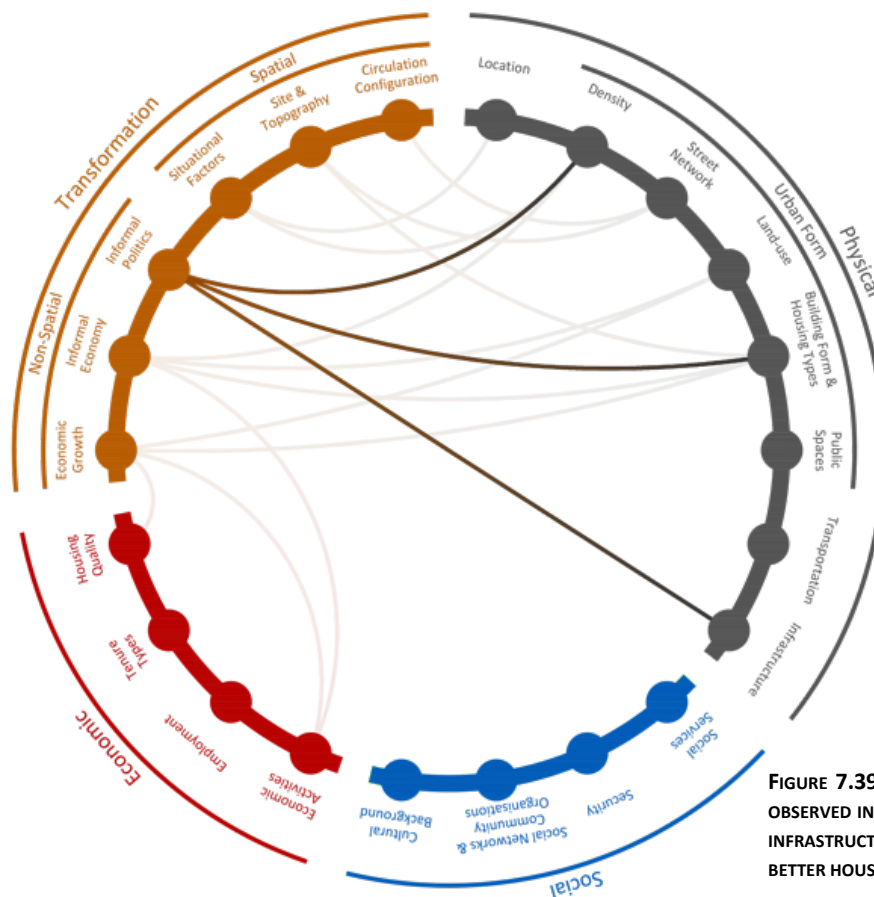
FIGURE 7.39: INFORMAL POLITICS ARE OBSERVED IN THE PRESENCE OF FORMAL INFRASTRUCTURE, INCREASED DENSITY, BETTER HOUSING TYPES

residents to legalise their houses. The politics of informal settlements give a sense of security to existing and future residents (Figure 7.39).

II. SPATIAL

II.I SITUATIONAL FACTORS

Both areas have almost reached their horizontal expansion limits. Ezbet El Haggana is surrounded by Nasr City, Cairo-Suez Road and a gated community built by the military covering all borders. Also, Ard El Lewa has reached its horizontal expansion limits because of the three transportation corridors and a surrounding informal settlement. This led to vertical expansion and the densification of both areas (Figure 7.40).
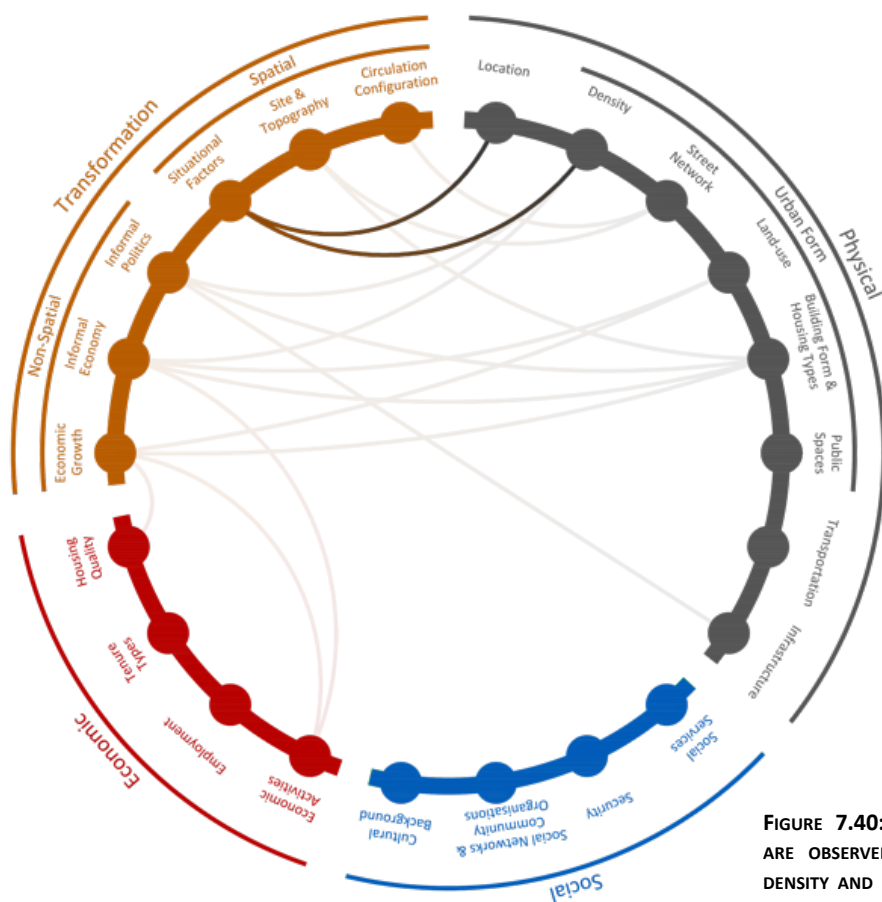
FIGURE 7.40: SITUATIONAL FACTORS ARE OBSERVED THROUGH INCREASED DENSITY AND SURROUNDING DEVELOPMENTS

II.II SITE & TOPOGRAPHY

The street network and built form responded to the site characteristics. Ezbet El Haggana is built on empty desert land, which explains its organic urban form, where the attached buildings take advantage of all available space. Later, the location attracted informal contractors to invest in the area. In contrast, Ard El Lewa followed the

agricultural plots and irrigation canals. Thus, the compact urban grid form and narrow streets. The site characteristics influenced the built form and street networks (Figure 7.41).
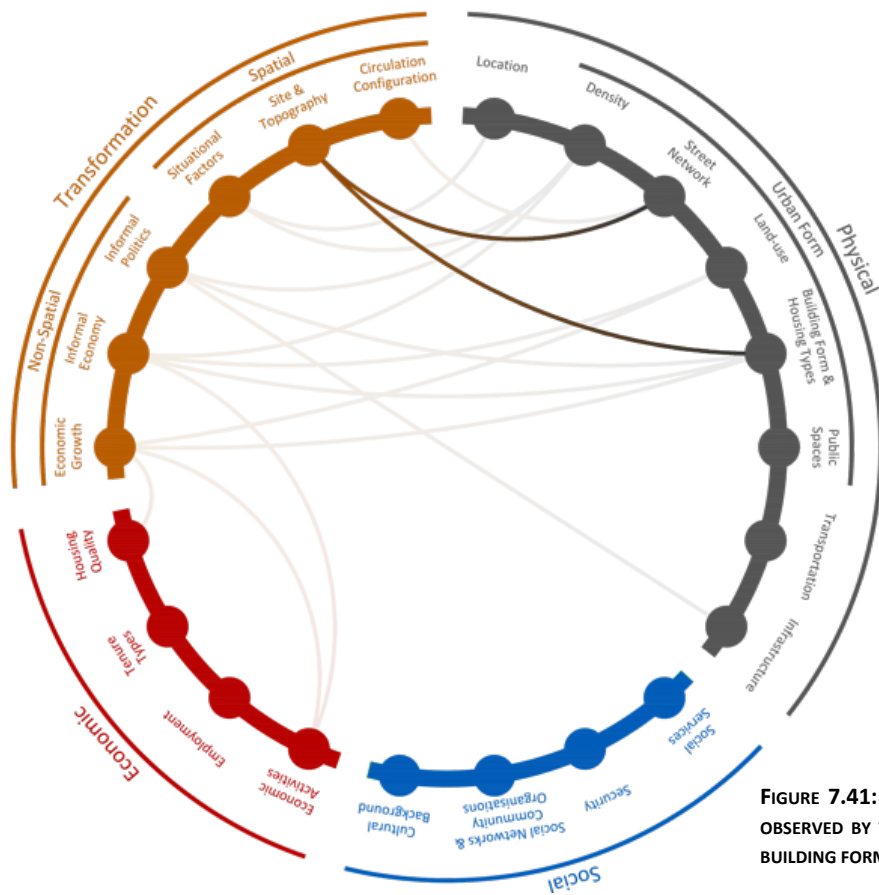
FIGURE 7.41: SITE & TOPOGRAPHY IS OBSERVED BY THE CHARACTERISTICS OF BUILDING FORM AND STREET NETWORK

II.III CIRCULATION CONFIGURATION

The difference between Ezbet El Haggana's organic form and Ard El Lewa's grid form relates to the nature of the sites. However, residents' needs meant they took advantage of all areas, protected them from outsiders and had more control over their streets. This created narrow small streets controlled by residents and used as their public space (Figure 7.42).
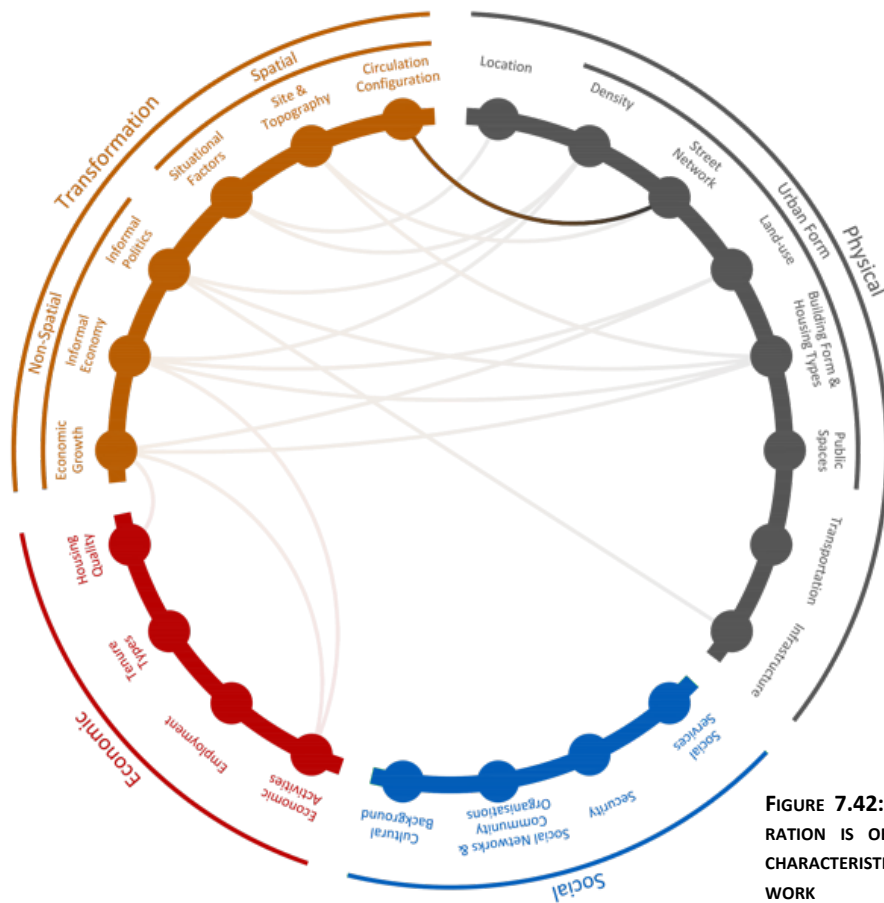
7.5.3 TIER 3: INFORMAL URBAN FORM VS. SUSTAINABLE URBAN INDICATORS

Under the concept of "sustainable development", governments, academics and planners are exploring how to improve and design cities in a quest for better, more sustainable cities. In response, different concepts emerged in the Global North, such as Neo-traditional developments, New Urbanism and the Compact City. Whilst in the Global South, the most common mode of urban space production is informal. Informality and informal settlements became the norm in and around every metropolitan region and big city in the Global South. Therefore, it is necessary to focus on informal settlements before importing concepts of the Global North.

One of the research objectives is to cross-examine the characteristics of the informal settlement with different sustainable urban form indicators. Therefore, the urban form of informal settlements is explored as one of the sustainable concepts and ways to improve the Informal Settlements Framework. The research framework developed a set of indicators derived from different concepts of sustainable urban forms, which

were implemented in the Global North. These indicators are implemented to examine the characteristics of the case studies.

I. COMPACTNESS

In both cases, the urban form is very compact; it can be traced back to the density, street network and building forms. Ezbet El Haggana has 1330 person/feddan, and Ard El Lewa has 638 person/feddan; thus, both have high population densities. The high density is reflected in the building form of both settlements, which tends toward high-rise apartment buildings that can reach 10 to 15 storeys because of the limited horizontal expansion and increased density. The high density coupled with compact building form created compact settlements (Figure 7.43).
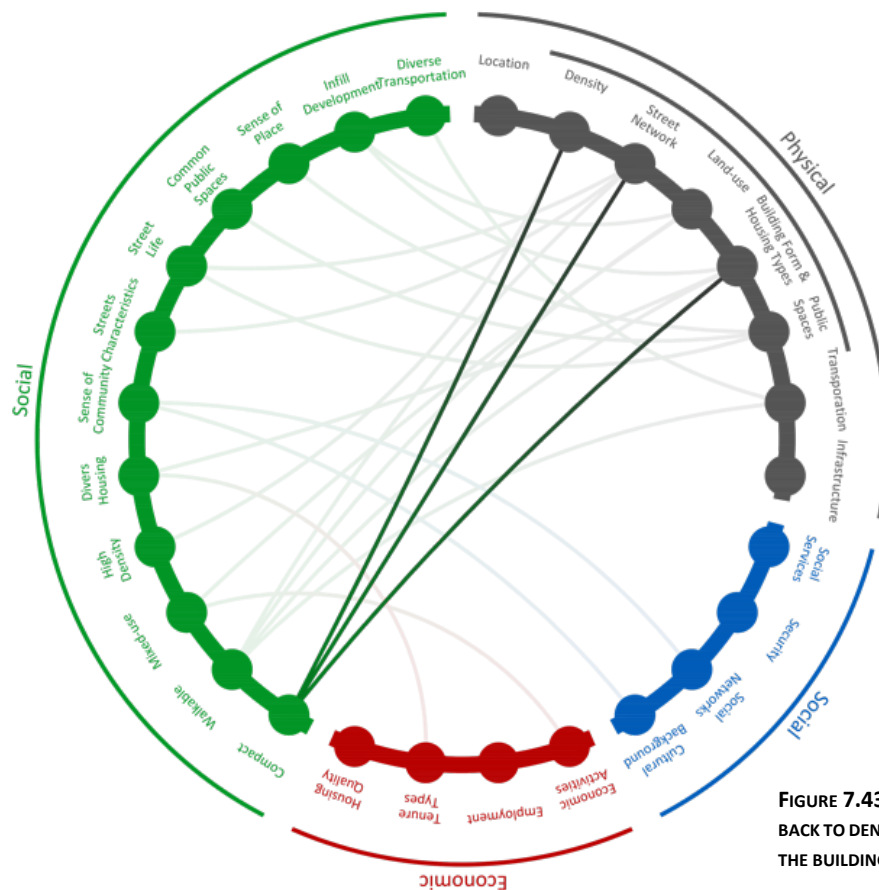
FIGURE 7.43: COMPACTNESS IS TRACED BACK TO DENSITY, STREET NETWORK AND THE BUILDING FORM OF SETTLEMENTS

II. WALKABLE

Whether a settlement is walkable can be indicated by the street network, land use, building form and transportation (Figure 7.44). The street network – of both areas – is narrow, with a hierarchy of main, secondary and residential streets that makes it

easier for residents to walk around with no intrusion from cars. Also, the mix of land uses, and inclusion of commercial activities on the ground floor of buildings makes walking easier and makes this the preferred method of transportation within settlements. Also, the home-work proximity for those working inside the settlement. To align it with the 15-minute city concept, the one thing that could be missing within a walking distance is accessing educational or health services which are missing in the informal areas as a whole.
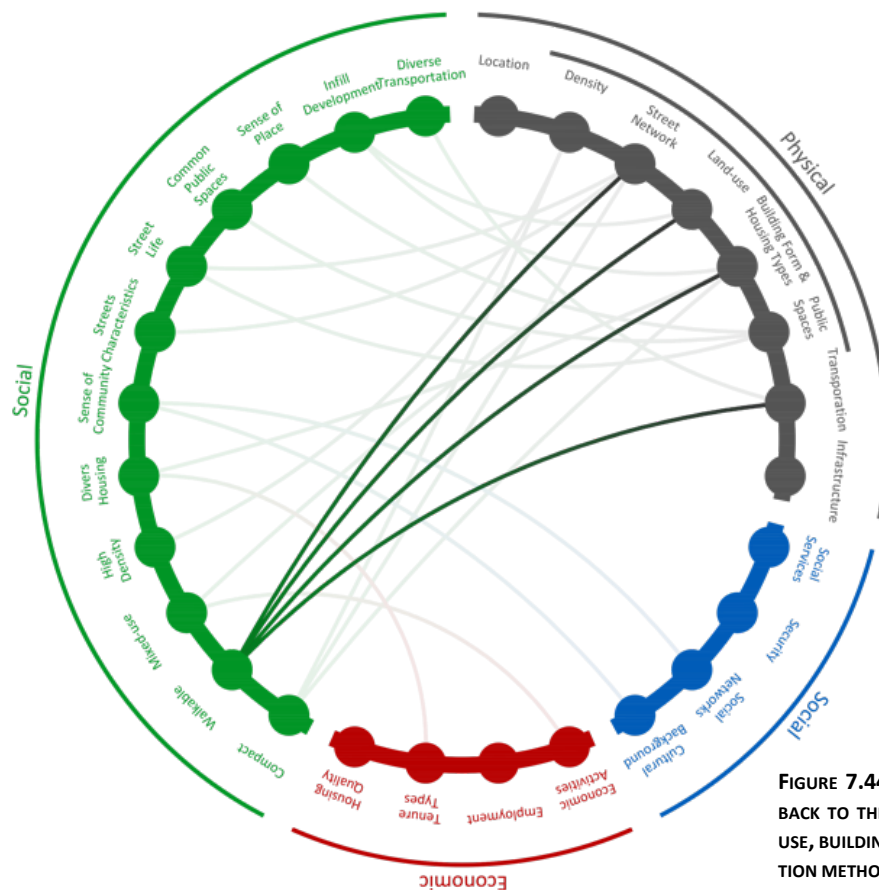
FIGURE 7.44: WALKABILITY IS TRACED BACK TO THE STREET NETWORK, LAND-USE, BUILDING FORM AND TRANSPORTATION METHODS

III. MIXED-USE

The land uses, and economic activities in both areas indicate the mix of uses (Figure 7.45). Both cases have a strong presence of economic activities like workshops, cafes, groceries, etc. Also, Ezbet El Haggana has car repair shops and main streets lined with commercial shops, while Ard El Lewa has the same commercial activities in its main streets, but its inner streets are home to wood and metal workshops.

IV. HIGH DENSITY

Both areas have a high population density, which is visible in the compactness of the urban form with 100% plot coverage and the vertical expansion of buildings. Also, it is aided by strong social ties where family and friends from the same original location want to stay close to each other (Figure 7.46).

