

Urban Governance as a Tool for Enhancing Resilient Urban Form: Case Study Alexandria, Egypt

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1 ABSTRACT

Cities are continually changing in an adaptation process to overcome a diverse range of natural and man-made pressures. Natural disaster, political upheavals or economic crisis are examples of stresses that cities face and try to overcome in different ways by developing mechanisms for handling continuous changes. Most of these stresses and pressures are interrelated, complicated and hard to predict in the future time. As a result of the wide range of shocks and stresses, cities may decay or collapse, affecting the lives of millions of people living within the urban areas. Therefore, to a certain extent, urban resilience is considered as one of the most essential topics within the discourses of the sustainable development as it tackles issues as risk reduction and disaster prevention. Accordingly, it was essential to develop and plan cities in ways that allow them to foster resilience to the uncertainty of the environmental, socio-economic and political changes overtime. Subsequently, the theory of resilience gained an attention within the urban field leading to the notion of urban resilience.

In the last decades, Egypt as -a developing country- has witnessed several stresses due to major shifts in its political situation. Started at the 1950s with a shift from a monarchy to a socialist republic, followed by an open market system at the late 1970s, to reach a capitalist system in the early 1980s. All these major political shifts brought a wide range of urban governance forms, which in turn had significant effects on the urban form of the cities' designed and built environment. In this context, urban governance changes in Egypt are frequent and consequent over a short period of time demonstrating the importance of tackling the issue of urban resilience.

Designing and planning cities are profoundly political activities; therefore, politics should be prioritized in managing cities. Broadly, the research aims to explore the interplay between the urban governance and the resilience of the urban form over time. The research focuses on urban resilience in terms of long-term urban governance through studying the effect of the urban legislation of the different consequent systems on the city resilience. Accordingly, the research worked on developing a resilience index to measure the resilience of the urban form of a neighbourhood area in Alexandria through a time line while analysing the urban building laws that shaped this form. The study reaches a conclusion of identifying the legislation that formed the most resilient urban form over time.

Keywords: Case study Alexandria, Urban Legislation, Urban Governance, Resilience Index, Urban Resilience

2 INTRODUCTION

Any city's resilience to external shock relies primarily on effective institutions, governance, urban planning and infrastructure (UN-Habitat, 2016). Resilience can to some extent be defined in terms of urban form, while urban form in a way is shaped by urban governance powers. Thus, the resilience of the urban form is indirectly influenced by the complex interrelations between different aspects of governance. According to Slack and Côté (2014:7), urban governance plays a critical role in shaping the physical and social character of urban regions (Avis, 2016). Accordingly, discussing the urban form conditions separately while ignoring the power dynamics that control and govern their existence, maintenance and quality gives an incomplete view of the situation.

A number of approaches developed to navigate the politicized nature of development may be applicable to urban contexts. Upon reviewing the previous discourses on the governance powers shaping the urban form, several different approaches had been found. A. Sorensen and J. Okata in their book *Mega cities* studied the urban governance forces that shapes the urban form taking London and Tehran as a case studies. In their study urban governance was approached by analysing the institutional and regularity frame work while studying the planning process separately (A. Sorensen, J. Okata, 2010). In 2013 London School of Economics and Political Science in its publication *evolving cities* argued that 3 forces of urban governance

shapes urban form: land ownership, planning and financing (Juliet Davis et al., 2013). On the other hand, Jeroen Van der Heijden in his research *Governance for Urban Sustainability and Resilience* focused only on the regulations framework as the governance power for tackling the resilience issues (Van der Heijden, 2014). In this research the urban governance is approached through the study of the urban legislation.

In response to the research aims, the study starts by a literature review investigating two main principle lines. First, the research begins by defining urban governance while focusing mainly on studying the urban legislation to explore how urban laws work on shaping the urban form. After that, the research will be introducing the concept of resilience, and discussing it more deeply in terms of urban studies for a better understating of the concept of urban resilience. Through the exploring of the theoretical discourses and previous literature on urban resilience, the research worked on identifying the dimension and sub-dimensions that could contribute to the resilience of the urban form. Following that, a drafted index with indicators is created for the evaluation of the resilience of the urban form of the selected area for study.

Following, an area was selected upon set criteria –discussed in case study section- and data was collected accordingly. Due to the lack of data, some modifications were made to the drafted index to be more localized and matching the needs and availability of the data for the selected case study. The constructed modified index was used for the assessment of the case study at three time intervals representing the major shifts in the urban governance forms in Egypt. Following that, the results drawn from the index were analysed and evaluated in terms of the urban legislation shaping the urban form at these time intervals. Finally, a conclusion of the outcomes and findings will be showing the effect of the different types of urban governance on the resilience of the urban form.