V. DIVERSE HOUSING

Ezbet El Haggana has a diverse housing typology - Suessi housing, family housing and apartment buildings - whilst Ard El Lewa has family houses and apartment buildings. Apartment buildings in both provide different unit areas, while both provide different tenure types that respond to their respective residents' needs. Ard El Lewa and Ezbet El Haggana have owned and rented units with an informal type of contract (Figure 7.47).
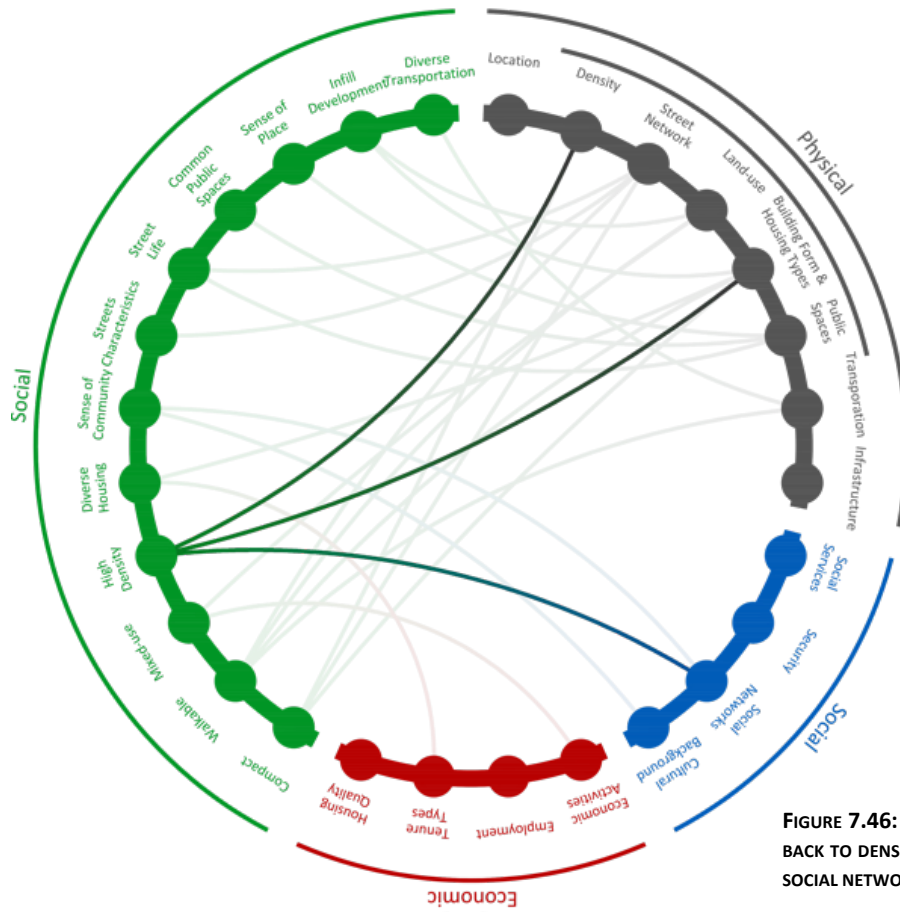
FIGURE 7.46: HIGH DENSITY IS TRACED BACK TO DENSITY, BUILDING FORM AND SOCIAL NETWORKS
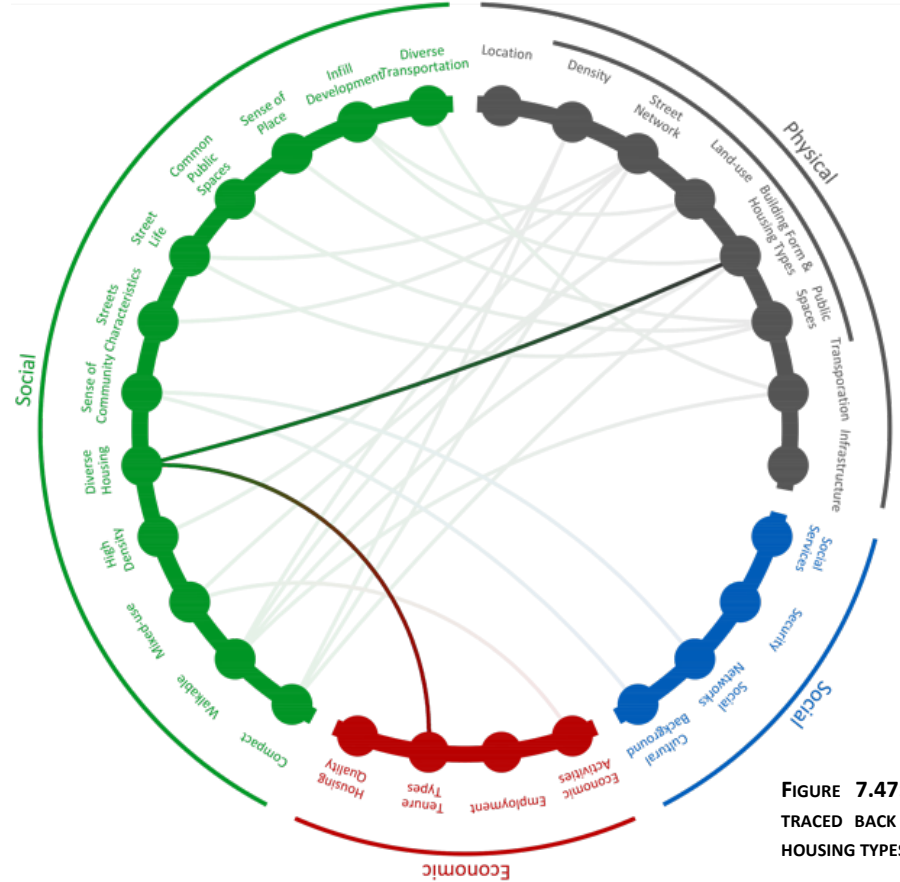
FIGURE 7.47: DIVERSE HOUSING IS TRACED BACK TO BUILDING FORM & HOUSING TYPES AND TENURE TYPES

VI. Sense of Community

The community in both areas originates from rural areas where a family member had migrated to Cairo for work, and later, the rest of the family will have moved in. Over time, extended family members and friends start to move near each other, resulting in strong social ties with common cultural backgrounds, which creates a strong sense of community (Figure 7.48).
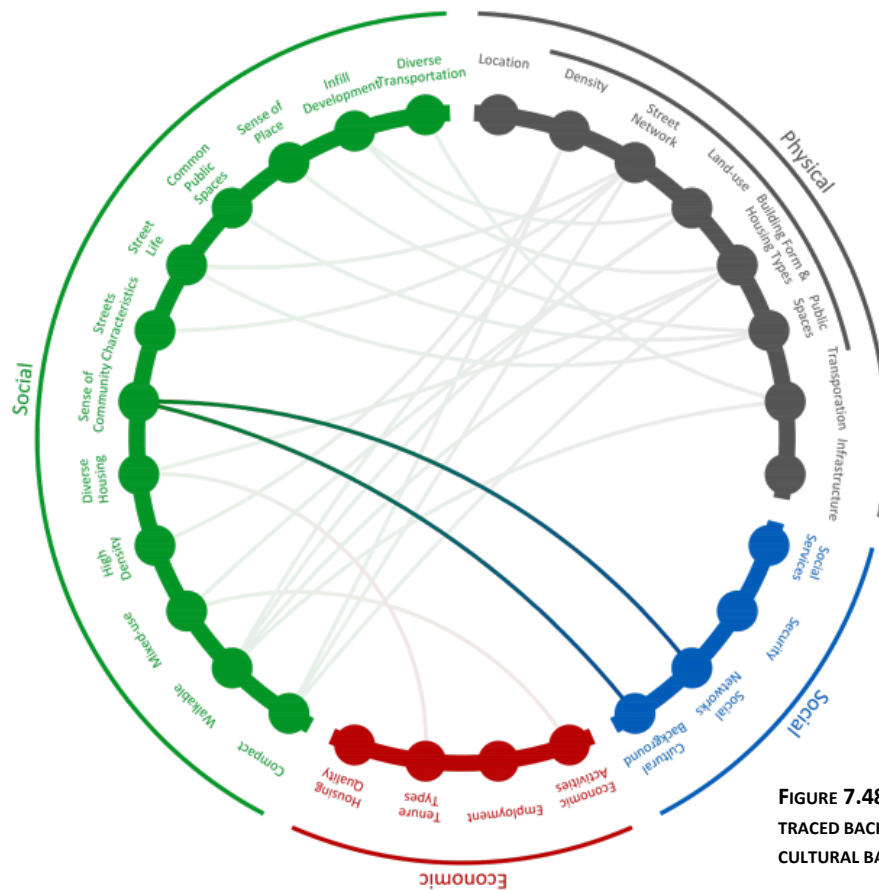
FIGURE 7.48: SENSE OF COMMUNITY IS TRACED BACK TO SOCIAL NETWORKS AND CULTURAL BACKGROUND

VII. Street Characteristics

There is a hierarchy of streets in informal settlements. First, main streets are the widest, where cars, trucks, and pedestrians share the space and commercial activities intensify. Second, secondary streets are narrower, and the main users are pedestrians and residents. They have commercial activities that serve the everyday needs of the residents. Third, residential streets are the narrowest, with workshops and shops that serve the residents; this is where the social activities intensify (Figure 7.49).
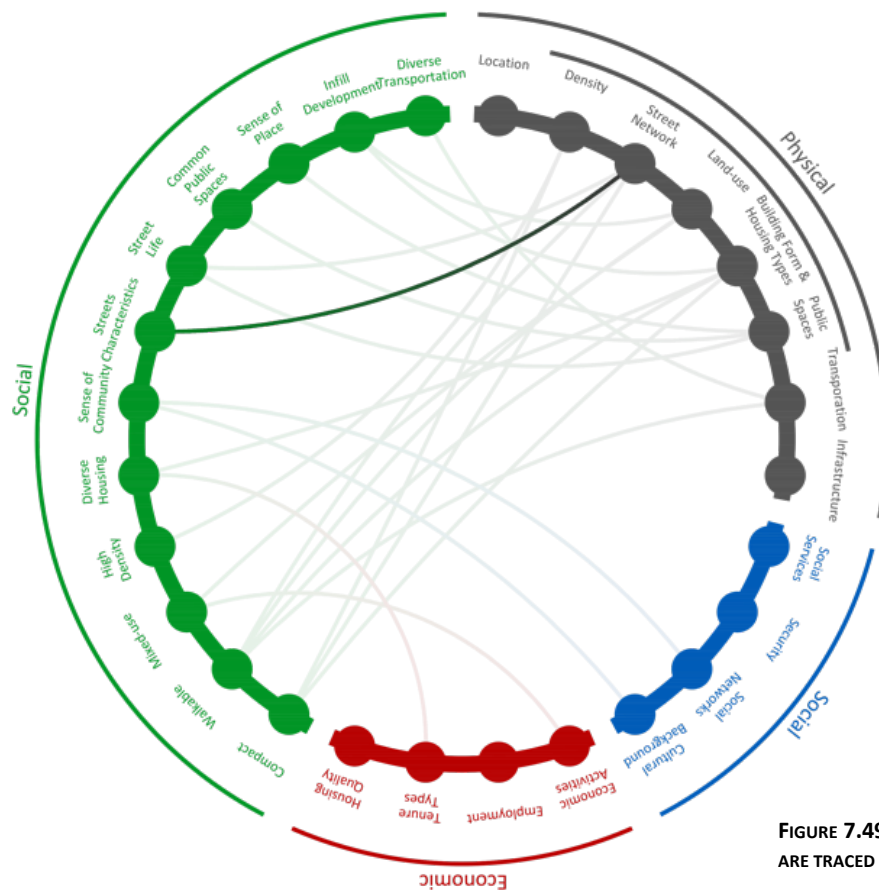
FIGURE 7.49: STREET CHARACTERISTICS ARE TRACED BACK TO STREET NETWORK

VIII. STREET LIFE

In both cases, streets have a strong life because of their multiple uses. The streets are for movement, social activities and economic activities. It is an extension of the home for family and neighbours to meet and a playground for children. Also, shops and workshops extend their workspace into the area out the front, and street vendors use it to show their products. This creates a strong street life all day and night. Also, celebrations can occur in the streets if not against any norms (Figure 7.50).

IX. COMMON PUBLIC SPACES

Public spaces are limited to street and building rooftops in Ard El Lewa and Ezbet El Haggana. Residents, pedestrians and shop owners use the streets, while rooftop usage is shared among all building residents. The activity can occur if it is not against their traditions and norms (Figure 7.51).
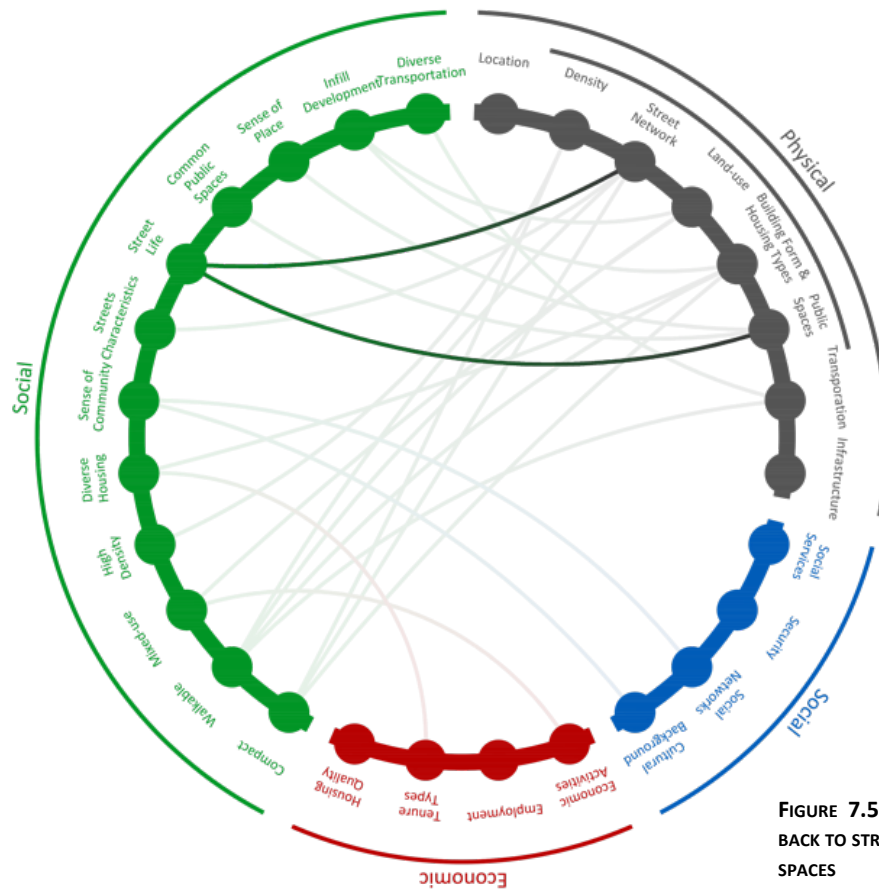
FIGURE 7.50: STREET LIFE IS TRACED BACK TO STREET NETWORKS AND PUBLIC SPACES
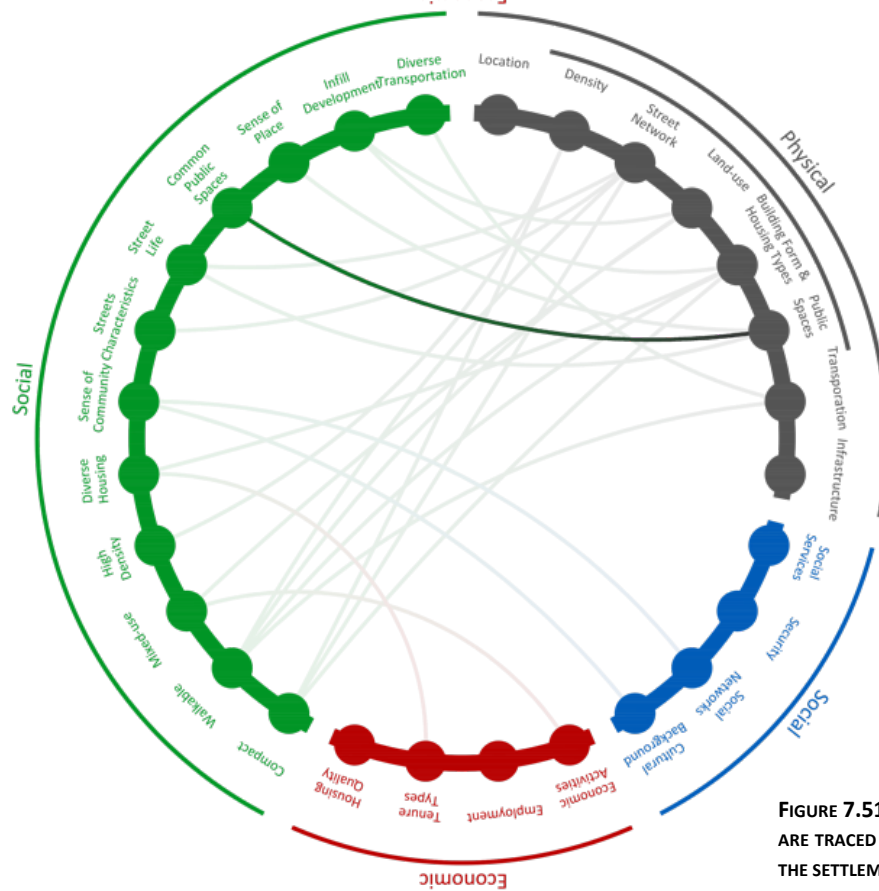
FIGURE 7.51: COMMON PUBLIC SPACES ARE TRACED BACK TO PUBLIC SPACES OF THE SETTLEMENTS

X. SENSE OF PLACE

The sense of place stems from the different uses of public spaces (i.e., streets) (Figure 7.52). It is governed and organised by residents' cultural traditions and norms. People could put street furniture in front of their houses in order to sit and socialise in their free time. The strong sense of place originated from the building of houses and the time spent living there.
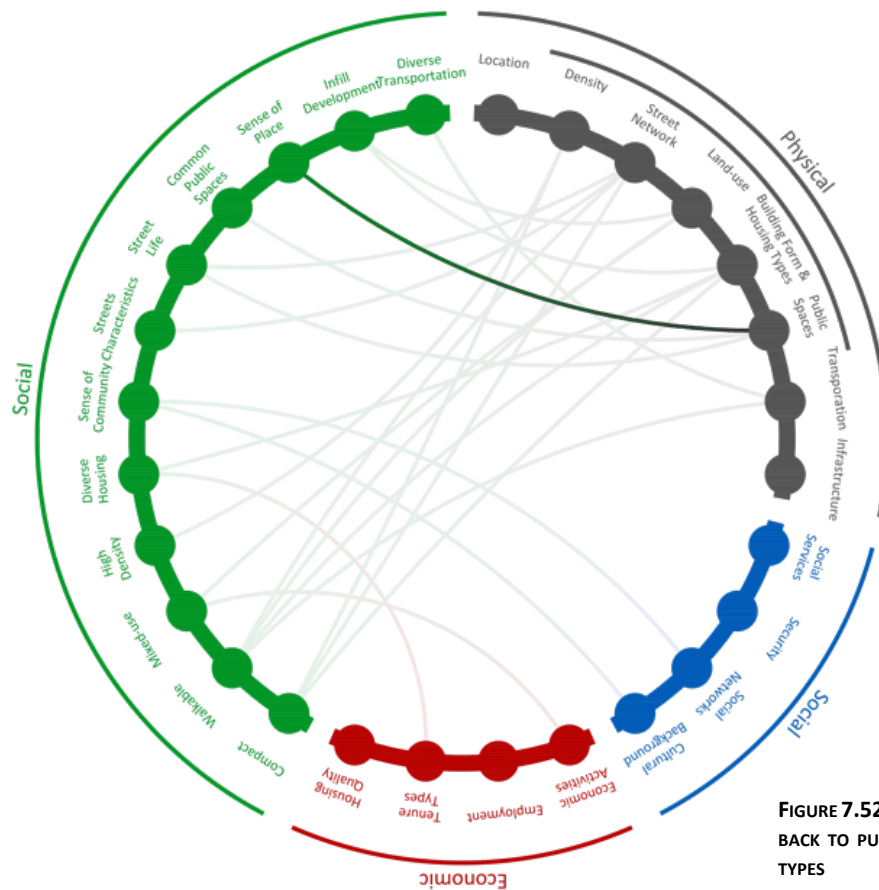
FIGURE 7.52: SENSE OF PLACE IS TRACED BACK TO PUBLIC SPACES AND HOUSING TYPES

XI. INFILL DEVELOPMENT

The development of informal settlements always occurs next to each other, demonstrating efficient use of space. In both cases, the current trend of demolishing old buildings and replacing them with new ones can be seen. They demolish a small building or more and replace them with bigger and better ones (Figure 7.53). This trend is evident from the strong informal real estate market in Ard El Lewa and Ezbet El Haggana.
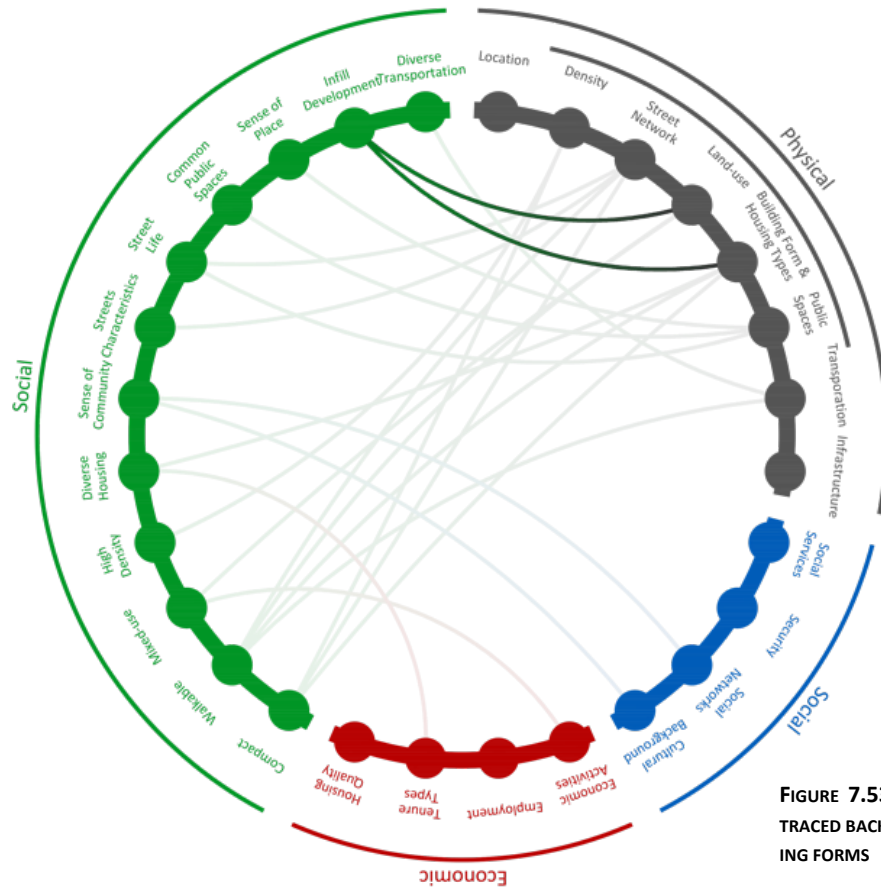
FIGURE 7.53: INFILL DEVELOPMENT IS TRACED BACK TO LAND-USES AND BUILDING FORMS
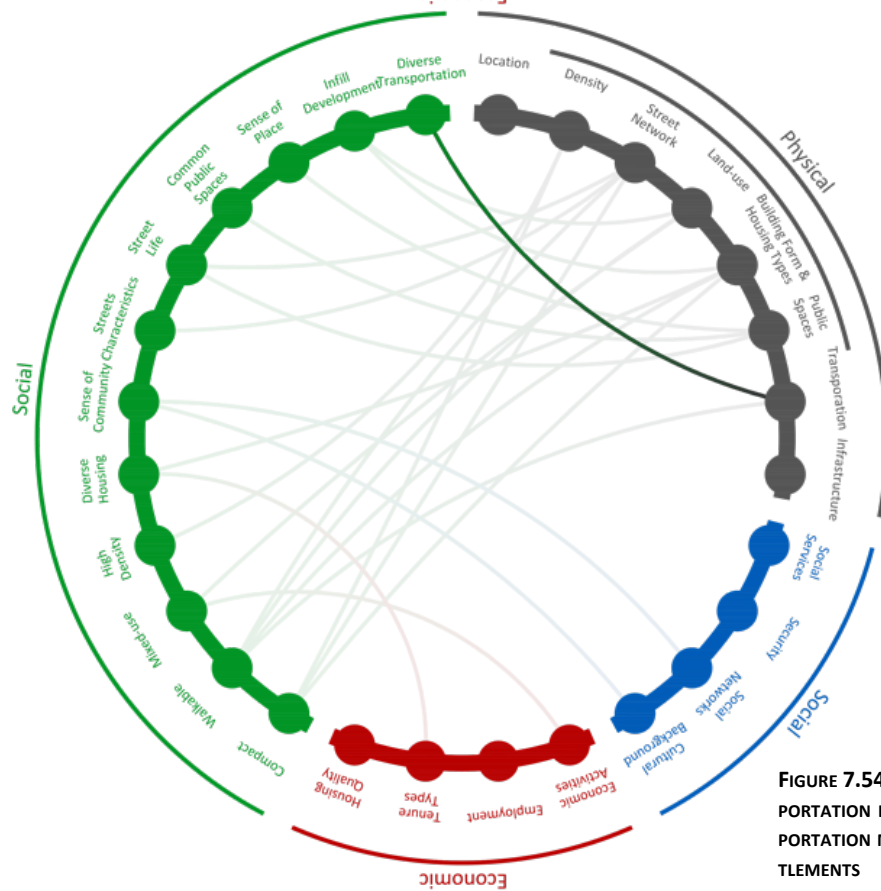
FIGURE 7.54: THE DIVERSITY OF TRANSPORTATION IS TRACED BACK TO TRANSPORTATION METHODS USED IN THE SETTLEMENTS

XII. Diverse Transportation

The primary method of transportation in both areas is walking because of its mixed-use and compact urban form. The second most used is Tuk-tuks when someone is in a hurry or needs to go to the edge of either area. Also, pick-up trucks are used to help people during rush hour in Ezbet El Haggana and as an extra source of income for the drivers. When moving outside the area to other districts, public buses and micro-buses are used (Figure 7.54).

7.6 Discussion

Ezbet El Haggana and Ard El Lewa are some of the oldest informal settlements in Greater Cairo. Both are typical examples of their respective typologies; Haggana is a squatter settlement on desert land, and Ard El Lewa is an illegally subdivided agricultural land. ISDF categorised both as unplanned areas. The origins of Ezbet El Haggana are much older than Ard El Lewa because the camel corps allowed their soldiers to build houses and live there in the 1930s (Soliman, 2004). Whilst the urbanisation of Ard El Lewa started in the 1970s because of its location next to Mohandessin (Eissa et al., 2019).

Although these two cases are different typologically, they share many similarities (Table 7.1). They are dense, compact and walkable (the most used transportation method) in informal areas with mixed land uses. Also, typical of any informal settlements, they lack proper services, open spaces and green areas. However, both are located on the edge of two well-established districts which offer access to services and transportation links to these areas and the rest of Greater Cairo. Ezbet El Haggana and Ard El Lewa are on the eastern and western periphery of Greater Cairo, respectively, near the Ring Road. Also, there is increased potential concerning their locations due to the 6th of October City and New Cairo development. Ezbet El Haggana is in the middle between Nasr City and New Cairo and Ard El Lewa between the 6th of October City and Mohandessin, facilitating social and economic exchange between the informal settlement and the formal districts.

Physically, Ezbet El Haggana has an organic urban form that follows the topographic desert land (Shawky & Abd Elghani, 2018); in comparison, Ard El Lewa's grid form reflects the previous farmland (Malterre-Barthes, 2020). The urban form shaped the street network of both, thus, creating three types of streets. The main streets allowed for the increased presence of commercial activities and street vendors. Then, secondary and residential streets are more pedestrian-friendly and have more social activities. Also, the building forms in both are different; in Ezbet El Haggana, there are three housing typologies (Boules et al., 2020), while in Ard El Lewa, only one typology is evident, namely apartment buildings (Elgendy & Frigerio, 2018). In all housing typologies, the ground floor is usually reserved for commercial use, influencing the existence of mixed land use. The last aspect of the urban form is public spaces which are absent in both areas. The residents depend on the streets and rooftops for any social activity.

While socially, neither area has public services, except for two schools in Ezbet El Haggana, which are in bad condition. To compensate for the lack of services, the population of rural migrants enabled the development and maintenance of strong social ties reflected in the sense of security the residents feel in their respective areas and seeking help from community leaders to resolve conflict. Importing village traditions and norms allowed for the presence of pigeon towers and animal breeding on rooftops and socialising on streets and rooftops. In Ezbet El Haggana, residents have a diverse cultural background because the area houses rural migrants from Suez Canal cities during the 1967 war, Christians from Minya and a small number of Sudanese, Syrians and Somali refugees ('Izbit Al-Haggāna, 2015).

Economically, residents engage in different employments and activities, ranging from day labourers to domestic workers, business owners, engineers and government employees. Ezbet El Haggana is known for the surrounding areas for car repair shops and waste recycling, especially iron. On the other hand, Ard El Lewa has wood and metal workshops in its inner streets. There are different tenure types for both areas because of the legal nature of both. Thus, both settlements have diverse tenure types, which include owned, rented and invented informal contracts that suit particular

situations, although they differ in terms of land ownership. Ezbet El Haggana land is occupied illegally, while Ard El Lewa residents own their land but built it illegally. The legality of the land is reflected in the building quality in both settlements. Ezbet El Haggana has diverse building qualities, ranging from poor, unsafe Suessi houses to formal-city-quality apartment buildings. In contrast, Ard El Lewa has overall better-quality buildings because all are built from reinforced concrete structures buildings.

Finally, the transformation factors are very similar. The non-spatial factors are significant as both areas experienced economic growth, which is seen in the flourishing informal real estate market and empty housing units; hence, a change in the development pattern. Second, both fall under the unplanned category, where no eviction can occur, and the extension of utility networks is required for the settlements. This signifies an unofficial recognition of each area that increases the security and investment within them. Likewise, spatial factors are very similar. First, both have limited horizontal expansion due to hard boundaries that run along the perimeter, thereby increasing the vertical expansion. Second, the circulation configuration is very similar, as compact urban form with commercial uses intensifies in the main streets, and social uses proliferate in secondary and residential streets. On the other hand, the site factors differ as each are developed on different types of land (desert vs agricultural).

Characterisation of Informal Settlements Framework presents different relations between the characteristics and how they influence one another. When taking the features together, it gives a network of relationships. It is essential to understand this network when preparing an upgrade plan. No difference is found in the relations between the two typologies. The network of relationships shapes the informal built environment. The analysis discussed each feature and its relations with other features.

The framework has three tiers (Figures 7.55, 7.56 & 7.57). The first tier is the physical, social and economic characteristics and relationships between them. The second tier includes the factors of transformation, which identifies the non-spatial and spatial factors influencing the change in development and future expansion. Finally, the third tier details the sustainable urban indicators, a list of indicators cross-examined

with the different characteristics of the settlement. The three-tiered framework forms the analytical part of the Control & Integration Model. The characteristics of Ezbet El Haggana and Ard El Lewa tested the framework and adapted to the two main typologies of informal settlements found in Egypt.

The first tier (Figure 7.55) shows the different relationships between the physical, social and economic features. These relations (summarised in Figure 7.58) show the connections that shape the built environment. Figure 7.58 presents the different relationships and how each relates to the others. The informal environment is very complex because no guidelines were used in its design. However, as it expands, it responds and adapts to residents' needs and socio-economic changes.

The second tier (Figure 7.56) studies the different non-spatial and spatial factors and represents the factors that influence the change and expansion of informal settlements. The different characteristics of informal settlements are analysed to identify the factors influencing the changes. Understanding the reasons behind the changes in informal areas requires transformation factors.

The third and final tier (Figure 7.57) examines the informal settlements against the sustainable indicators. The diagrams show that the features of sustainable urban forms are present in informal settlements, proving that they can be seen as a different concept of sustainable urban forms. Like in Greater Cairo, informal settlements cover more than half of the built-up area. Therefore, the continuation and upgrade of this urban form could offer the best solution for Egypt and other developing countries.
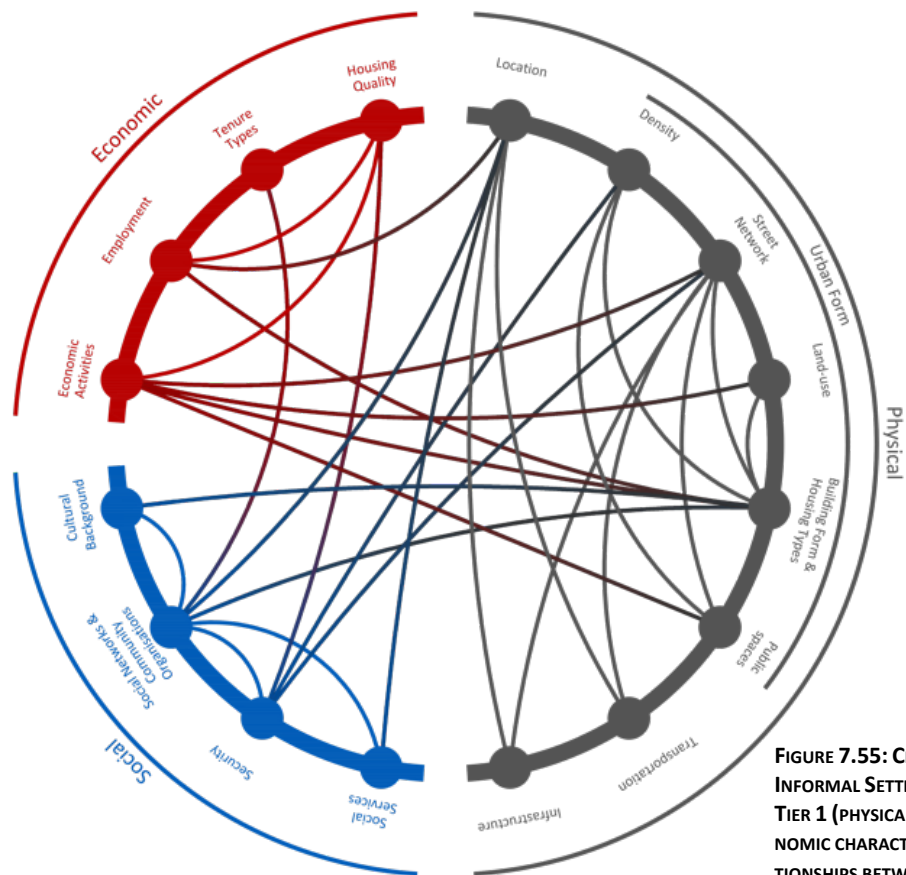
FIGURE 7.55: CHARACTERISATION OF INFORMAL SETTLEMENTS FRAMEWORK: TIER 1 (PHYSICAL, SOCIAL AND ECONOMIC CHARACTERISTICS AND RELATIONSHIPS BETWEEN THEM)
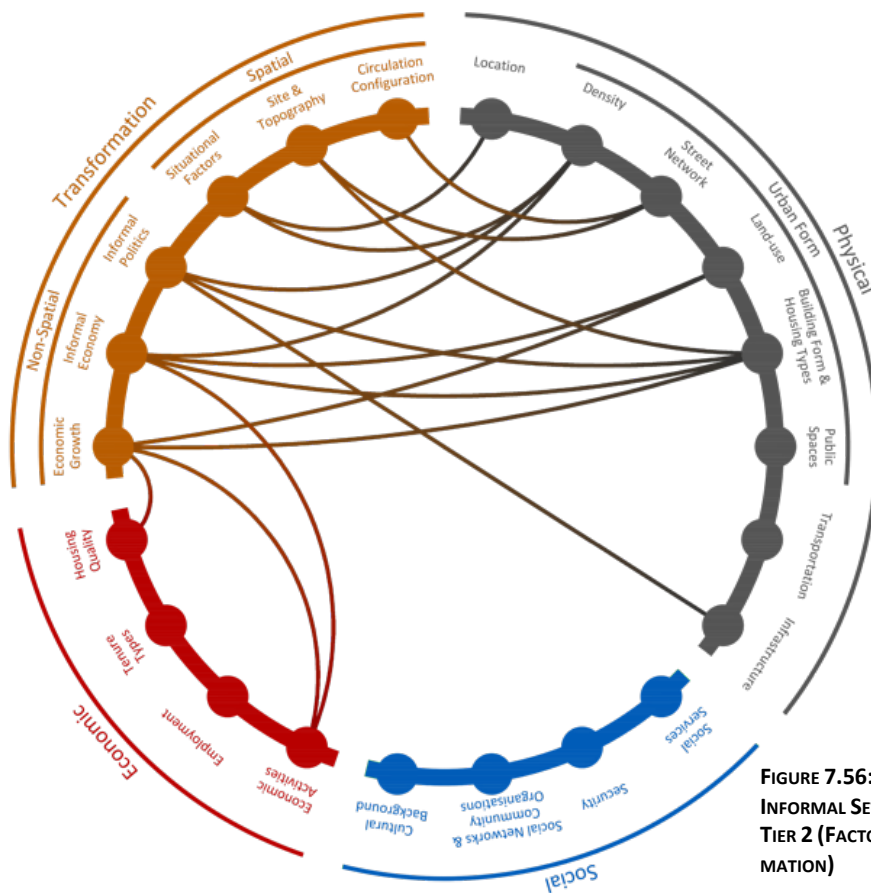
FIGURE 7.56: CHARACTERISATION OF INFORMAL SETTLEMENTS FRAMEWORK: TIER 2 (FACTORS OF TRANSFORMATION)
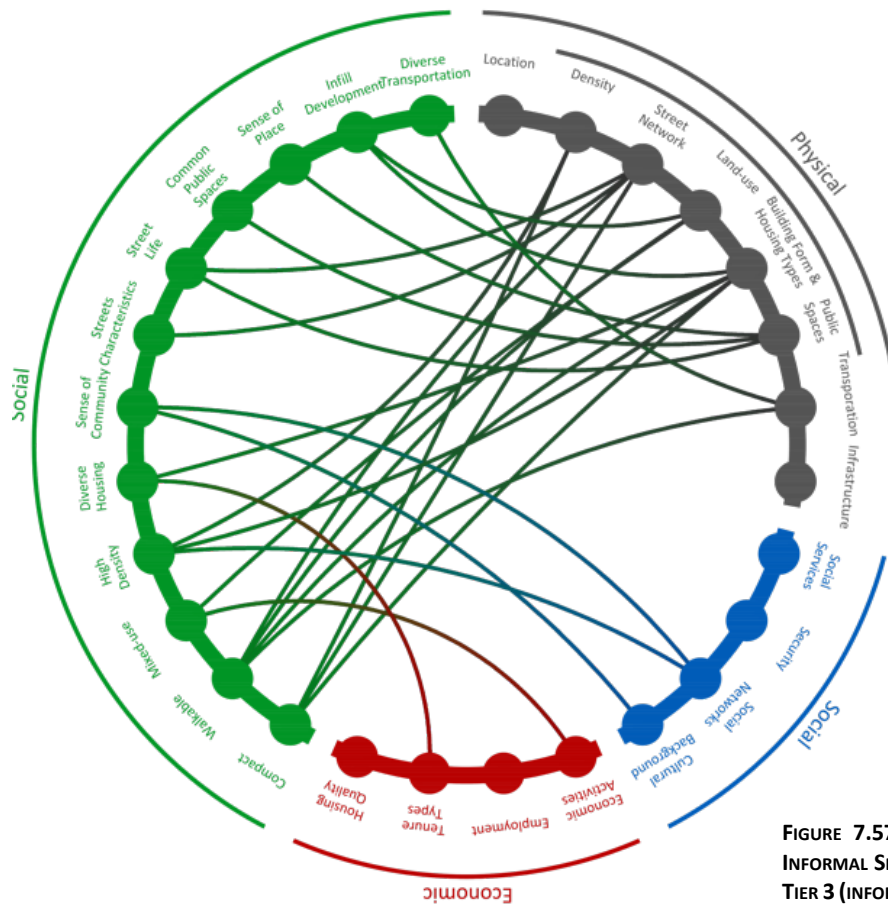
Figure 7.57: Characterisation of Informal Settlements Framework: Tier 3 (informal urban form vs sustainable urban indicators
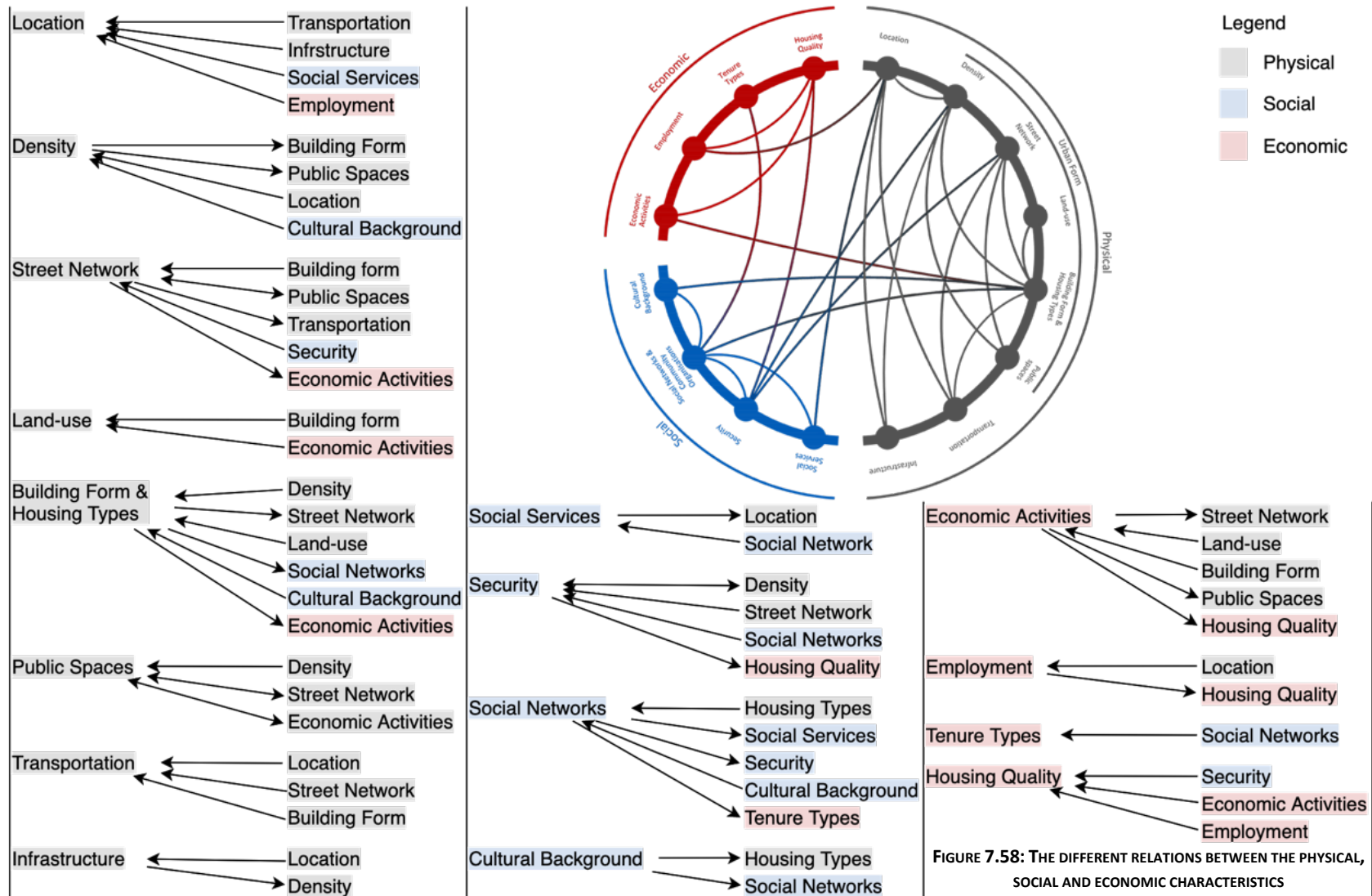
FIGURE 7.58: THE DIFFERENT RELATIONS BETWEEN THE PHYSICAL, SOCIAL AND ECONOMIC CHARACTERISTICS

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7.7   CONCLUSION

In chapter four, the research developed the Characterisation of Informal Settlements Framework (CISF), which was the result of exploring different informal settlements in cities across the Global South. It found that there are different relationships between physical, social and economic characteristics. The research wanted to test and adapt this framework to the context of Egypt. Therefore, the research investigated two case studies and collected data to identify and analyse their characteristics. Next, the study tested the framework by investigating each characteristic and how it relates to the others.

The two case studies are typical examples of their respective typologies, but they share many general characteristics with other informal settlements (Table 4.2). Both are unplanned, incrementally built, and dense areas with poor infrastructure and lacking basic services. They are located on Greater Cairo's eastern and western peripheries, within a short distance and with good links to transportation networks. The location supports the economic and social exchange between the informal and formal areas, as they are close to job opportunities and different social facilities. Also, with Ezbet El Haggana, they provide services to surrounding formal areas through car repair and maintenance workshops.

The economic status differs between Ezbet El Haggana and Ard El Lewa. Ard El Lewa has better quality buildings overall, and currently, the development pattern is changing, while Ezbet El Haggana has a broader spectrum of quality because it has unsafe and poor-quality houses and much better high-rise apartment buildings. Socially, Ard El Lewa houses day labourers, workshop owners, university professors and governmental employees, but Ezbet El Haggana has more day labourers, construction workers and workshop owners. Otherwise, both have strong social ties between community members and a strong presence of community organisation that helps residents.