3 URBAN GOVERNANCE

Urban governance is defined as the different ways in which several stakeholders of the public sector, private sector and civil society with their conflict and diverse interests manage the city affairs (UN-Habitat, 2000). In 2015, the UN-Habitat III in its issue papers re-defined urban governance as the software that enables the urban hardware to function (UN-HABITAT, 2015). M. Raco. elaborates that Urban governance is concerned with the processes through which government is organized and delivered in urban areas and the relationships between state agencies and civil society (Raco, 2009). Moreover, according to Avis in 2016, Urban governance is the process by which governments (local, regional and national) and stakeholders collectively decide how to plan, finance and manage urban areas through a continuous process of negotiation and contestation over the allocation of social and material resources and political power (Avis, 2016).

There is no single, universally applicable model of good urban governance. Different people, organizations, governments and city authorities will define “good governance” according to their own experience and interest. The Governance and Social Development Resource Centre states that effective urban governance involves the city-national interface, municipal capacity, the role of the private sector, and political systems and institutions (Avis, 2016). On the other hand, the UN-Habitat endorsed the “enabling approach” as an approach to good urban governance. Enabling approach is characterized by several strategies as decentralization, participation, partnerships, building capacity and networking (UN-Habitat, 2000). The enabling environment requires the adequate legal frameworks, efficient political, managerial and administrative processes, as well as strong and capable local institutions able to respond to the citizens’ needs (UN-HABITAT, 2015).

Summing up the pervious definitions, good governance could be described as the hierarchal processes of policymaking and implementation. National governments establish the parameters and empower local authorities as primary agents of implementation while establishing enabling frameworks for partnerships and civil society engagement through appropriate legislation and various support measures such as capacity building and training. Thus, the government is responsible of establishing legislative, institutional and financial frameworks that will enable the private sector, nongovernmental organizations and community groups to be fully engaged in decision making and implementation process.

3.1 Urban Law

Urban laws are essential as they work on defining the urban governance framework from laying out rules for planning and decision-making, setting to the conditions for formal/informal access to land infrastructure, housing, and basic services ... etc. Good quality urban law provides balance and stability within urban

development in the different aspects of spatial, societal, economic and environmental fields (UN-HABITAT, 2015). Subsequently, analysing the urban laws is essential as it works on shaping the urban environment which in turns is reflected on the resilience of the urban form.

In the consensus that the government is seen as an enabler and not a provider, the government is responsible for setting the institutional and legal enabling frameworks with well adopted urban laws that can respond to the continues process of urbanization and its challenges for sustainable development. Those urban laws should work on enabling the participation of the different stakeholders of the private sector, public sector and civil society. Legal reforms must be based on the notion of human rights and developed by engaging the civil society and consolidating the public interest. An essential norm for successful legal reform is credibility which is enhanced when laws are culturally resonant and enforceable while the population has a higher sense of ownership. On the contrary, where legal provisions hold no sway, and government cannot enforce compliance, enacting such laws can only be counterproductive (UN-Habitat, 2016).

Also, urban laws should work on defining mechanisms for implementing decentralization while empowering local governments and building capacities. Effective urban legislation should take into consideration a holistic view of the institutional, financial and social factors in addition to the different technical objectives that should not be viewed in isolation. This requires creative locally relevant urban law frameworks that are able to overcome the scare within the institutional and financial resources (UN-Habitat, 2016).

In brief, the urban laws that reflect good urban governance should first work on providing an institutional framework allowing decentralization and support to local governments while also allowing the participation of the different stakeholders in decision making and implementation process. Secondly, urban laws guarantee transparency and accountability through monitoring and evaluation to ensure the enforcement of law and its efficiency. The below diagram illustrates the framework of the different aspects and how they integrate together as concluded from the literature review.

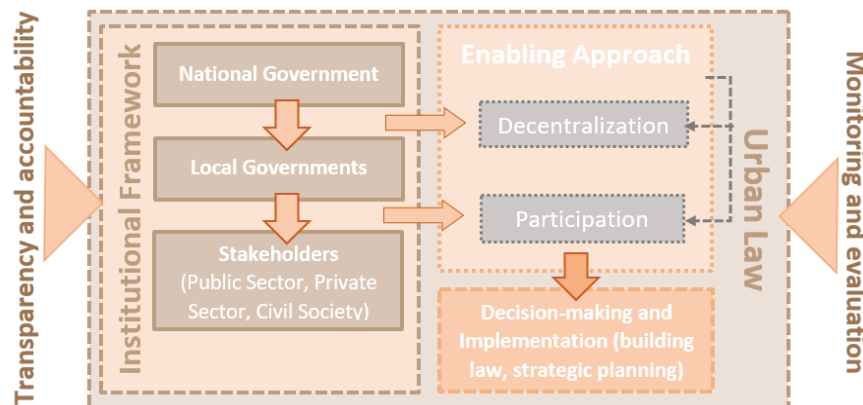


Fig. 1: Good urban Governance Diagram. Source: Author

In 2015, The UN-Habitat in its report on urban legislative for city planning and extension in Egypt analysed the urban law through investigating 6 pillars which are (urban planning framework, Land Acquisition, Public spaces, Plotting Regulation, development of rights and building Law). This research is focusing mainly on the building Laws and not other pillars as we are concerned by studying an already developed neighbourhood where many existing buildings are demolished and rebuilt. The research will be investigating the aspects of the urban governance of decentralization, participation and effectiveness reflected in the building laws.