The first tier of the framework examines each characteristic and explores the different relations between them. These relations are essential in understanding the dynamics and complexity of informal settlements. The result is that relations are very

similar across Greater Cairo's informal settlements and others in different cities. Also, the level of depth in the two case studies allowed the researcher to identify that the informal built environment has unique dynamics that are heavily influenced by social and economic characteristics. Therefore, it influences its urban form and future expansion.

The similarities between the two cases can also be seen in the transformation factors, which are very similar between the two settlements. Non-spatial factors can be traced back to the booming informal real estate market that responded to the state's politics to focus on unplanned areas. Thus, people felt safer, and investment increased, proving that non-spatial factors can heavily influence informal growth. Similarly, spatial factors can be traced back to the limited space for horizontal expansion, conveying similar circulation configurations and building typologies.

The third and final tier examined the settlement's characteristics with the sustainable urban form indicators. It concluded that the urban form of informal settlements is sustainable. It has all the indicators present in one way or another. Therefore, it can be considered a sustainable form that works in the cities of the Global South. There is no need to import concepts developed in the Global North or to try to adapt them. The informal urban form is already shaped by people, efficiently serving their needs.

The chapter tested the three-tiered Characterisation of the Informal Settlements Framework and showed that it could be applied to different typologies in Egypt and adapted to different contexts. The framework works on three levels: identifying different characteristics and relations between them, noting the transformation factors that influenced the changes and expansion, and examining the informal settlements with sustainable urban form indicators. This is the analytical part of the Control & Integration Model. One of the success factors for informal upgrades is thoroughly studying the informal settlement, an activity for which this framework offers a guide. Also, it examined the settlements with sustainable urban form indicators and proved that informal settlements fulfil many of the properties of sustainable urban concepts.

Throughout this chapter, the research achieved two objectives. First, it investigated the physical, social, and economic characteristics and the relationships between them. Second, it cross-examined informal settlements with the principles of different sustainable urban development concepts. It built the base for the development of the Control & Integration Model.

Chapter 8.   Control & Integration Model

8.1   Introduction

After testing the Characterisation of Informal Settlements Framework (CISF), the investigation continued to move towards the development of the conceptual framework. This study aimed to address the problems associated with the subpar built environment, social and economic marginality, and the uncontrolled expansion of informal settlements. Moreover, it aimed to develop an intervention strategy to elevate current conditions, integrate informal settlements with the formal city and manage spontaneous expansion. Thus, this model offers a blueprint for formulating an intervention strategy for informal settlements. This chapter presents the model's five phases: policy adjustment, access to community, settlement analysis, upgrade & integrate and growth management (Figure 8.1). Next, a series of interviews are conducted with different experts in the field to test the model.

Access to Community
- Establish communication with:
  - Local NGOs & CBOs
  - Community leaders
- Establish community union to:
  - Participation in all projects phases
  - Monitor & communicate upgrade progress
  - Maintenance & management
  - Govern any future expansion
  - Survey the communities needs and priorities

Policy Adjustment
- Recognise informality and informal settlements as a tool for urbanisation and solution to housing shortage
- Decentralisation of decision-making process paving the way for the participation of all community groups
- Restructuring of governance system and change the budgeting system from sectoral to locational
- Flexibility of housing regulations and standards, and acceptance of incremental building process

Settlements analysis
- Three-tiered CISF
  - Characteristics and relations between them
    - cross-examine with sustainable urban indicators
    - Factors of transformation

Upgrade & Integrate
- Improvement of Informal Settlements Framework
  - Efficient use of infrastructure
  - Enhance & support local businesses
  - Preserve sense of place & way of life

Growth Management
- Development of new compact, mixed-use core
- Connect the informal street network with new ones
- Infrastructure capable of handling high population density
- New developments start with the needed services

FIGURE 8.1: CONTROL & INTEGRATION MODEL

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8.2 Conceptual Model

8.2.1 Policy Adjustment

Initially, policies must support informal settlements and their upgrading projects. Previous studies show that informal settlements and upgrading projects must be part of the state's laws and policies. Therefore, before implementation, new policies must be introduced and others amended to ensure successful implementation. Table 8-1 summarises those policies.

TABLE 8.1: POLICIES NEEDED TO ENSURE THE SUCCESSFUL IMPLEMENTATION

Policy Adjustment
Recognition of Informality as a tool for urbanisation & informal settlements as a solution to the housing shortage
Restructuring of governance system and changing the budgeting system from sectoral to locational
Flexibility of housing regulations and standards and acceptance of incremental building process
Decentralisation of the decision-making process to eliminate any political influence

First, informal settlements account for over 65% of Greater Cairo's urban development (Magdi, 2018). It houses a broad spectrum of different socio-economic backgrounds (Hendawy & Madi, 2016), whether residents live only or live and work in informal settlements. The proliferation of informal settlements is attributed to the low number of affordable housing units. Therefore, the recognition of informality and informal settlements as a tool for urbanisation and form of housing development will ease pressure on housing. The recognition of informal settlements needs to be supplemented with flexibility in housing and building regulations. Informal settlements do not adhere to formal regulations and standards because they are unaffordable to follow or do not meet people's needs. Thus, building regulations and standards need to be flexible or include a new tier or class of regulations that can meet people's expectations and legalise the existing ones. Also, building regulations and standards need to accept an incremental process as residents often build their houses in phases depending on the needs or financial state of the owner.

Next, it is obliged by the law that the community must participate in any development plan; however, the representation described is not reliable (Participant HK, 2020). Previous projects neglected the community's needs and priorities and used them for

political propaganda (Magdi, 2018) or beautification, thereby creating mistrust between the government and communities. Thus, the decision-making process must be decentralised to ensure the correct representation of the community and to realise the communities' vision. The decisions must be taken and authorised by high-ranking people, which jeopardises the implementation of the projects (Figure 8.2). Also, Abdelaal et al. (2021, p. 46) mentioned that the central government heavily influenced local administration, adding that *"primary actors are appointed through direct patronage from primary political figures"*. Thus, high-ranking officials and political figures have the power to amend details or introduce other individuals who could lead but not meet the expectations and needs of communities.
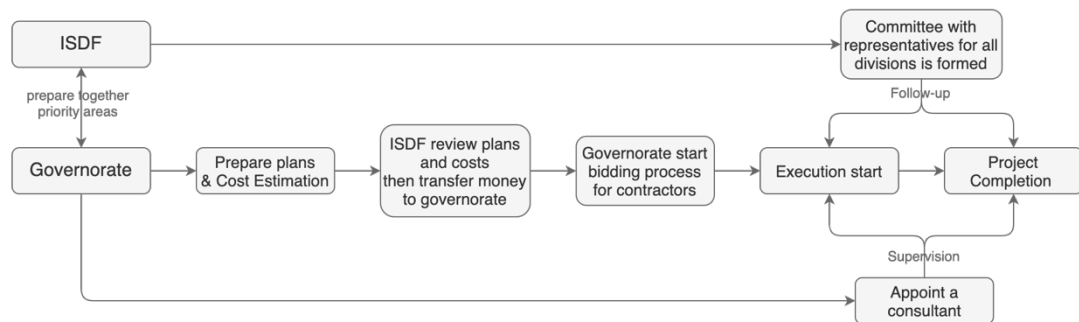
FIGURE 8.2: DECISION PROCESS OF UPGRADING AN INFORMAL SETTLEMENT. ADAPTED FROM THE INTERVIEW WITH PARTICIPANT MA

Last, the governance system needs restructuring. In Egypt, there are three different systems. All governorates follow the oldest system, the sectoral budgeting system. The state's ministries, like education, health, and local development, allocate 90% of the national budget while only 10% to governorates. When a governorate needs to execute a development plan, it must contact the respective ministries requesting what they need; for example, the development plan of an area needs two schools and a hospital. The governorate sends a request to the relevant ministries, and they decide whether it fits their budget. Governorates with the old governance system have informal settlements under their authority. The current system prevents many projects from being realised as intended because each ministry has its priorities and budget to work with. So, the governance system needs to be revamped to give autonomy like the new system implemented in the first generation of new cities. It gave local councils more power to work in districts under their authority rather than wait for different ministries to cooperate and implement their development plans.

8.2.2 ACCESS TO COMMUNITY

Before collecting data on the settlement, two things need to happen (Figure 8.3). First, communication must be established with community leaders, local NGOs and CBOs as they act as middlemen between the residents and the officials. Moreover, they facilitate entry to the settlement and reach different resident groups with whom they can connect and understand their problems and priorities. Also, this will ease their participation later in the intervention. Second, a community union identifies who will participate in different phases of the upgrade, communicates progress to the residents, and monitors any community problems that may arise. The local district will supervise the union. Later, after the implementation, they will oversee the maintenance and management of the settlement and govern its future expansion. The next step is the analysis of the different characteristics of the settlement.
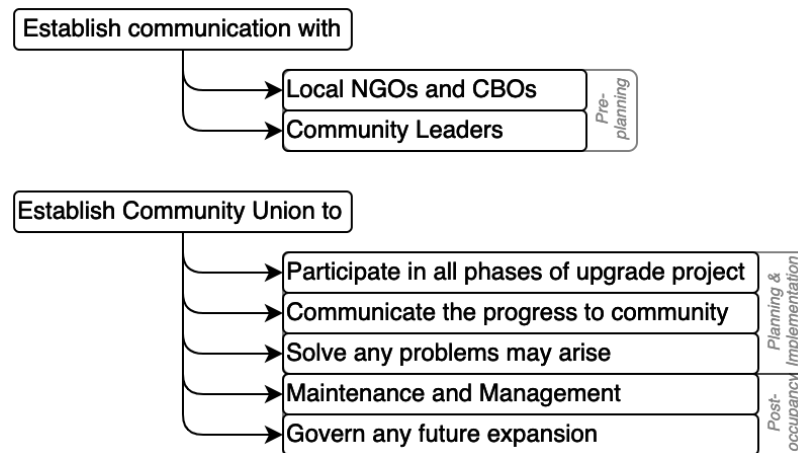
FIGURE 8.3: ACCESS TO THE COMMUNITY: A PREREQUISITE PHASE BEFORE THE START OF THE SETTLEMENT ANALYSIS

8.2.3 CHARACTERISATION OF INFORMAL SETTLEMENTS

Alongside the founding of the Community Union, the Characterisation of Informal Settlements Framework (CISF) implementation starts. As shown in Chapter 7, the three-tiered framework defines the physical, social and economic characteristics and the different relationships between them, identifies the factors that influence the transformation and growth of the settlement, and cross-examines the urban form of the settlement with different concepts of sustainable urban forms.

The first tier (Figure 8.4) shows the relationships between the physical, social and economic characteristics. It shows the connections and effects of different

characteristics on others to understand the settlements' dynamics. Ard El Lewa and Ezbet El Haggana had very similar dynamics, even though they had different typologies. The second tier (Figure 8.5) inspects the spatial and non-spatial transformation factors and how they are investigated through the different characteristics of the settlement. Finally, the third tier (Figure 8.6) cross-examines the current built environment with sustainable indicators to assess the sustainability of the urban form.
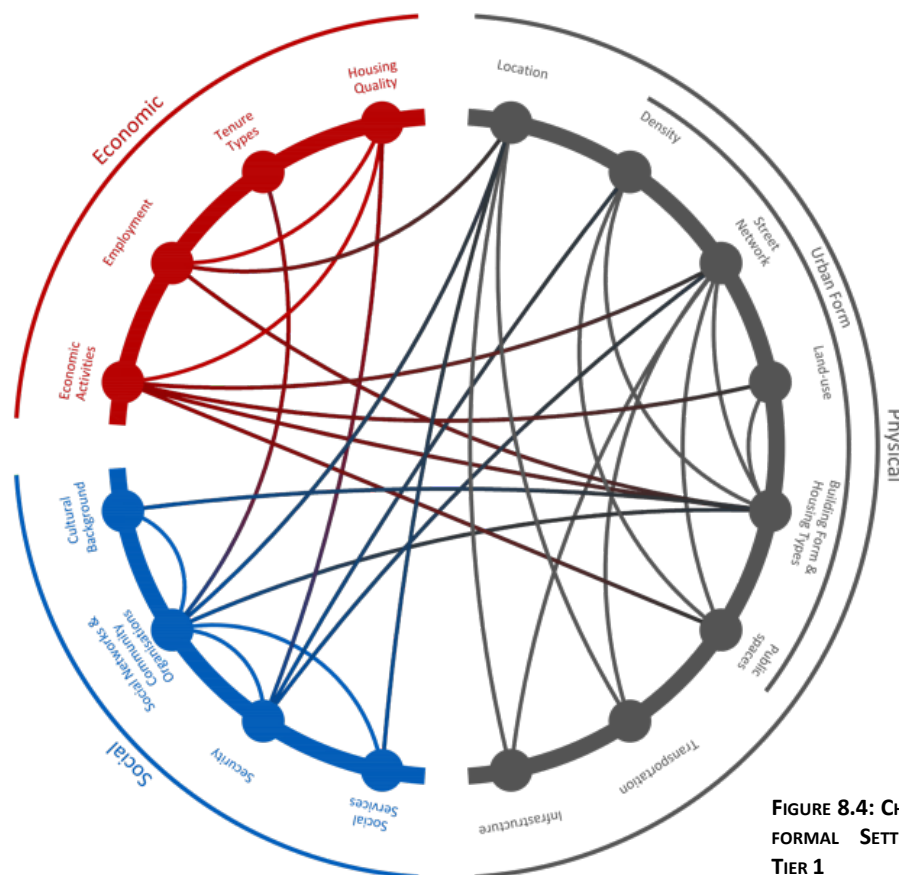
FIGURE 8.4: CHARACTERISATION OF INFORMAL SETTLEMENT FRAMEWORK: TIER 1
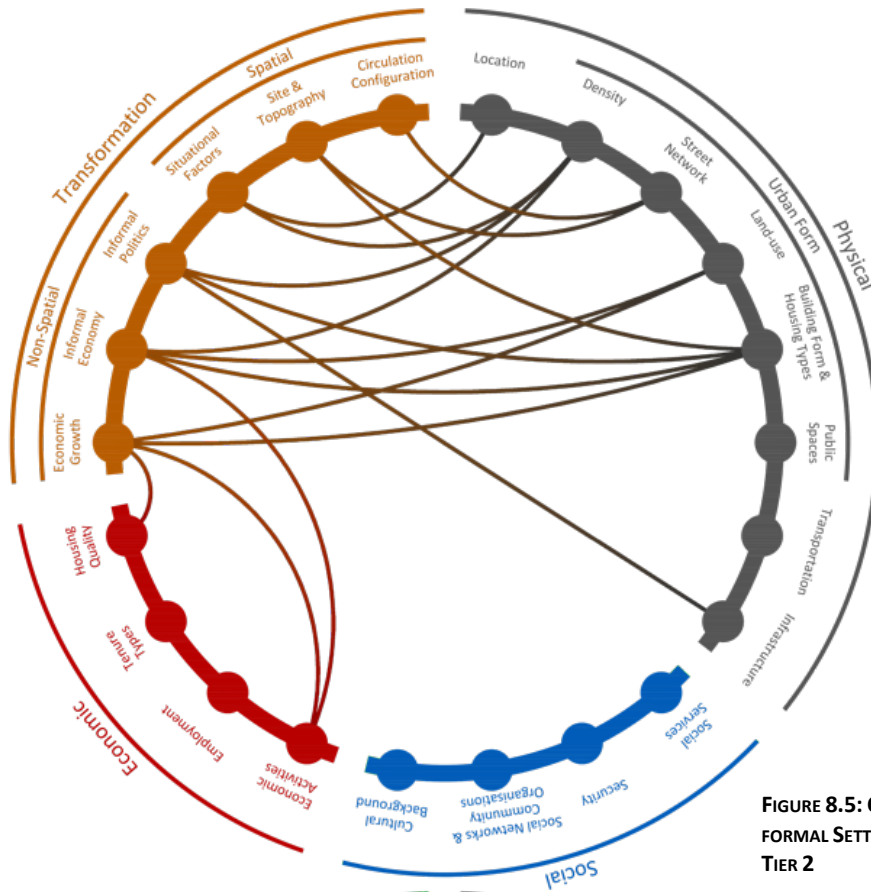
FIGURE 8.5: CHARACTERISATION OF IN-FORMAL SETTLEMENTS FRAMEWORK: TIER 2
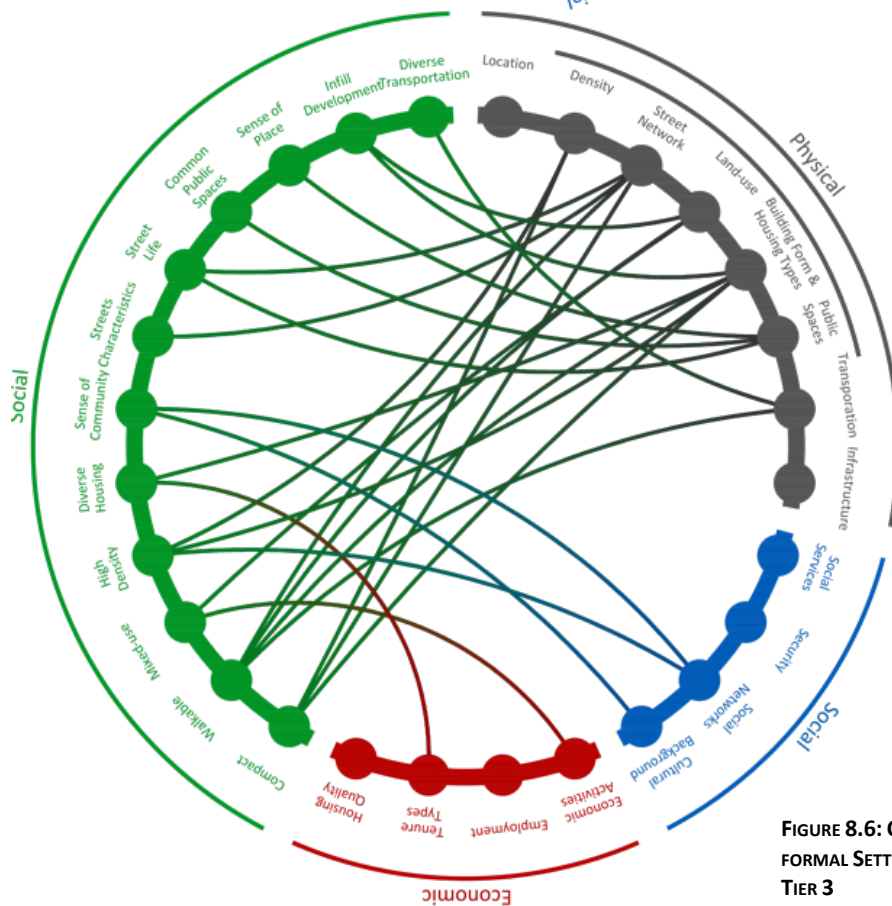
FIGURE 8.6: CHARACTERISATION OF IN-FORMAL SETTLEMENTS FRAMEWORK: TIER 3

8.2.4   UPGRADE & INTEGRATE

I.   PRINCIPLES OF UPGRADING & INTEGRATION

The upgrade plan has principles to follow and consider when designing the intervention. Slow urbanism, smart growth, the compact city and mixed-use developments inspire the model's principles. The primary concepts are slow urbanism and smart growth, the former for upgrading and integrating plans and the latter for expansion control. Slow urbanism has six principles that focus on enhancing and preserving the built environment, increasing social cohesion and supporting economic development. Slow urbanism principles are adapted to the informal built environment. The adapted principles (Figure 8.7) are efficient implementation and use of infrastructure, preserving the sense of place and the way of life in settlements, and enhancing and supporting local businesses. Smart Growth is another adopted concept. It is a growth management programme that aims to control informal expansion through infill developments on surrounding vacant lands. The appropriation of vacant land will direct the growth of informal settlements. They will be points of attraction for future informal development, thus controlling expansion. According to smart growth principles, the community must participate with different stakeholders in new developments; in return, it will respond to the community's needs and priorities. The infill development should concentrate on commercial and other uses in compact centres, following the principles of the compact city and mixed-use developments. Thus, the Improvement of Informal Settlement Framework is created.
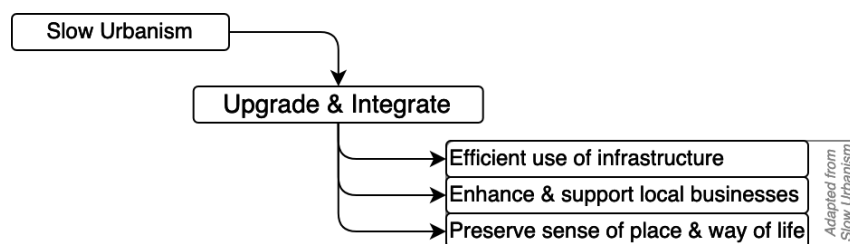
FIGURE 8.7: PRINCIPLES OF UPGRADING AND INTEGRATING

II.   IMPROVEMENT OF INFORMAL SETTLEMENTS FRAMEWORK

Experts recommend a comprehensive upgrade plan. According to previous studies in chapter 4 and interviewees, the upgrade plans of informal settlements should tackle physical, social and economic aspects. As a result, the Improvement of Informal

Settlements Framework (IISF) (Figure 8.8) was developed from the previous princi-
ples (Section 8.2.4 – I). It works on these three aspects and how they affect each
other. The physical aspects include infrastructure, preservation of urban form,
streets, accessibility, public spaces and spatial integration. The social aspects are the
preservation of social networks, social services, skills development and social inte-
gration, while the economic aspects are property rights, microfinance and empower-
ing the local community. Therefore, the upgrade plan should not affect the resident's
way of life but support the integration of informal settlements with the formal sur-
rounding areas.
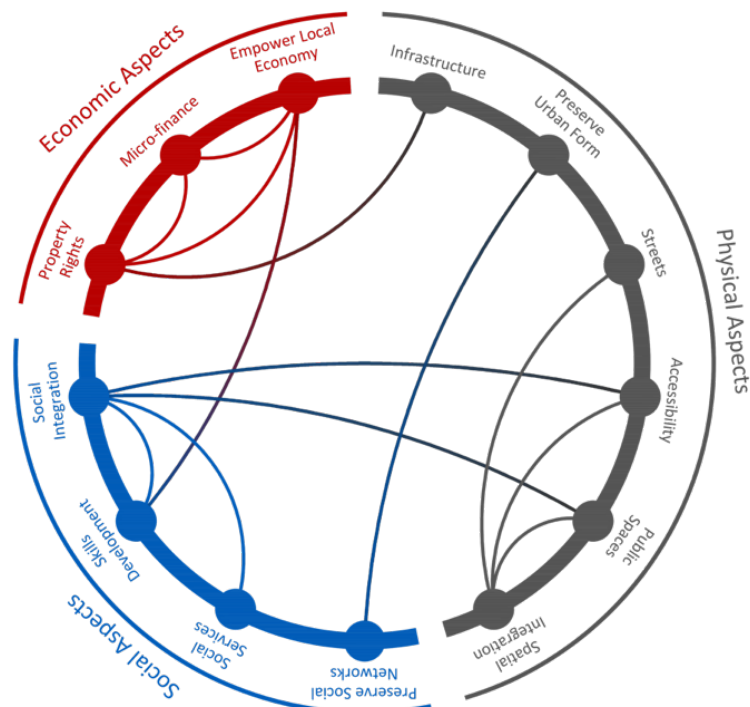
FIGURE 8.8: IMPROVED INFORMAL SETTLEMENTS FRAMEWORK

II.I   PHYSICAL ASPECTS

Informal settlements are disadvantaged and spatially marginalised city districts that
need upgrading. One of the aspects to upgrade is the spatial integration of informal
settlements with the surrounding formal areas. There are physical aspects that need
upgrading to ensure such integration. In Ard El Lewa and Ezbet El Haggana, two fea-
tures need particular attention: open public spaces and street networks. Public
spaces are scarce, which is why residents use the space for celebrations, social gath-
erings, and children's playgrounds, and also lined with street traders. Informal

communities need flexible public spaces that are adaptable to their needs. Also, open public spaces must be strategically introduced to areas that can help with informal-formal spatial integration.

Similarly, street networks can play a role in informal-formal integration. The investigation carried out on both case studies showed hierarchical street typologies with commercial uses heavily concentrated in the main streets. Both areas have limited access points; thus, connecting the informal and formal street networks is essential in any spatial integration. The main commercial streets should be utilised in the integration process and improve the accessibility of the settlements. Also, the upgraded and integrated street networks could elevate the sense of security by clearing the area of drug dealers, which will help them become safer at night.

Another aspect is the infrastructure. Informal settlements - including the two case studies - have poor connections to utilities. Ezbet El Haggana and Ard El Lewa have access to water, electricity and gas, but water and electricity suffer from regular cuts. The unreliability of informal connections to houses causes regular cuts because of grid overload. The utility grids are extended from a nearby formal district, which cannot cope with the extra demand. So, this is one aspect that needs upgrading and needs to be done before any upgrades are made to the streets network.

Finally, it is vital to preserve the settlements' urban form during the upgrade. Compact, walkable, highly dense and mixed land uses are the characteristics of an urban form that responds to residents' needs and shapes their lives. Any change in the urban form could lead to a weakening or the loss of social and economic networks that support the lives of residents and ultimately change their way of life.

II.II Social Aspects

Informal settlements - including the two cases - have poor or lack public social services. The investigation showed that residents depend on nearby formal districts to access social services. Ezbet El Haggana has two primary schools, but they are in bad condition, while Ard El Lewa has no schools. Thus, residents need to send their children to schools outside the area, which creates extra costs and lost time in

transportation; it also means a high number of dropouts. Similarly, they have no health facilities or hospitals but have charitable health centres and private clinics that serve the areas. There is a desperate need to provide schools for all education levels. Also, there is a need for training centres and vocational schools for skills development because both areas are home to day labourers and skilled workers. Introducing educational facilities and vocational schools would help residents develop their skills and offer better opportunities to engage in formal work or elevate their current work.

With better social services and skills development programmes, residents could engage with formal work or provide better services to formal areas, which will help to increase their income. Also, receiving the same level of services as neighbouring formal area residents could lead to a decrease in the social gap and greater social equality. Finally, the inclusion of better social services, i.e., health and education facilities, will be a step toward upgrading the informal areas into sustainable neighbourhoods. They can develop on vacant lands or be part of the settlements' new patterns of urban development. As mentioned before, in Ard El Lewa, there are changes in development patterns by demolishing old buildings and replaced by new ones to increase the non-residential uses.

II.III ECONOMIC ASPECTS

Economic aspects consist of property rights, microfinance and empowering the local economy. Property rights in both case studies are different because, in Ard El Lewa, the people own the land, although they illegally built on it. While in Ezbet El Haggana, the state owns the land. Although residents feel secure because the size of the settlements is too big to evacuate, they have no official rights to prove their ownership of the housing unit. So, the legalisation of houses will allow properties in the informal market to integrate into the formal estate market, therefore promoting investing. It could create a system of micro-credits and loans to finance new micro-enterprises or support small and struggling businesses that serve the settlement and neighbouring areas. Furthermore, property rights, micro-financing, skills development and better access to education will help to empower the local economy and the economic activities of informal settlements, which are home to micro-enterprises and home-based

income-generating activities. This could help elevate the areas' socio-economic status and allow for more opportunities, whether by expanding local businesses beyond the settlement boundaries or by starting new businesses.

8.2.5 INFORMAL GROWTH MANAGEMENT

The expansion of informal settlements is unavoidable in developing countries because of the increasing population, the unaffordability of formal housing, and rural-urban migration. In simple words, current interventions analyse the current situation of a settlement and then upgrade it but do not consider the future of the settlement. Therefore, interventions must predict, provide space, and prepare for future expansion. Expansion control is the last step in the Control & Integration Model.
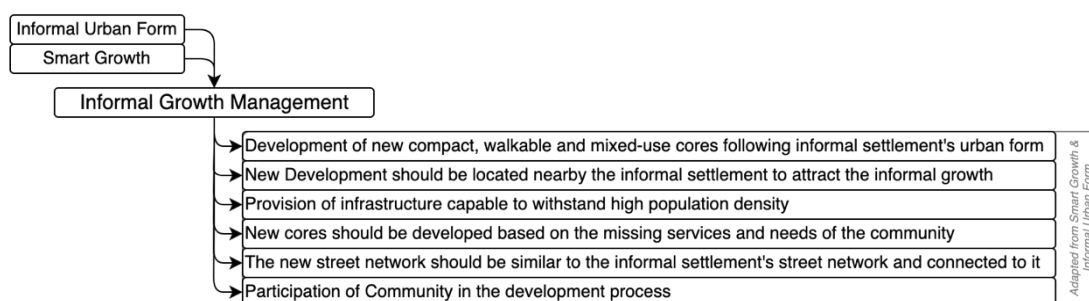
FIGURE 8.9: INFORMAL GROWTH MANAGEMENT PRINCIPLES

I. PRINCIPLES OF INFORMAL GROWTH MANAGEMENT

The future of informal development should include monitoring and guidance to ensure that upgraded conditions continue and that growth is directed to more suitable places. Smart Growth principles and the characteristics of the informal settlement are the bases for Informal Growth Management. First, guided future expansion should be as close as possible to the urban form of the particular informal settlement. Therefore, future expansion should inherit the characteristics of the settlement, for example, walkability, mixed land uses and compactness. Second, Smart Growth as an urban management programme has principles that shape future expansion; according to Table 3-6, it has ten principles. The development follows the principles of Smart Growth and informal urban form (Figure 8.9), which are:

- The community must participate in the development process.

- The development should occur near the settlements in the most suitable direction for expansion.

- To develop new centres of commercial and mixed land use in compact, pedestrian-friendly forms.

- To extend utility infrastructure networks that can handle a high population density like the particular settlement in consideration.

- To connect the street network of informal settlements with the newly developed streets by following the same hierarchy and characteristics of the existing network.

II. EXPANSION CONTROL

The upgrade process should integrate the existing informal area with the surrounding formal district. That is why managing the growth will help integrate informal urbanism into the city's urban planning process.

Informal growth management should be conducted seamlessly to increase the chances of success and fulfil its objective, as growth management is based on Smart Growth and the characteristics of the informal settlement's urban form. Another important aspect is the vacant area(s) location for development. The appropriated land should be strategically selected and developed in areas where the informal settlement can expand and in the direction of the required growth. Moreover, the development process should start by providing the services which informal residents need. This means developing a mixed-use core that includes facilities and commercial and recreational services. It requires the development of a new compact mixed-use centre to which residential uses will later expand. Thus, the development of services nearby which are missing in the informal settlement will act as an attraction for new residents and encourage informal development, thus directing growth.

8.3 FROM CONCEPTUAL TO OPERATIONALLY VALIDATED MODEL

Figure 8.1 shows the conceptual model with the different aspects that need attention: policy adjustment, access to community, settlement analysis, upgrade & integrate and growth management. Figure 8.10 shows the operational model that shows

the sequence of implementation and its different phases. Also, it shows the model's different variables that need to be studied and how each phase is dependent on the one before it. Policy adjustment is a preliminary phase aiming to set the right atmosphere for future interventions. Next, access to community is essential for the formulation and success of any intervention because the community's involvement should produce an intervention that is suitable and responsive to their needs. Also, it sets the stage for the settlement analysis, which should be carried out thoroughly. Later, the upgrade & integrate and growth management can be carried out in parallel. Upgrade & integrate concerns the settlement itself, and the plan will be designed based on the outcome of the settlement analysis. The same is intended for growth management, which will be designed and planned based on the needs of the settlement, including where it can attract future growth.

The operational model is developed to show the sequence for implementing the different phases. Also, it shows the different variables that need to be studied and how each phase depends on the preceding one. The model starts by adjusting the policies before planning any intervention. After adjusting the policies, the intervention planning starts by communicating with local NGOs and community leaders, who can help establish the community union and set its objectives. Later, the investigation of the built environment starts by implementing the Characterisation of Informal Settlements Framework (CISF) tier one in order to understand the physical, social and economic characteristics and different relationships between them. From this, tiers two and three of the Characterisation of Informal Settlements Framework (CISF) can be implemented through a series of observations, surveys and interviews with the community, which will help develop a holistic picture of the informal settlement, residents' needs and their way of life. Finally, the last two phases (Upgrade & Integrate and Growth Management) must run in parallel. Both are important to ensure that the informal settlement is upgraded and that future growth responds to the community's needs.
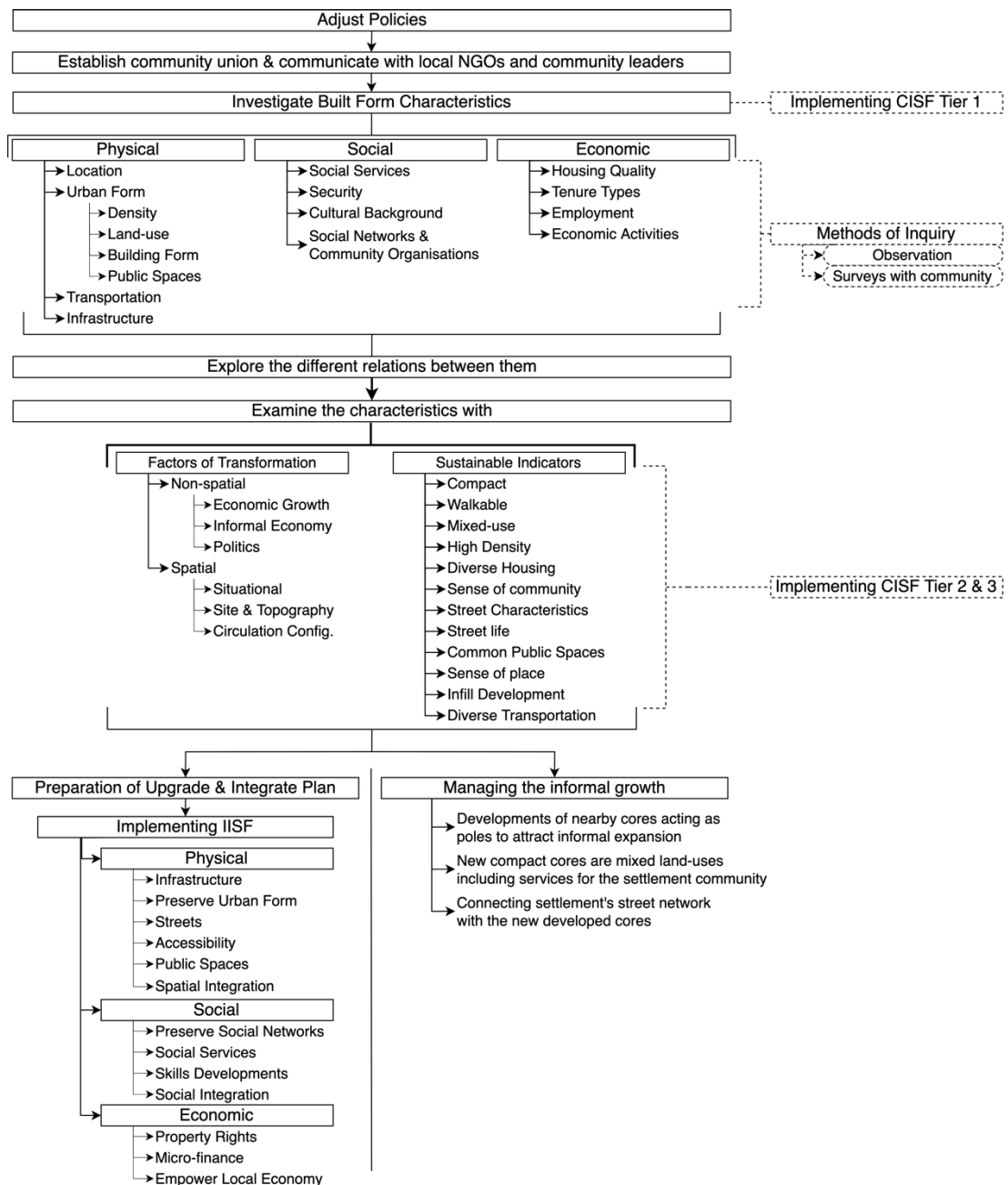
FIGURE 8.10: OPERATIONAL MODEL

8.4   MODEL VALIDATION

After the development of the model, it was tested by experts to validate its components. The experts were invited to participate in a one-on-one interview and a document explaining the model (Appendix E). The presentation document described the key issues tackled by the model and outlined its objective, theoretical base and different stages. Also, it included a description of each part of the model. During the interviews, the discussion was used to validate and test the model with the experts.

The conversations discussed every step of the model (Appendix F). The issues raised by interviewees focused on two particular parts: policy adjustment and access to settlements, as both received the most attention.

8.4.1 CRITIQUE OF POLICIES ADJUSTMENT

The policies received the attention of all participants. Participant HK said that informality is not a tool but rather a route to urbanisation because the people choose that form when electing to live in urban areas. Also, she said that it was necessary not only to recognise but to integrate. Recognition only will not guarantee the acknowledgement of their investments, while integration will and will help to be part of urban areas. HK also stated that decentralisation would be very hard because the nature of the government is to centralise all aspects. She stated it would be better to look at centralised governments and how they deal with decision-making regarding informal settlements. Another consideration is that informal incremental processes have become a thing of the past in Greater Cairo's informal settlements, although they would still be relevant in informal settlements in other cities. HK also advised tying policies two and four together because linking decentralisation with changes in the budgeting system would help achieve better results and decisions in upgrading projects.

Furthermore, participant GF supported the first policy because informality is an important partner in housing provision and will help with community integration. Also, she welcomed the change in the governance system and the introduction of multidisciplinary work and cooperation between institutions and organisations, which should create a unified vision between the Urban Development Fund, the Ministry of Housing and the Governorates; this echoed the advice of HK

Participant MR said the recognition of informality would reflect the acceptance of a low-income mechanism in housing provision. This could stimulate legal systems to learn from informal systems and apply them in formal areas. MR also suggested that decentralisation would be a good idea and would be reflected in the governance system. He added that the governance system concerned not only budgeting but four other levels that needed changing. First, strategy is lacking because there is a lack of

knowledge about the market, key players, and different stakeholders in the housing sector. This leads to the second point that there is no cooperation between stakeholders. The government needs to include the private sector in the low-income housing sector and regulate that cooperation. The third level is the steering structure, which is missing, where the lack of unified vision is a reason for the deficiency in coordination. The fourth and last level is capacities development and innovations, which are missing in Egypt.

MK also stressed policies and said that the recognition of informal settlement must be reinforced with proper integration and become part of the formal agglomeration. She added that flexible building regulations are important and should be specific to each area, allowing more open space in highly dense areas. So, the summary of the experts' comments is as follows:

- Informality is one of the ways of urbanisation, not a tool.

- The acceptance of informal settlements as part of the urban fabric should include the informal with the formal to achieve proper integration.

- The flexibility of building regulations should be specific to each area, with emphasis on allowing more open spaces in highly dense areas.

- The recognition of informality would acknowledge the mechanism of the low-income group.

- A restructure of the governance system is required in budgeting, strategies, cooperation and coordination, and capacity development and innovation.

8.4.2 CRITIQUE OF ACCESS TO COMMUNITY

Another part of the model that received attention is access to the community because it ensures community participation. Participants AK and MK said that NGOs are not very active in Egypt because they do not have the political backing that gives them the required space and freedom to work. So, they need laws that give them more power, which in return are part of the decision-making process. Participant MR said that a community union as an idea is good, like the Local Popular Council law,

which is frozen. Therefore, it could be easier to reinstate it and empower these decision-making capabilities. Participant HK suggested it could be optional to establish the union. If it is established, it must include people from the municipality to enhance communication between the union and the municipality or district council. Participant GF also supported the idea but indicated that community unions must be part of the decision-making. She added that they must be part of the executive board and set a framework for selecting its members. The summary of their suggestions and comments are as follows:

- Ensure that community unions are part of the decision-making process;

- Implement a clear framework for member selection in the community union;

- Include representatives from the municipality in the community union;

- Back up NGOs and give them more power.

8.4.3 UPDATED CONCEPTUAL MODEL

Following the interviews with experts, changes were made to some phases of the model. In general, their verdict was that the model was comprehensive and worked on different important levels for upgrading projects. Therefore, the model was adjusted to offer a better position.

TABLE 8.2: AMENDED POLICIES NEEDED TO ENSURE THE SUCCESSFUL IMPLEMENTATION

Policy Adjustment
Recognition of informality and integrate it as one of the approaches of urbanisation; thus, accepting informal settlements as part of the urban fabric and a solution for affordable housing
Decentralisation of the decision-making process and restructuring of the governance system • Change the budgeting system from sectoral to locational • Emphasise cooperation between different stakeholders in the housing market • Set up a framework for coordination between different stakeholders • Create programmes for capacity development & innovation
Flexibility of housing regulations and standards, and acceptance of the incremental building process • The housing regulations must be specific to each area, responding to the social and economic needs of residents • The regulations must meet good health and hygiene standards.
Establishment of community unions for each area must be part of the decision-making process for any projects aimed at the community

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First, the policies (Table 8.2) are amended according to the experts' advice. These amendments present the policies in greater detail and introduce important parts to ensure they respond to the current situation more effectively. The first policy is edited to ensure it does not just recognise informality but also integrates it so that it becomes one of the urbanisation processes. In return, it will integrate informal settlements into the urban planning process and become a partner in housing provision. Second, the restructuring of the governance system should be undertaken in different stages, not just through the budgeting system. The policies added the need to include different stakeholders in the housing market and coordinate between them.

Additionally, they stipulated the need to set out programmes that allow for capacity development and innovation. This is important because it will pave the way for the private sector and informal market to become key players in housing provision. Third, housing regulations need to be flexible but also respond to residents' social and economic needs and ensure that they meet a good standard for the health and hygiene of urban residents. Finally, the community union should be part of the law to ensure its establishment and an official part in the decision-making process.

Second, the community union must have a framework for selecting its members, which should cover the different community groups and representatives from the municipality. This will allow the union to participate in the decision-making process under the supervision of the municipality. The framework of member selection should follow those principles:

- Members should represent all different groups of the community: Youth, women, local businesses, CBOs, etc;
- Members should have no political affiliation to avoid steering the upgrades toward any political gains;
- Inclusion of representatives from local NGOs;
- Inclusion of representatives from the municipality and its different departments.

Finally, the model is updated to show that it is a cycle (Figure 8.11) which can start with policy adjustment or access to community and then move to the later stages. The model can change and respond to the situation. After implementing the upgrade and growth management plans, it can produce other policies that need addressing or find new weak spots in the community access phase. This emphasises that it should follow continuous change and update according to circumstances and, later, work with updated versions. It is not a one-off plan but rather a continuous process that must be part of the urban planning of cities.

Policy Adjustment
- Recognition of Informality and integrate it as one of approaches for urbanisation; thus, accepting informal settlements as part of urban fabric and a solution for affordable housing
- Decentralisation of decision-making process and restructuring of governance system and a solution for affordable housing
- Establishment of Community Unions for each area and must be part of decision-making process for any projects aimed toward the community
- Flexibility of housing regulations and standards and acceptance of incremental building process

Access to Community
- Establish communication with:
  - Local NGOs & CBOs
  - Community leaders
- Establish community union to:
  - Participation in all projects phases
  - Monitor & communicate upgrade progress
  - Maintenance & management
  - Govern any future expansion
  - Survey the communities needs and priorities

Settlements analysis
- Three-tiered CISF
- Characteristics and relations between them
- cross-examine with sustainable urban indicators
- Factors of transformation

Upgrade & Integrate
- Improvement of Informal Settlements Framework
  - Efficient use of infrastructure
  - Enhance & support local businesses
  - Preserve sense of place & way of life

Growth Management
- Development of new compact, mixed-use core
- Connect the informal street network with new ones
- Infrastructure capable of handling high population density
- New developments start with the needed services

FIGURE 8.11: THE UPDATED CONTROL & INTEGRATION MODEL

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8.5 CONCLUSION

The model aims to create a blueprint to encourage better upgrading of informal settlements. Its objective is to upgrade informal settlements, their integration with the formal urban fabric and the management of informal growth. The model has five parts: policy adjustment, access to community, settlement analysis, upgrade & integrate, and informal growth management. It starts at the higher level, namely the policies. Those policies stemmed from the factors of success of intervention strategies (Sections 4.3, 6.5 & 7.4-III). The policy adjustment aims to create a better environment for upgrading projects. They acknowledge the presence of informal settlements and integrate them as a way of urbanisation. Also, this is supported by building regulations and standards. The flexibility of regulations will ensure that informal settlements and their future growth are perceived as illegal. Next, the policies introduced the restructuring of the governance system. The flawed governance system needs adjustment to support future upgrades and projects and enable the decentralisation of the decision-making process. The decision-making process is centralised, which has affected many projects and needs changing. Lastly, the community union presence must be supported by law, which is why it is one of the policies to be introduced. The policy's final form resulted from the conversations held with experts who suggested amendments. Moreover, those policies can be revised or add others after the implementation of the whole cycle of the model. After implementing the model, other problems or observations may arise that can help improve the model's future implementation.

Second, it is crucial to have efficient and transparent communication with local NGOs, CBOs and community leaders to establish community unions. First, the opening of a communication channel is needed between local NGOs and local leaders; this would allow the project initiator to build a better understanding of informal settlements. NGOs and leaders are the best points of entry to reach residents and understand the current situation of the settlement alongside the residents' needs. It is later aided by the community union, providing a middle ground between the community and

project designers, thus enhancing community participation. Previous interventions (Table 4.5) show that weak community participation can render the intervention ineffective or not fully achieve its objectives. Additionally, the union will increase community participation, include them in the decision-making and increase the sense of ownership. Also, the model sets the criteria for member selection; these criteria ensure good representation of all groups in the community and have no political gain from the union. The selection framework was one of the comments from the experts. The Local Popular Council law is frozen but still, when active, did not show any signs of real participation of different community groups and was politically influenced. So, the community union can be an alternative that overcomes the weaknesses of the Local Popular Council. Moreover, the model is flexible that the initiator is not a governmental organisation; it can start from this phase and, in the end, influence policy adjustment and start implementing the model in other informal settlements.

The settlement analysis is the third part which concerns the different characteristics of the settlement. The analysis is conducted by implementing the Characterisation of Informal Settlements Framework (CISF). It was tested on two case studies; Ard El Lewa and Ezbet El Haggana (Chapter 7). The framework demonstrates the different relationships between the physical, social and economic characteristics which will help with the later stages, namely the upgrade & integrate and growth management. Those relationships show the complexity and dynamics of informal settlements, and understanding those relations is the key to developing an intervention plan. It also helps to understand the different factors that influence the growth of informal settlements and compares the settlement with the sustainable urban form indicators, which must be part of the intervention plan to ensure settlement sustainability.

The upgrade & integrate and informal growth management depend on settlement analysis, which can run parallel to each other. The first set the upgrade plan according to the Improvement of Informal Settlements Framework (IISF), which shows that each aspect depends on the others. To create a comprehensive plan, each aspect of the IISF must be tackled. Also, the IISF provides a guide that traces each aspect of the upgrade plan and how it will affect the others because upgrading one of those

aspects may impose a positive or negative effect on the others. It gives the planners an idea of what can be done and its impact, which, in turn, will lead to a comprehensive upgrade. The IISF provide a guide to different upgrading aspects (physical, social and economic) and how they are connected with each other. The upgrade & Integrate part is built upon Slow Urbanism principles. The IISF developed from the most relevant principles and adapted slow urbanism principles (Section 2.4.5) to the informal settlements context, in addition to factors of success (Section 7.4). The second is informal growth management, which sets the principles that help develop the upgrade as a tool to direct growth toward desirable lands. It creates growth poles for future expansion to allow for the sustainable growth of informal settlements. The informal growth management principles are adapted from Smart Growth as a growth management concept (Section 2.4.3). Finally, the operational model conceptualises the different steps of the Control & Integration Model. It efficiently guides the implementation to harness its capability.

This chapter presented the Control & Integration Model, which aims to upgrade, integrate and control informal settlements. Its five stages set a blueprint for better implementation of intervention strategies which ensures that it is comprehensive, allows full community participation and continues the sustainable growth of informal settlements. This model resulted from the following four lines of inquiry: To investigate informal settlement characteristics, investigate the different aspects of intervention strategies, investigate the factors of success of intervention strategies and explore different urban development concepts. Those lines of inquiry created a model with five pillars: Policy adjustment, access to the community, settlement analysis, upgrade & integrate, and informal growth management.

First, policy adjustment is a preliminary phase that sets up the right atmosphere for future interventions. Next, access to community is essential for the formulation and success of an intervention because community involvement will produce an intervention that is suitable and responds to the needs of the community and later maintain and manage the settlement after the end of a project. Also, it sets the stage for the settlement analysis, which must be done thoroughly. Later, upgrade & integrate, and

growth management can be implemented in parallel. The upgrade & integrate concerns the settlement itself, and the plan design must be an outcome of the settlement analysis. The same goes for growth management, which will be designed and planned based on the needs of the settlement, where it can attract the future growth of the settlement. After the model development, the model was validated by a series of interviews, which created another layer to enhance the model further. The next chapter, the final chapter, shows how the research met its objectives and answered the questions and the main contribution of the research.

Chapter 9. CONCLUSION

9.1 INTRODUCTION

With the rapid urbanisation of cities of the Global South since the middle of the last century, informal settlements have become home to many urban dwellers. In 2018, the UN reported one billion informal residents, almost a quarter of the total urban population (United Nations, 2021). That quarter lives in sub-standard living conditions and needs more attention to improve their built environment following SDG 11.1. The situation in Greater Cairo reflects that of the Global South, where 65% of the urban population lives in informal settlements. Therefore, the research aims to develop an intervention strategy with three goals: To elevate the current conditions, integrate informal settlements with the formal city, and manage the informal expansion. Thus, this research contributes to the knowledge by developing a conceptual framework that can be adopted by decision-makers or NGOs that helps formulate an intervention strategy that integrates the informal settlements in the formal planning process and controls its growth.

This chapter presents the conclusions of the research. It starts with a discussion of each research question and objective and how each was achieved. Next, it presents the contribution of this research to the topic and the broader field by producing a conceptual model that helps improve interventions to improve informal settlements. Also, the limitations faced by this research need to be mitigated in future studies. Later, policies and recommendations for informal development can enable better planning interventions when upgrading informal settlements. Finally, it outlines future opportunities and research which can be pursued.

9.2 KEY FINDINGS – RESPONDING TO THE RESEARCH OBJECTIVES

This section presents the main findings of the research, answering the four main questions and their related objectives. These questions guided the research journey to answer the overarching question: *How can informal settlements be integrated with*

the formal urban planning process of Greater Cairo? The answer is explored in this section.

9.2.1 QUESTION & OBJECTIVE 1

What are the different characteristics that shape the informal built environment?	*To investigate the physical, social, and economic characteristics of the informal settlements and the relationships between them.*

The answer to this question is covered in chapters two, four, five, six and seven. It started with an investigation that laid the foundation for the research. It began with a comprehensive literature review on informal settlements and an understanding of the reasons behind their emergence, as well as the different informal-formal relations. The formal-formal dialogic model of the relational school acknowledges the complexity of informality. Later, this was echoed within informal built environment studies. These were concerned with analysing the built environment and the factors of transformation. Chapter two sets the base for the investigation of the informal settlement.

The research investigated the physical, social and economic characteristics of different settlements in the Global South. It was found that the reason for informal development is almost the same across the Global South. Globalisation and industrialisation made cities attractive to rural residents; therefore, they increased the urbanisation rate of cities. This increase created pressure on governments to provide affordable housing, which they failed to do. Therefore, informal settlements grow out of necessity by housing rural-urban migrants and low-income groups of people. Over time, informal settlements developed and became more established until they were home to most people in the Global South. Later, the investigation conducted an exploratory case study of Belgrade by investigating its different characteristics, and finally, the investigation focused on Greater Cairo, the home of the research context.

This non-governed growth led to the creation of a unique and dynamic environment. The characteristics of informal settlements are investigated in chapter four by

focusing on the Global South. This study developed the Characterisation of Informal Settlements Framework: Tier 1 (Figure 4.13). Characterisation of Informal Settlements Framework (CISF) Tier 1 presents the different relations between the physical, social and economic characteristics unique to informal settlements.

I. Physical characteristics

The physical characteristics are divided into *location*, *urban form*, *transportation* and *infrastructure*. The first is *location*. They are usually in two locations – inner-city and peri-urban areas – but the location was chosen based on four important relations: links to transportation, the presence of utility *infrastructure*, proximity to employment areas and access to social services.

The second is the *urban form,* which comprises *density*, *street network*, *land use*, *building form & housing types* and *public spaces*. *Density* increases according to the sense of security, which in return intensifies the demand for housing, leading to the emergence of new housing types and the loss of public spaces. The *compact building form* influenced the narrow street network and was the only public space. Also, it influenced walkability and a sense of security. Next, *land use* corresponds to the needs of the people to generate income, which explains why commercial uses appear on the ground floor of buildings, which also influences the *building form & housing types*. Additionally, the area's high density, cultural background and economic activities shaped the space and enhanced social ties. Last, the scarcity of *public spaces* is due to their compact and dense form and the extension of economic activities to streets which are the only public spaces.

Third, *transportation* within the settlement is mainly conducted on foot because of the compact urban form and narrow street network. Also, the location near formal districts enabled good links to transportation networks. Similarly, the infrastructure is easily extended to informal settlements from nearby formal districts.

II. Social Characteristics

While social characteristics comprise *social services*, *security*, *social networks & community organisations* and *cultural background*, access to *social services* directly

relates to the location of the settlements. Most, if not all, are near formal districts to ensure access to social services. Also, social networks and CBOs in informal settlements help to compensate for the lack of those services. Next, *security* in settlements is affected by strong social ties with relatives and friends who live nearby, thus, increasing the feeling of security. Moreover, feeling secure encourages the construction of better houses. Social networks can relate to – and be enhanced by – housing types and common origins, like houses occupied by one extended family, which enhances the network. Also, these enhanced ties increase the feeling of security, alongside the range of tenure types to suit all.

III. Economic Characteristics

Last, *economic activities*, *employment*, *tenure types* and *housing quality* were investigated to understand the economic characteristics. Economic activities are essential for residents' livelihoods. Their presence affects the street network because street vendors, shops, and workshops extend to the street for extra space. Thus, producing mixed land-use and building forms and enabling improved housing quality through income. Similarly, employment is directly related to the location where they can access jobs and represents a factor in improving housing quality and types. Another aspect is tenure types, based on social networks and trust between residents. Last, housing quality is directly affected by residents' engagement in economic activities in the area or having jobs outside the area where they earn money to improve their housing. Also, they will not invest in their houses if they do not feel secure.

IV. Transformation Factors

From the literature review in chapter two, some factors affect the transformation and expansion of informal settlements. Those factors were further developed to form the Characterisation of Informal Settlements Framework (CISF) Tier 2 and are divided into *spatial* and *non-spatial* factors. The spatial factors are *economic growth*, *informal economy* and *informal politics*. The increased density, commercial uses, change to better housing, and increased economic activities can observe economic growth in the area. Similarly, the informal economy is present because of the high density, mixed land uses, better housing types and economic growth. Last, government

politics toward informal settlements, like extending infrastructure and not evicting the residents, allow for increased growth and density, which imposed changes to housing types.

While spatial factors include *situational factors*, *site and topography* and *circulation configuration*, each can be detected from the physical characteristics of informal settlements. The situational factors are traced to the settlement's location relative to formal districts and their increasingly high density. Street networks and building forms are shaped by the nature of the site and topography. Finally, circulation configuration can be understood by investigating the street network.

9.2.2 QUESTION & OBJECTIVE 2

What are the factors that contribute to the success of intervention strategies?   *To explore the factors of success within intervention strategies.*

To answer this question, the investigation took different paths. It was explored from the intervention case studies in cities of the Global South and Egypt and interviews with different experts and academics; the answer was addressed in chapters two, four, six and seven. Interventions need some adaptation in each of the several stages to ensure better planning and implementation. So, there are factors that need to be considered to ensure its success.

Before planning any intervention, some policies need adjustment or introduction to enable better planning and implementation of interventions. At the top, states need to recognise informality as an alternative form of urban development. Informal urbanisation has become dominant in almost all countries of the Global South, where the urbanisation rate is increasing, which increases the demand for affordable housing. That recognition will render informal settlements legal, but this must be accompanied by the introduction of incremental building methods and flexible housing regulations and standards. These must ensure that residents' needs, aspirations and incomes are considered. Furthermore, policies may differ from one context to another; for example, policies like accepting social-cultural land administration and customary

land titling can only work in a specific context and if it is acceptable to the culture and traditions of residents. These policies are important because the nature of informal settlements is dynamic as they respond to people's needs, thus ensuring their work does not fall out of legality.

In addition, some factors must be introduced within interventions to ensure they are appropriate and responsive to the community's needs. In the pre-planning phase, several points need addressing; first, decision-making needs to be decentralised because previous case studies have shown that sometimes big political figures or institutions can interfere and steer plans to their gain, which necessarily benefits residents. Second, a complete analysis needs to be conducted of the built environment to ensure the plan is prepared in the most beneficial way for residents. Part of that analysis is to understand residents' ways of life and movement relative to land-use distribution. Third, it is vital to ensure that funding will cover the whole project, so it is not left incomplete. Fourth, community participation must be ensured at all stages of intervention by establishing a management programme that aims to supervise all stages of the intervention and, later, supervise maintenance and future issues that may arise. Last, the planning stage needs careful consideration to preserve the flexibility and dynamism of informal settlements and not impose formal rules and spatial order. Also, the intervention must respect residents' cultural norms and traditions and preserve the social and economic networks, including the way of life.

After completing the investigation on Egypt, the literature review and interviews with experts highlighted the need to introduce significant policy changes. Similar to the Global South, informal settlements should be recognised to relieve the pressure on demand for affordable housing. Additionally, flexible building regulations and incremental building processes are necessary because Unified Building Law is rigid and does not differentiate between different contexts or locations. Moreover, an overlap between institutions' roles and responsibilities and the centralisation of decision-making creates a misunderstanding as to who handles what. Also, suppose a significant political figure becomes interested in one area. In that case, they create a focus that speeds up the operation with the aim of just 'getting it done without giving full

attention to residents' needs. Therefore, each institution's and organisation's responsibilities need clarification, while decision-making should be decentralised to avoid becoming the responsibility of any one key political figure. Plus, the budgeting system should be changed from sectoral to locational because the old budgeting system is obsolete and renders many development projects incomplete. Finally, an important issue is the disabled law of the Local Popular Council. Currently, there is no representation for the area within discussions about the development plan. Even when this law was active, it did not produce plans with real participation from the local community. Therefore, it needs to be reactivated and changed to allow for better representation of the local community and to move away from enabling political benefits to members.

Second, the preparation phase needs to focus more on developing comprehensive development plans and not only on the physical aspects. However, ISDF interventions only work on the physical aspect. A comprehensive analysis of all aspects is still not obligatory before planning interventions. A complete settlement analysis must be conducted before the planning phase to enable a comprehensive approach. Finally, the planning phase needs to care about residents' way of life and maintain their existing social and economic networks, as these are important to their livelihoods. Also, it is essential to maintain the good characteristics of the current urban form as the social and economic network is shaped around it. Post-development, there is a need to let the Local Popular Council supervise the area maintenance by reporting any problems to the district office.

9.2.3 QUESTION & OBJECTIVE 3

What is the relationship between informal settlements and sustainable urban development in Greater Cairo?

To cross-examine the informal settlements with the concepts of sustainable urban development.

In order to design an intervention strategy, the research had to explore the sustainability of the urban form. So, Characterisation of Informal Settlements Framework (CISF) Tier 3 was developed to cross-examine sustainable urban form indicators with

informal settlements. These indicators emerged from several widely used concepts in the Global North. Informal settlement characteristics were examined against these (12) indicators: *compactness*, *walkable*, *mixed-use*, *high density*, *diverse housing*, *sense of community*, *street characteristics*, *street life*, *common public spaces*, *sense of place*, *infill developments* and *diverse transportation*.

The first of these indicators is *compactness*, denoting a high population density, narrow streets and high-rise apartment buildings with no gaps between them, thereby creating a compact urban form. This compactness allowed the settlement to be *walkable*, aided by a street network that mainly allows cars on main streets, leaving secondary and residential streets primarily pedestrian based. Also, *mixed land uses* made it more pedestrian-friendly, which can be traced to the economic activities inside a settlement that introduced different land uses other than residential. Moreover, building form & housing types and strong social ties increase the density, meaning that *high density* aids in the compactness of informal settlements. *Diverse housing* is present in informal settlements and can be seen in the area's different housing and tenure types. Residents went further by developing informal types of contracts to suit more people, which is one of the indicators in the provision of housing and tenure types that suit a wider range of people. In addition, a *sense of community* is observed whereby residents enjoy strong social ties because of their proximity and shared cultural background, increasing the strong sense of community. Observing the street network and public spaces shows that *street life* in informal settlements is strongly present. Also, informal settlements have different street types where secondary and residential streets are pedestrian-oriented, and because streets are the only public spaces available, this means greater use throughout the day. Residents use them for any activity that is not against their traditions and norms, like children's playgrounds, socialising spaces, extensions for shops and special occasions. This shows that anyone can use such *public spaces* if such activities are not deemed harmful; it also shows a *sense of place* where the different uses of streets and public spaces show how people claim the space in their settlement. This might include putting furniture in the streets to sit on and socialise or extending workshops in spaces in front. When comparing

sustainable urban forms, infill development is noted as significant. Informal settlements keep growing step by step and try to make as small a footprint as possible, which can be characterised as infill development. They efficiently use the available space by building close to each other. When they try to upgrade their housing, this is done in the same area. Also, this type of development allows for the use of different methods of transportation. They are walkable areas and use tuk-tuks if they are travelling long distances to connect to other types of transportation to link with the city. Therefore, *diverse transportation* methods are available according to need.

9.2.4   QUESTION & OBJECTIVE 4

| *What are the different strategies to upgrade Greater Cairo's informal settlements and integrate them into the formal urban planning process?* | *To develop a strategy to integrate the informal settlements with the formal city and to manage its growth.* |

This is the final question and objective associated with the main aim of the research, and it was answered and achieved in chapter eight. The research developed a model for urban integration to govern the growth of informal settlements by continuing the informalisation process while improving current conditions by utilising vacant lands between formal and informal areas. The model offers a blueprint for formulating an intervention strategy for informal settlements. It has a preliminary policy adjustment phase and four subsequent phases: access to community, settlement analysis, upgrade & integrate and expansion control (Figure 8.9).

The model aimed to tackle the issues present in Egypt. First, there is little to no interaction between the ISDF and the community. The leading strategies are the total redevelopment or eradication and relocation of informal residents to social housing. Second, the primary strategy is the eviction of unsafe areas or the physical upgrade of unplanned areas. Third, no comprehensive model or framework exists to upgrade or integrate the informal settlements and informal urbanisation process into the city's urban planning. Fourth, the continuity in maintaining upgraded areas is almost non-existent, whether from the government or the NGOs.

To tackle these issues, the model had four main lines of inquiry: Investigating the different characteristics of informal settlements, the different aspects of intervention strategies, the factors of success of intervention strategies, and the exploration of different urban development concepts. Consequently, the Control & Integration Model was developed as a blueprint for future intervention strategies. The model has five phases. First, at the higher level, policy adjustment introduces four different policies to pave the way for later phases. Second, access to settlements is a prerequisite to subsequent steps. In this phase, the organisation responsible for the project will establish a connection with the community and found the community union, which will ease the next phase of settlement analysis. The third is the settlement analysis, where the Characterisation of Informal Settlements Framework (CISF) is implemented. The CISF testing in chapter six showed the important relationships between the physical, social and economic characteristics. These relationships are crucial to understanding the dynamics of informal settlements, which leads to the subsequent phases. The fourth and fifth phases are upgrade & integrate and growth management, which stages can run in parallel. Upgrade & integrate is concerned with developing the physical, social and economic aspects that will lead to the integration of settlements with the formal fabric. The latter is concerned with managing and directing future informal growth toward the best places possible. Several experts validated the model and gathered feedback on how to develop it. Their input confirmed that the model achieved its goal of being comprehensive, encouraging community participation and will integrate informal settlements into the formal urban fabric.

9.3   RESEARCH CONTRIBUTION TO KNOWLEDGE

At the start of this research, there was a gap in knowledge in understanding the complexities of informality and its urban form and architecture. These complexities make upgrading informal settlements a complex task, and not all informal settlements are equal. There are differences in the physical, social and economic characteristics. Acknowledging that several upgrading projects have been undertaken before, the number of informal residents is still increasing. Therefore, the challenge to upgrading

them is to elevate their conditions, reduce poverty and integrate them with the formal city. This is a challenge in Egypt and cities across the Global South.

So, this research started by understanding the characteristics of informal settlements and produced the Characterisation of Informal Settlements Framework, which adds to the literature dealing with informality and informal settlements. When implementing this framework, it shows the settlement's characteristics as a network of relationships which helps to understand the complex nature of informality. Also, it gives a broader look at informal-formal relations, which influences its growth and development. Finally, the framework compares informal settlements with the different sustainable urban form concepts to complete the image. It provides a new methodological approach when studying and analysing informal settlements. Other studies usually deal with informal settlements by surveying the current situation and planning according to what the settlement lacks. However, this approach does not allow for creating an in-depth and comprehensive data set that allows subsequent work to be more suitable for upgrading and future expansion. Additionally, the framework focuses on informal-formal relations, which is crucial for understanding different aspects of informal settlements that could significantly impact planning. Another point is comparing informal settlements with sustainable urban development concepts; this new approach aligns with SDG goals to create sustainable urban areas. It assesses the informal urban form to understand how it can help planners in the design phase of an upgrading project.

Another addition to knowledge is urban planners, designers, NGOs, and anyone who deals with informal settlements. The research developed a conceptual model to upgrade the settlement's condition, integrate settlements within the formal city and manage its growth. The model can help better prepare for upgrades and guide an in-depth study of the settlements and their upgrade plan. Also, the model deals with informal growth and tries to manage, utilise and integrate within the urban planning process of cities. The Control & Integration model is a blueprint for better upgrading plans and aims to utilise informal growth to help increase affordable housing stock, a common cause behind informal settlements.

Besides, the Characterisation of Informal Settlements Framework (CISF) Tier 3 proved that the informal built environment could be compared to other sustainable urban forms. This can help urban planners and institutions learn from it and include it in their future urban plans. The informal urban form is unique and covers more than half of the cities of the Global South. Therefore, it is crucial to learn from it as it can solve two aspects: affordable housing and finding sustainable urban forms for the Global South.

In summary, the research provides a threefold contribution to knowledge. First, it adds to the literature on informality and informal settlements. Second, it has developed a new methodological approach to deal with the upgrade of informal settlements. Finally, it adds to the sustainable urban development literature concerning urban forms, especially in the Global South.

A study of different case studies and one-on-one interviews with experts led to the recommendations detailed in the following sections. The analysis revealed important points that must be considered to ensure a strategy's viability and meet the targeted community's needs and ambitions. The recommendations are divided into two: policy recommendations and intervention planning recommendations.

9.3.1 POLICIES RECOMMENDATIONS

In this research, one of its contributions is a set of policies that needs changing or introduction to the policies of cities with high rates of informality. The policies can be summarised into two sets. The first set is for Global South cities, which are:

- The state must recognise informality as an alternative form of urban development (Bari, 2016) and integrate informal urbanisation with the formal urban process. This will lead to the formal recognition of informal settlements as a solution to the housing shortage (Chisholm, 2019).
- The adaptation of housing regulations and standards that respond to residents' needs, aspirations and income by introducing flexible housing standards, the acceptance of incremental building methods, the acceptance of social-cultural land administration and customary land

titling, the cooperation between all stakeholders and the participation of local communities (Chitengi, 2015).

- It must introduce two different scales for intervention policies: (1) a nationwide policy and (2) a specification that each settlement has a tailored intervention strategy.

While the second set is specific to the Egyptian context, which is:

- To recognise and integrate informality as part of urban development and recognise and integrate informal settlements as a source of housing provision. This will relieve the problem of affordable housing because of the large supply of housing they will provide.

- Decentralise decision-making and differentiation between different roles of central and local government.

- Restructure governance systems with an emphasis on changing the budgeting system from a sectoral to locational.

- Include the Local Area Development Plan for land use as part of any development plan. It will sit between the Strategic Plan and the Detailed plan.

- Reactivate the Local Popular Council law, so there is a real representation of the community. Also, it needs a selection framework to ensure the representation of different groups of the given community.

9.3.2 INTERVENTION PLANNING RECOMMENDATIONS

The other set of recommendations is for the development of informal areas. Those recommendations can differentiate between a successful and unsuccessful project. So, the next set of recommendations is for planners and institutions responsible for formalising intervention plans for informal settlements.

- Conduct a complete analysis of the built environment, including the settlement's socio-economic, socio-spatial, cultural and unique characteristics (Goodship, 2019).

- Understand the ways of life and movement of people in and around the settlement and how this influenced the distribution of land use (Goodship, 2019).

- Ensure the availability of a sustainable source of funding that covers all stages of the project (Lungu, 2016).

- Communicate the intentions of the intervention to the community to secure their participation in all stages of the intervention project (Lungu, 2016).

- Establish an independent management programme that includes representatives from the community and different stakeholders of the intervention project, which is crucial during and after project completion (Lungu, 2016).

- Conduct the planning stages from the ground up and preserve as much as possible of the settlement's flexibility and dynamism by recognising the importance of the informal economy to the livelihood of residents; avoid imposing a formal spatial order (Nogueira, 2017).

- Preserve the movement of people in and around the settlement (Goodship, 2019), respect cultural rules and norms, and preserve the way of life and social and economic networks.

- Conduct a 'Participatory Needs Assessment' to identify residents' needs and priorities and reflect on the development plan.

- Establish a governance and management system for the intervention project. It will manage the project implementation and later guide the area's maintenance.

9.4 LIMITATIONS & FUTURE RESEARCH

The research faced some challenges and limitations during the investigation. First, the COVID-19 pandemic enforced restrictions on the progress of the research. The imposition of social distancing restrictions restricted any fieldwork or face-to-face conversation with participants. This restriction limited the research to only online

interviews with experts. Also, the initial plan was to conduct a survey of residents' case studies to gather more up-to-date details on their physical, social and economic characteristics (one line of investigation). This could have added residents' points of view on different aspects of the case studies. An online trial was conducted of the survey by distributing the link to the survey to social media groups, but this did not yield reliable results.

Another limitation was time. The sudden impact of the COVID-19 pandemic meant a reassessment of the methodology to work through imposed restrictions. The investigation had to find alternatives to the tools that allow social distancing. These amendments increased the time of the research and limited the number of case studies. The research had to turn to information-rich case studies to mitigate the problem of not contacting residents to complete surveys. So, the Characterisation of Informal settlements Framework needs to be tested in more case studies to be fully adapted to the context of Greater Cairo. Finally, the time limitation limited the investigation and developed a different framework without including the environmental aspects. In the future, this is very important to include as part of the Characterisation of Informal Settlement and Improvement of Informal Settlements Frameworks. This could streamline the Control & Integration model for future concerns related to climate change.

In the future, after the end of COVID-19 restrictions, the investigation can be carried out in better conditions. It will remove the restriction on the methodological approach, whereby surveys can be conducted by directly contacting people in the area. As a result, it could develop better results in investigating the physical, social and economic characteristics. Also, future studies could add the environmental aspect into focus.

Another suggestion for the future is to test the Characterisation of Informal Settlements Framework in other cities in Egypt and other countries in the Global South. The framework was tested only in case studies in Greater Cairo. Testing in other cities and countries can allow the adaptation and generalisation of the frameworks to

informal settlements globally. Another potential for the future is the Control & Integration Model; the model needs testing and validation with experts from different backgrounds, disciplines and contexts. The model was only tested with academics and experts in architecture and urban planning disciplines and in relation to the Egyptian context.

The final approach for future research is to focus on environmental aspects, especially climate change. Informal settlements are the main source of affordable housing in almost all cities of the Global South. There is a need to focus on climate change to keep up with current research in different contexts and disciplines. Informal settlements should be treated equally.

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Ethics Application Form

Please answer all questions

1. Title of the investigation
Controlling and Integrating Growth of Informal Settlements into The Formal Planning Process: The case of Cairo, Egypt
Please state the title on the PIS and Consent Form, if different:

2. Chief Investigator (must be at least a Grade 7 member of staff or equivalent)
Name: Ashraf M. Salama ☒ Professor ☐ Reader ☐ Senior Lecturer ☐ Lecturer ☐ Senior Teaching Fellow ☐ Teaching Fellow Department: Architecture Telephone: +44 (0)141 548 3995 E-mail: ashraf.salama@strath.ac.uk

3. Other Strathclyde investigator(s)
Name: Asser Bakhaty Status (e.g. lecturer, post-/undergraduate): PhD Student Department: Architecture Telephone: +44 (0)748 466 8728 E-mail: asser.bakhaty@strath.ac.uk

4. Non-Strathclyde collaborating investigator(s) (where applicable)
Name: Status (e.g. lecturer, post-/undergraduate): Department/Institution: If student(s), name of supervisor: Telephone:

E-mail:
Please provide details for all investigators involved in the study:

---

5. Overseas Supervisor(s) (where applicable)

Name(s):
Status:
Department/Institution:
Telephone:
Email:
I can confirm that the local supervisor has obtained a copy of the Code of Practice: Yes ☐   No ☐
Please provide details for all supervisors involved in the study:

---

6. Location of the investigation

At what place(s) will the investigation be conducted
The investigation will be conducted from home following the COVID-19 restrictions.

If this is not on University of Strathclyde premises, how have you satisfied yourself that adequate Health and Safety arrangements are in place to prevent injury or harm?
The investigation will be conducted online from home so no injury or harm could be caused.

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7. Duration of the investigation

Duration(years/months):   0/8

Start date (expected):   01 / 11 / 2020   Completion date (expected):   30 / 06 / 2020

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8. Sponsor
Please note that this is not the funder; refer to Section C and Annexes 1 and 3 of the Code of Practice for a definition and the key responsibilities of the sponsor.

Will the sponsor be the University of Strathclyde: Yes ☒   No ☐
If not, please specify who is the sponsor:

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9. Funding body or proposed funding body (if applicable)

Name of funding body:
Status of proposal – if seeking funding (please click appropriate box):
☐ In preparation
☐ Submitted
☐ Accepted
Date of submission of proposal: /   /   Date of start of funding: /   /

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10. Ethical issues

Describe the main ethical issues and how you propose to address them:
The main issue will be the use and handling of any personal data, this will be handled only by the researcher to ensure its confidentiality.

11. Objectives of investigation (including the academic rationale and justification for the investigation) Please use plain English.

The main objective is to develop an intervention strategy to upgrade the current conditions, integrate the informal settlements with the formal planning process and control the spontaneous expansion of the informal settlements. In order to fulfil it, the investigation has a series of objectives:

- Investigate the physical, social and economic characteristics of the informal settlements and the relationship between them.
- Explore the factors of success of different intervention strategies.
- Cross-examine the informal settlements with the concepts of sustainable urban development.
- Develop a strategy to integrate the informal settlements in the urban planning process and to manage its growth.

12. Participants

Please detail the nature of the participants:
Group 1: Architecture & Urban planning academics and urban consultants.

Group 2: Informal settlements inhabitants.
Summarise the number and age (range) of each group of participants:
Number: Group 1: 10 - Group 2:   Age (range) Group 1: 30-70 - Group 2: 18-60
Please detail any inclusion/exclusion criteria and any further screening procedures to be used:
Group 1: Must all have experience in carrying out investigation or projects in informal settlements.

Group 2: They must be living in one of the case study areas.

13. Nature of the participants
Please note that investigations governed by the Code of Practice that involve any of the types of participants listed in B1(b) must be submitted to the University Ethics Committee (UEC) rather than DEC/SEC for approval.

Do any of the participants fall into a category listed in Section B1(b) (participant considerations) applicable in this investigation?: Yes ☐   No ☒
If yes, please detail which category (and submit this application to the UEC):

14. Method of recruitment

Describe the method of recruitment (see section B4 of the Code of Practice), providing information on any payments, expenses or other incentives.
Group 1: The recruitment procedure will be through an email including an invitation letter presenting

the researcher, the research project, the aim of the interview, and if they are willing to participate or not.

Group 2: The recruitment procedure will be through online platforms and word of mouth, the participants will be sent a URL link for the questionnaire including the PIS and consent form.

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15. Participant consent

Please state the groups from whom consent/assent will be sought (please refer to the Guidance Document).
The PIS and Consent Form(s) to be used should be attached to this application form.
Group 1: After sending the invitation letter through the email and receiving their acceptance to participate, the researcher will send the PIS and consent forms for the participants to read and sign before conducting the interview.

Group 2: After opening the URL link for the questionnaire form, the participants will be shown the PIS and consent forms which should be read, signed and accepted before taking part in the questionnaire.

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16. Methodology
Investigations governed by the Code of Practice which involve any of the types of projects listed in B1(a) must be submitted to the University Ethics Committee rather than DEC/SEC for approval.

Are any of the categories mentioned in the Code of Practice Section B1(a) (project considerations) applicable in this investigation?   ☐ Yes ☒ No
If 'yes' please detail:

Describe the research methodology and procedure, providing a timeline of activities where possible. Please use plain English.
The main methodology of the research will be semi-structured interviews with various architects, urban planners and academics with hands-on experience working on informal settlements, the procedure is divided into two stages:

First stage is a semi-structured online interview which will discuss three themes: different characteristics   of informal settlements, the different interventions strategies and to what extent they were successful   and how we can compare the informal settlements to different concepts of sustainable urban development.

Second stage is an unstructured interview to discuss and validate the newly developed intervention strategy and its suitability and applicability on the different typologies of informal settlements in Cairo, Egypt.

Between the two stages of interviews, there will be a questionnaire conducted on the residents of the three case studies in order to have an inside view from the inhabitants which will supplement the data gathered from the first stage of interviews then all the data will help in developing the intervention strategy which will be validated in the second stage of interviews.

What specific techniques will be employed and what exactly is asked of the participants? Please identify any non-validated scale or measure and include any scale and measures charts as an Appendix to this application. Please include questionnaires, interview schedules or any other non-standardised method of data collection as appendices to this application.
Online semi-structured interview & unstructured interview.

Online Questionnaire.

Where an independent reviewer is not used, then the UEC, DEC or SEC reserves the right to scrutinise the methodology. Has this methodology been subject to independent scrutiny?   Yes ☐   No ☒
If yes, please provide the name and contact details of the independent reviewer:

17. Previous experience of the investigator(s) with the procedures involved. Experience should demonstrate an ability to carry out the proposed research in accordance with the written methodology.

PhD supervisor 0 With experiences in all the techniques utilised in this research work including interviews and attitudes surveys.

18. Data collection, storage and security

How and where are data handled? Please specify whether it will be fully anonymous (i.e. the identity unknown even to the researchers) or pseudo-anonymised (i.e. the raw data is anonymised and given a code name, with the key for code names being stored in a separate location from the raw data) - if neither please justify.
The data will be treated confidentially

Explain how and where it will be stored, who has access to it, how long it will be stored and whether it will be securely destroyed after use:
The data will be digitised and stored on a safe hard drive that is only accessible by the researcher only during the course of carrying out the investigation, then it will be destroyed when the research has been finalised.

Will anyone other than the named investigators have access to the data? Yes ☐   No ☒
If 'yes' please explain:

19. Potential risks or hazards

Briefly describe the potential Occupational Health and Safety (OHS) hazards and risks associated with the investigation:
The significant risk is the researcher or any interviewee could be infected with coronavirus which causes COVID-19 disease which led all governments to restrict travelling between countries and maintaining a minimum of 2 m of social distancing, that's why the main method for conducting the interview will be through an online communication method like Skype and for the questionnaires will be conducted through an online platform like Google Forms or Survey Monkey

eRisk assessment ID: 2496.

Please attach a completed OHS Risk Assessment (S20) for the research. Further Guidance on Risk Assessment and Form can be obtained on Occupational Health, Safety and Wellbeing's webpages

20. What method will you use to communicate the outcomes and any additional relevant details of the study to the participants?

At the end of the interview, I will debrief the participants on the possibility of communicating the outcome of the study if they choose to, and if there are any questions they wish to ask I would happy to answer.

At the end of questionnaires, I will include a debrief for the participants on the possibility of communicating the outcome of the study if they choose to, and if there are any questions they wish to ask they can do so through contacting the research by email or phone.

21. How will the outcomes of the study be disseminated (e.g. will you seek to publish the results and, if relevant, how will you protect the identities of your participants in said dissemination)?

The main outcome of the study is the PhD thesis of the researcher and the possibility of publishing a paper.

Any data is used in the thesis or any published material will be treated in a strictly confidential way

Checklist	Enclosed	N/A
Participant Information Sheet(s)	☒	☐
Consent Form(s)	☒	☐
Sample questionnaire(s)	☒	☐
Sample interview format(s)	☒	☐
Sample advertisement(s)	☐	☒
OHS Risk Assessment (S20)	☒	
Any other documents (please specify below)	☐	☐
Invitation Letter	☒	☐
Clarification of survey questions	☒	☐
Clarification of interview questions	☒	☐
	☐	☐

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22. Chief Investigator and Head of Department Declaration
Please note that unsigned applications will not be accepted and both signatures are required

I have read the University's Code of Practice on Investigations involving Human Beings and have completed this application accordingly. By signing below, I acknowledge that I am aware of and accept my responsibilities as Chief Investigator under Clauses 3.11 – 3.13 of the Research Governance Framework and that this investigation cannot proceed before all approvals required have been obtained.

Signature of Chief Investigator

Please also type name here: 17 November 2020

I confirm I have read this application, I am happy that the study is consistent with departmental strategy, that the staff and/or students involved have the appropriate expertise to undertake the study and that adequate arrangements are in place to supervise any students that might be acting as investigators, that the study has access to the resources needed to conduct the proposed research successfully, and that there are no other departmental-specific issues relating to the study of which I am aware.

Signature of Head of Department

Please also type name here   Prof. Tim Sharpe

Date: 17   / 11   / 2020

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23. Only for University sponsored projects under the remit of the DEC/SEC, with no external funding and no NHS involvement

Head of Department statement on Sponsorship
This application requires the University to sponsor the investigation. This is done by the Head of Department for all DEC applications with exception of those that are externally funded and those which are connected to the NHS (those exceptions should be submitted to R&KES). I am aware of the implications of University sponsorship of the investigation and have assessed this investigation with respect to sponsorship and management risk. As this particular investigation is within the remit of the DEC and has no external funding and no NHS involvement, I agree on behalf of the University that the University is the appropriate sponsor of the investigation and there are no management risks posed by the investigation.

If not applicable, tick here ☐

Signature of Head of Department

Please also type name here

Date: /   /

For applications to the University Ethics Committee, the completed form should be sent to ethics@strath.ac.uk with the relevant electronic signatures.

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24. Insurance

The questionnaire below must be completed and included in your submission to the UEC/DEC/SEC:

Is the proposed research an investigation or series of investigations conducted on any person for a Medicinal Purpose? Medicinal Purpose means: ▪ treating or preventing disease or diagnosing disease or ▪ ascertaining the existence degree of or extent of a physiological condition or ▪ assisting with or altering in any way the process of conception or ▪ investigating or participating in methods of contraception or ▪ inducing anaesthesia or ▪ otherwise preventing or interfering with the normal operation of a physiological function or ▪ altering the administration of prescribed medication.	No

If "**Yes**" please go to **Section A (Clinical Trials)** – all questions must be completed
If "**No**" please go to **Section B (Public Liability)** – all questions must be completed

Section A (Clinical Trials)

Does the proposed research involve subjects who are either: i. under the age of 5 years at the time of the trial; ii. known to be pregnant at the time of the trial	Yes / No

*If "**Yes**" the UEC should refer to Finance*

Is the proposed research limited to: iii. Questionnaires, interviews, psychological activity including CBT; iv. Venepuncture (withdrawal of blood); v. Muscle biopsy; vi. Measurements or monitoring of physiological processes including scanning; vii. Collections of body secretions by non-invasive methods; viii. Intake of foods or nutrients or variation of diet (excluding administration of drugs).	Yes / No

If "No" the UEC should refer to Finance

Will the proposed research take place within the UK?	Yes / No

*If "**No**" the UEC should refer to Finance*

Title of Research	
Chief Investigator	
Sponsoring Organisation	

Does the proposed research involve:

a)	investigating or participating in methods of contraception?	Yes / No
b)	assisting with or altering the process of conception?	Yes / No
c)	the use of drugs?	Yes / No
d)	the use of surgery (other than biopsy)?	Yes / No
e)	genetic engineering?	Yes / No
f)	participants under 5 years of age(other than activities i-vi above)?	Yes / No
g)	participants known to be pregnant (other than activities i-vi above)?	Yes / No
h)	pharmaceutical product/appliance designed or manufactured by the institution?	Yes / No
i)	work outside the United Kingdom?	Yes / No

If **"YES"** to **any** of the questions a-i please also complete the **Employee Activity Form** (attached).
If **"YES"** to **any** of the questions a-i, <u>and this is a follow-on phase</u>, please provide details of SUSARs on a separate sheet.
*If "Yes" to any of the questions a-i then the UEC/DEC/SEC should refer to Finance (*insurance-services@strath.ac.uk*).*

Section B (Public Liability)	

Does the proposed research involve :

a)	aircraft or any aerial device	No
b)	hovercraft or any water borne craft	No
c)	ionising radiation	No
d)	asbestos	No
e)	participants under 5 years of age	No
f)	participants known to be pregnant	No
g)	pharmaceutical product/appliance designed or manufactured by the institution?	No
h)	work outside the United Kingdom?	Yes

*If **"YES"** to any of the questions the UEC/DEC/SEC should refer to Finance (*insurance-services@strath.ac.uk*).*

For NHS applications only - Employee Activity Form

Has NHS Indemnity been provided?	Yes / No
Are Medical Practitioners involved in the project?	Yes / No
If YES, will Medical Practitioners be covered by the MDU or other body?	Yes / No

This section aims to identify the staff involved, their employment contract and the extent of their involvement in the research (in some cases it may be more appropriate to refer to a group of persons rather than individuals).

Chief Investigator		
Name	**Employer**	**NHS Honorary Contract?**
		Yes / No
Others		
Name	**Employer**	**NHS Honorary Contract?**
		Yes / No
		Yes / No
		Yes / No
		Yes / No

Please provide any further relevant information here:

Participant Information Sheet for Experts

Name of department: Architecture
Title of the study: Controlling and Integrating of Informal Settlements into the Formal Planning Process: The case of Cairo, Egypt

I am a PhD Candidate in the School of Architecture, University of Strathclyde, studying the different physical, social and economic characteristics and transformation factors of informal settlements. This will help in developing an intervention strategy to elevate the current conditions, integrate informal settlements with the formal city and control the spontaneous expansion.

Your voluntary participation is part of a field study for research on informal settlements in Cairo, Egypt. You have been invited to this study because of your experience of studying or working on projects related to informal settlements. Your participation in the study through an online interview which will discuss two themes: different characteristics of informal settlements and the different interventions strategies and to what extent they were successful. Also, the possibility for another interview to discuss and validate the newly developed intervention strategy and its suitability and applicability on the different typologies of informal settlements in Cairo, Egypt.

All the data obtained will be accessed by the researcher only, used for academic purposes and all answers and responses will be treated confidentially.

Thank you for reading this information – please ask any questions if you are unsure about what is written here.

Please also read our Privacy Notice for Research Participants

If you chose to participate, you can contact the researcher by email confirming you are willing to participate to set up a suitable date, time and the preferred method for the online meeting, finally you will be asked to sign a consent form.

If you chose not to participate, then thank you for your attention.

Researcher contact details:
Asser Bakhaty
Department of Architecture
University of Strathclyde
James Weir Building
75 Montrose Street
Glasgow
G1 1XJ

Telephone: +44 748 466 8728
Email: asser.bakhaty@strath.ac.uk

Chief Investigator details:
Professor Ashraf M. Salama
The place of useful learning
The University of Strathclyde is a charitable body, registered in Scotland, number SC015263

Department of Architecture
University of Strathclyde
James Weir Building
75 Montrose Street
Glasgow
G1 1XJ

Telephone: +44 141 548 3995
Email: ashraf.salama@strath.ac.uk

This research was granted ethical approval by the University of Strathclyde Ethics Committee.

If you have any questions/concerns, during or after the research, or wish to contact an independent person to whom any questions may be directed or further information may be sought from, please contact:

Secretary to the University Ethics Committee
Research & Knowledge Exchange Services
University of Strathclyde
Graham Hills Building
50 George Street
Glasgow
G1 1QE

Telephone: 0141 548 3707
Email: ethics@strath.ac.uk

APPENDIX C: CONSENT FORM

Consent Form for Experts

Name of department: Architecture
Title of the study: Controlling and Integrating of Informal Settlements into the Formal Planning Process: The case of Cairo, Egypt

☐ I confirm that I have read and understood the Participant Information Sheet for the above project and the researcher has answered any queries to my satisfaction.

☐ I confirm that I have read and understood the Privacy Notice for Participants in Research Projects and understand how my personal information will be used and what will happen to it (i.e. how it will be stored and for how long).

☐ I understand that my participation is voluntary and that I am free to withdraw from the project at any time, up to the point of completion, without having to give a reason and without any consequences.

☐ I understand that I can request the withdrawal from the study of some personal information and that whenever possible researchers will comply with my request. This includes the following personal data:

      ○ Audio recordings of interviews that identify me;
      ○ My personal information from transcripts.

☐ I understand that anonymised data (i.e. data that do not identify me personally) cannot be withdrawn once they have been included in the study.

☐ I understand that any information recorded in the research will remain confidential and no information that identifies me will be made publicly available.

☐ I consent to be a participant in the project.

☐ I consent to being audio recorded as part of the project. (recording is optional, please indicate your choice by (Yes / No).

Researcher: Asser Bakhaty	
Signature of Participant:	Date:

Appendix D: First Stage of Expert Interviews

Interview Guide with an expert

I. **What are the relationships between the different characteristics that shape the informal built environment?**

Each informal settlement has its unique characteristics, what is unique in these informal settlements?
- Social ties & social cohesion / certain type of craft or product / spatial organisation / socio-spatial relationships / sense of place / etc…

How they access different social facilities?
- Schools / healthcare / markets / childcare / etc…

How strong the community is organised? & the reasons behind its strong or weak organisation?
- to compensate for unavailable services / cultural background / etc…

What are the major risks in these informal settlements and its residents face?
- Eviction / environmental hazards / etc…

What are the things most lacking in these settlements?
- Social services /safety / public spaces / facilities / etc…

What are the different factors that influence the expansion of these settlements?
- Spatial / non-spatial / economic aspects / social aspects / etc…

What are the main characteristics that attract people to live in these settlements?
- Location / affordability / etc…

How the state governs the informal settlements?
- who is the decision-maker of any projects implemented in the settlements?

II. **What are the factors that contribute to the success of intervention strategies?**

What is the perception toward the informal areas?
- Government's perception / professional & experts' perception

What are the inhabitants' preferences toward acting in their area?
- Move to formal area / upgrade / total development

From your POV, what is the best practice to deal with the informal settlements?
- Past cases within Egypt / other countries
- Future recommendations

Key Issues

- There is little to no interaction between the ISDF and the community, and the leading strategies are total redevelopment or eradication and relocating the informal inhabitants to social houses.

- The main strategy is either the eviction of unsafe areas or the physical upgrade of the unplanned areas.

- No comprehensive model or framework to upgrade or integrate the informal settlements and informal urbanisation process into the city's urban planning.

- The continuity of maintaining the upgraded areas is almost non-existence whether from the government or the NGOs.

Objective

A model for urban integration and governing the growth of the informal settlements through continuing the informalisation process while improving the current conditions through the utilisation of vacant lands between the formal and the informal.

The model is a blueprint for formulating an intervention strategy for informal settlements. It has a preliminary phase of policy adjustment and four phases: Access to community, Settlement Analysis, Upgrade & Integrate and Expansion control.

Control & Integration Model

A Conceptual Framework for interventions in informal settlements

The formal models of master planning and urban design are falling in the countries of the Global South (Dovey, 2017). It is present in many countries around the globe, and the same happens in Cairo, Egypt. In Egypt, the urban development is fragmented between the formal planning accessible only to a fraction of the country's population and the informal urbanisation that became the norm. The different governmental cabinets keep trying to formalise it through the total redevelopment of the informal areas, but their efforts did not reach significant results. Informal urbanisation in the Global South and Egypt is still the only form of affordable housing for low- and middle-income groups. The current cabinet priority is to end the presence of informal areas setting 2030 as the target year that the country will be clear from informal settlements. The research deals with the problem of the subpar built environment, marginality and uncontrolled expansion of informal settlements; and to develop an intervention strategy that will elevate the current conditions, integrate the informal settlements with the formal city and manage the spontaneous expansion.

Policy Adjustment

- Recognition of Informality as a tool for urbanisation & informal settlements as a solution to the housing shortage
- Restructuring of governance system and changing the budgeting system from sectoral to locational
- Flexibility of housing regulations and standards and acceptance of incremental building process
- Decentralisation of the decision-making process to eliminate any political influence

recognition of informality and informal settlements as a tool for urbanisation and form of housing development will ease the pressure on the housing shortage. Additionally, the recognition of informal settlements needs to be supplemented with *flexibility in housing and building regulations*. Informal settlements do not adhere to formal regulations and standards because they are either unaffordable to follow or do not meet peoples need. Thus, the building regulations and standards need to be flexible or include a new tier or class of regulations that can meet the expectation of the people and legalise the current ones.

Next, previous projects neglected the community needs and priorities and used them for political propaganda (Magdi, 2018) or beautification that created mistrust between the government and communities. Thus, to ensure the correct representation of the community and realisation of the communities' vision, it must *decentralise the decision-making process*. The decisions must be taken and authorised by high-ranking people, which jeopardise the implementation of the projects. Also, Abdelaal et al. (2021) mentioned that the central government heavily influenced local administrations, adding *"primary actors are appointed through direct patronage from primary political figures"* (Abdelaal et al., 2021, p. 46).

Last, the *restructuring of the governance system*. In Egypt, there are three different systems. All governorates follow the oldest system, the sectoral budgeting system. The state's ministries have 90% of the national budget while only 10% to governorates. When a governorate needs to execute a development plan, it must contact the respective ministries requesting what need. Governorates with the old governance system have informal settlements under their authority. The current system stops many projects to be realised as intended because each ministry has its priorities and budget that can work with it. So, the governance system needs to be revamped to give autonomy. It gave local councils more power to work in districts under their authority rather than wait for different ministries to cooperate and implement their development plans.

Model's Theoretical Base

The investigation was divided into four lines of inquiry:

1. Investigating the informal settlements different characteristics
2. Investigating the different aspects of intervention strategies
3. Investigate the factors of success of intervention strategies
4. Exploring different urban developments concepts
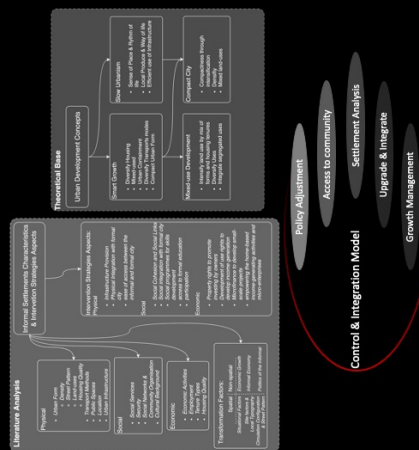
All formed the base of the model.

Slow urbanism, smart growth, compact city and mixed-use developments inspired the model. Slow urbanism, smart growth, compact city and mixed-use developments inspire the model's principles. The primary concepts are slow urbanism and smart growth, the former for upgrading and integrating plans and the latter is for expansion control. Slow urbanism has six principles, enhancing and preserving the built environment, increasing social cohesion and supporting economic development. The principles are adapted to the informal built environment. The adapted principles are efficient implementation and use of infrastructure, preserving the sense of place and the way of life in the settlements and enhancing and supporting local businesses.

The other concept adopted is smart growth, a growth management programme that aims to control informal expansion through infill developments in surrounding vacant lands. The appropriation of vacant land will direct the growth of informal settlements. They will be attraction points for future informal development; thus, controlling the expansion. According to the principles of smart growth, the community must participate with different stakeholders in new developments; in return, it will be responding to the community's needs and priorities. The infill development should concentrate the commercial and other uses in compact centres following the principles of the compact city and mixed-used developments.

The model has one preliminary phase and four main phases.
Policy adjustment is a preliminary phase in which is a prerequisite for the four main phases that can be applied to different settlements.

Access to Community

Establish communication with
→ Local NGOs and CBOs
→ Community Leaders
Pre-planning

Establish Community Union to
→ Participate in all phases of upgrade project
→ Communicate the progress to community
→ Solve any problems may arise
→ Maintenance and Management
→ Govern any future expansion
Planning & Implementation / *Post-occupancy*

Before collecting data on the settlement, two things need to happen. First, *establish communication with community leaders, local NGOs and CBOs*. They will act as middlemen between the residents and the officials. They facilitate entry to the settlement and reach different residents' groups to connect with and understand their problems and priorities. Also, this will ease later their participation in the intervention. Second, *establish a community union* aiming to participate in different phases of the upgrade, communicate the progress to the residents and monitor the community problems that may arise. Later, after the implementation, oversee the maintenance and management of the settlement and govern its future expansion. The local district will supervise the union. The next step is the analysis of the different characteristics of the settlement.

Settlement Analysis

In parallel with the founding of the Community Union, implementing the Characterisation of Informal Settlements Framework (CISF) starts. The three-tiered framework defines the physical, social and economic characteristics and the different relationships between them, then, the factors that influence the transformation and growth of the settlement and cross-examine the urban form of the settlement with different concepts of sustainable urban forms.

First-Tier / Second-Tier / Third-Tier

First Tier
The built environment characteristics are all connected. The urban form is shaped according to the socio-economic characteristics of the residents. The presence of strong social networks helps in attracting new families as well as maintaining the day-to-day needs. Also, the importance of informal economy for income-generating activities where they alter the built-environment accommodate it. Plus, the presence of informal-formal relations and social and economic reciprocity between both. Consequently, CISF was developed through in-depth analysis of the different physical, social and economic characteristics. This framework represents the different relations between the characteristics.

Second Tier
The first tier shows the relationships between the physical, social and economic characteristics. It shows the connections and the effects on different ones on others, understanding the dynamics of the settlements.
Moving on to the second tier, it inspects the spatial and non-spatial transformation factors and how to investigate them through the different characteristics of the settlement. Following that, the research developed two sets of factors divided into non-spatial and spatial factors. The non-spatial factors are Economic Growth, Informal Economy and Informal Politics. While spatial factors are: Situational Factors, Site & Topography and Circulation Configuration. Those factors are investigated from the different characteristics and developed the second tier of the CISF.

Third Tier
Compact City, New Urbanism, Smart Growth & Neo-traditional Developments. Each one had its principles. Those principles are compared to find the common aspects; then, developed a list of indicators used by this research. The indicators cross-examined with the characteristics. The different physical, social and economic characteristics of the informal settlements are investigated to find if the indicators are present or not. Next, develop the third tier of CISF.

Upgrade & Integrate

A comprehensive upgrade plan is what experts always recommend. The upgrade plan should tackle physical, social and economic aspects; as a result, the Improvement of Informal Settlements Framework (IISF) was developed. It works on those three aspects and how they could affect each other.
The framework built upon the understanding of the critical factors that need to be upgraded to improve the standard of living and integrate the settlements with the surrounding formal districts.
The figure below shows the principles that need to be taken into account when implementing the framework.

Slow Urbanism

Upgrade & Integrate
- Efficient use of infrastructure
- Enhance & support local businesses
- Preserve sense of place & way of life

Physical Aspects

Improvement of Informal Settlements Framework

Adapted from Slow Urbanism

Informal Growth Management

A comprehensive upgrade plan is what experts always recommend. The upgrade plan should tackle physical, social and economic aspects; as a result, the Improvement of Informal Settlements Framework (IISF) was developed. It works on those three aspects and how they could affect each other.
The framework built upon the understanding of the critical factors that need to be upgraded to improve the standard of living and integrate the settlements with the surrounding formal districts.
The figure below shows the principles that need to be taken into account when implementing the framework.

Informal Urban Form

Smart Growth

Informal Growth Management
- Development of new compact, walkable and mixed-use cores following informal settlements urban form
- New Development should be located nearby the informal settlement to attract the informal growth
- Provision of infrastructure capable to withstand high population density
- New cores should be developed based on the missing services and needs of the community
- The new street network should be similar to the informal settlement's street network and connected to it
- Participation of Community in the development process

Adapted from Smart Growth & Informal Urban Form

First physical Aspects. One of the upgrading aspects is the *spatial integration* of informal areas with the formal surrounding ones. There are physical aspects that need upgrading to ensure such integration. Two features of the urban form need attention: *open public spaces* and *street networks*. The *public spaces* are scarce; that's why the residents use the streets for celebrations, social gatherings, children's playgrounds and lined with street traders. The informal communities need flexible public spaces that are adaptable to their needs. Also, open public spaces must be strategically introduced in areas that can help with informal-formal spatial integration.

Similarly, the *streets networks* can play a role in informal-formal integration. The investigation carried on both case studies showed hierarchical street typology with commercial uses heavily concentrated in main streets. But most informal areas have limited access points; thus, connecting the street network with the formal one is very important to spatially integrating informal with the formal districts. It should utilise the main commercial streets in the integration process and improve the accessibility to the settlements. Also, the upgraded and integrated streets network could elevate the sense of security by clearing the area from drug dealers and becoming safer at night.
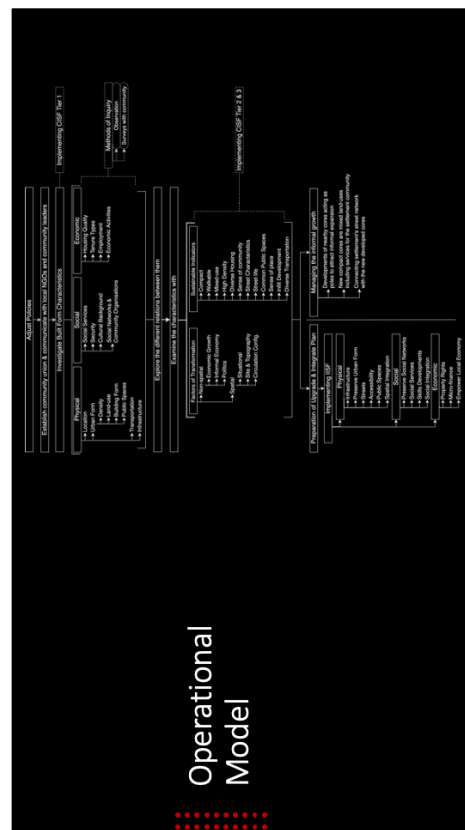
Another aspect is the *Infrastructure*. Informal settlements have a poor connection to utilities, and both cases are no different. Most unplanned areas have access to water, electricity and gas, but usually water and electricity suffer from regular cuts. The unreliability of informal connections to houses or the grid overloading causes the cuts. The utility grids are extended from a nearby formal district, which could not cope with the extra demand. So, it is one aspect that needs upgrading and needs to be done before any upgrades to the streets network.

Finally, *preserving the urban form* of both settlements during the upgrade. Compact, walkable, high density and a mix of land uses are the characteristics of urban form. The current urban form responds to the needs and shapes the resident's life. Any change in the urban form could lead to weakening or loss of social and economic networks that support the life of the residents and change their way of life.
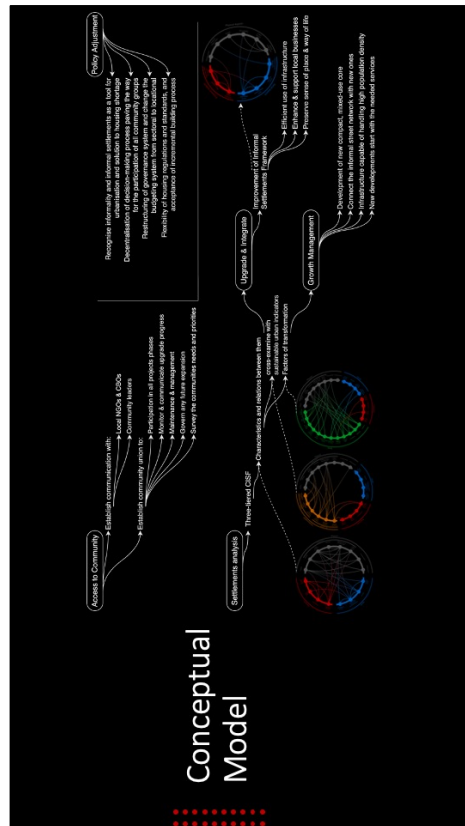
Second Social Aspects. Informal settlements have poor or lack public *social services*. Thus, the residents need to send their children to schools outside the area. It exerts extra financial costs and lost time for transportation, and a high number of dropouts. Similarly, they have no health facilities or hospitals. But have charitable health centres and private clinics that serve the areas. The investigation showed that residents depend on nearby formal districts to access social services. There is a desperate need to provide schools for all education levels. Also, the need for training centres and vocational schools for *skills development* because both areas are home to day-labourers and skilled workers. Introducing educational facilities and vocational schools will help the residents develop their skills and allow better chances of engaging in formal work or elevating their current work.

With better social services and skills development programmes, the residents could engage with the formal work or provide better services to formal areas. It will help with increasing their income. Also, the residents receiving the same level of services - as their neighbouring formal area residents - will lead to a decrease in the social gap and more social equality.

Third Economic Aspects. Finally, the economic aspects which are comprises property rights, microfinance and empowering the local economy. *Properties rights* differ according to the typology of the informal settlements. But in most settlements, the residents feel secure because the size of the settlements is too big to evacuate, but still, they have no official rights proving their ownership of the housing unit. So, the legalisation of houses will allow the properties to integrate the informal estate market with the formal one; therefore, promote investing. It will pave the way for creating a system of micro-credits and loans system to finance new micro-enterprises or support the small and struggling businesses that serve the settlement and neighbouring areas. Last, property rights, micro-financing, skills development and better access to education all will help in empowering the local economy and economic activities of the settlements as informal settlements are home for micro-enterprises and home

Informal settlements expansion is unavoidable in developing countries because of increasing population, unaffordability of formal housing and rural-urban migration. In simple words, current interventions analyse the current situation of a given settlement, then upgrade it. They don't consider the future of the settlement. Therefore, interventions need to predict, provide space and prepare for future expansion. Expansion control is the last step in Control & Integration Model.

Informal growth management should be done seamlessly to increase its chances of success subsequently, fulfilling its objective. As mentioned before, growth management is based on Smart Growth and Informal urban form characteristics. Also, another important aspect is the location of vacant area(s) that will be developed. The appropriated land should be strategically selected and developed in areas where the informal settlement can expand and in the direction of needed growth. Whilst the development process should start by providing services the informal residents need. It is the development of a mixed-use core that include needed facilities, commercial and recreational services. It is the development of a new compact mixed-use centre, where later, the residential uses will expand to it. The concept is the development of services missing in the informal settlement nearby will act as an attraction pole for new residents and informal development. Thus, directing the growth.

Conceptual Model

Policy adjustment is a preliminary phase that sets up the right atmosphere for any future interventions. Next, access to the community is very important for the formulation and success of an intervention because the community involvement will produce an intervention that is suitable and responds to the needs of the community. Also, it sets the stage for the settlement analysis, where it is very important to be carried out thoroughly. Later, upgrade & integrate and growth management can be carried out in parallel. The upgrade & integration concerns the settlement itself, and the plan design is based on the outcome of the settlement analysis. The same goes for the growth management, where it will be designed and planned based on the needs of the settlement, where it can attract the future growth of the settlement.

Operational Model

The operational model shows the sequence of implementing the different phases of the model.
Also, it shows the model's different variables that need to be studied and how each phase is dependent on the one before it.
Additionally, the last two phases (Upgrade & Integrate and Growth Management) are two phases that must go in parallel. Both are important to ensure the informal settlement is upgrading and that the future growth is responding to the community needs.

APPENDIX F: SECOND STAGE OF EXPERT INTERVIEWS

Interview Questions to validate the model

Model's Theoretical base
- Slow Urbanism as bases for upgrading and Smart Growth and compact city for controlling the growth, what is your feedback on those concepts as a base for the model? Are there other concepts could be more suitable?

Conceptual Framework Pillars
- Are those main areas that the model tackles are enough to ensure the formulation of a good intervention plan?

Policy Adjustment
- Are those policies enough, or extra policies need to adjust or introduced?
- Do you have other suggestions that can be added to help improve the formulation and implementation of intervention strategies?

Access to community
- How to strengthen community participation in all phases of intervention?
- Does the community union is a good idea? what can be done to strengthen its position?

Settlement analysis
- What are the most important aspects to consider when studying the settlement before designing the intervention?
- According to the model there are factors that influence the growth of informal settlements, Are those still applicable in Greater Cairo? Are there others that needs to consider?
- Sustainable indictors are developed from NTD, New Urbanism, Smart Growth and Compact city concepts, what other concepts can be used to cross-examine the settlements?

Upgrade & Integrate
- What principles can be added to enhance the implementation of the framework?
- What other aspects need to be considered for the framework?

Informal Growth Management
- Are those principles sufficient to control and direct the growth?
- What other growth management concepts or strategies can influence these principles?

Conceptual Model

- What is your overall feedback on the model and its different phases? Are there other things to consider or to adapt it?

Operational Model
- What is your feedback on the operational model and the What can be done to make it more efficient?