4 RESILIENT URBAN FORM

Over the last decade, the notion of resilience has been evolving with a debate on the subject and the way it should be embedded within the urban sphere. Since its origin, the concept of resilience within the urban environment has undergone various changes as the disturbance that cities face manifest in different ways, in addition to shifts in the notions of the urban environment itself (Helene Fourniere et al., 2017). In 2014, ARUP international development defined urban resilience as “the ability of a community, business or city, for example, to continue to function and achieve its purpose, to the fullest possible extent in the face of stress” (Jo da Silva et al., 2014). In 2018, the UN-Habitat defined the urban resilience as “the measurable

ability of any urban system, with its inhabitants, to maintain continuity through all shocks and stresses, while positively adapting and transforming toward sustainability” (City resilience profiling tool, 2018).

Accordingly, for developing a conceptual framework assessing the resilience of the urban form, it was essential to respond to three main aspects. First, is the different ways the previous literature had approached the concept of resilience within the urban form. Secondly, is identifying the elements of the urban form; and finally, is studying the different types of hazards that would threaten the resilience of the urban form.

4.1 Approaches of resilient urban form

In 2013, London School of Economics and Political Science listed four key ‘measures’ for assessing the urban resilience which are physical, environmental, social and economic (Juliet Davis et al., 2013). On the other hand the UN-Habitat presented a framework for studying the resilience concept in the urban system through five critical and interdependent dimensions; Spatial, Organizational, Physical, Functional attributes and time (UN-Habitat, 2015).

Various works on resilience in relation to livelihoods have identified a range of different asset types both physical or intangible. The intangible assets like (social, human, political and economic); while the physical assets can be divided into man-made like (infrastructure, buildings.. etc) and natural like (rivers, gardens .. etc) (Jo da Silva et al., 2014). Previous discourses usually discussed the presence of the resilience in the urban environment through the assessment of the urban assets or the urban systems. Both assets and systems contribute with each other for their existence, therefore studying only one of them individually will not be reflecting a holistic image of the real situation. Accordingly the research is concerned with studying in parallel the urban system reflected in the urban governance and the urban physical assets reflected in the urban form.

4.2 Elements of the Urban form

Broadly, the urban environment is defined by the UN-Habitat in its publication CRPT as “an integrated and complex system of systems, comprised of sectors, people and hazards, and managed through effective governance mechanisms”. With a more focus in the same report, the urban form is considered as one of four layers of the city built environment where the three others are the land tenure, the housing and the built assets (City resilience profiling tool, 2018). The urban form as a part of the urban environment is usually defined in terms of scale and hierarchy of levels as a part of a whole. Those levels of the urban form begin from the city level down to community/neighborhood, household and individual levels (Jo da Silva et al., 2014). This hierarchic system helps gain a better understanding of the spatial distribution of elements, their location related to each other, and how they influence one another (Sharifi, 2018). Characteristics therefore range from, at a much-localized scale, features such as building materials, façades and fenestration, to a broader scale, residential type, streets design and their spatial arrangement and layout (Sharifi, 2018).

Issues critical to resilient urban form is too difficult to be addressed at the broad city or regional scale, which will be covering almost all of the urban elements - physical and non- physical. This is due to the huge number of small details and wide range of data that will be needed to tackle the issue of resilience on urban form on a large scale of a city. Accordingly, this research is concerned with the study of the urban form on the scale of a neighborhood area to be able to address the elements of the urban form.

In the context of neighborhood scale, Sharifi in his paper divided the urban form elements into three major scale-based categories, namely macro-, meso-, and micro-scales. The meso scale which is the concern of the study, includes (Structure and shape of neighborhoods/districts, Diversity/Heterogeneity, Typology of transportation network and Open and green space) (Sharifi, 2018). Nicole Dempsey et al. relate elements of urban form to some major features that can be categorized into five broad groups namely, density, housing/building type, transport infrastructure, layout, and land use as shown in the below figure (Nicola Dempsey, 2009). On the other hand, in 2013, London School of Economics and Political Science in its report on resilience, defined the physical measure of the urban form in terms of the density of population, the density of the built-up area and the adaptabilities of street layouts and built assets. In 2016, the UN-Habitat in its report “MEASUREMENT OF CITY PROSPERITY: Methodology and Metadata” classified the physical urban form index into Street Intersection Density, Street Density and Land Allocated to Streets (UN-HABITAT, 2016). Later, the UN-Habitat, 2018, in its report CRPT The layer of the urban form

of the built environment was translated into several dimensions of land consumption and expansion, open areas, public open space and street layout (City resilience profiling tool, 2018).

In an effort to introduce a more comprehensive categorization of urban form in the context of resilience that takes cross-scale dynamics into account, the urban form was divided into the following dimensions and sub-dimensions shown in the below diagram.

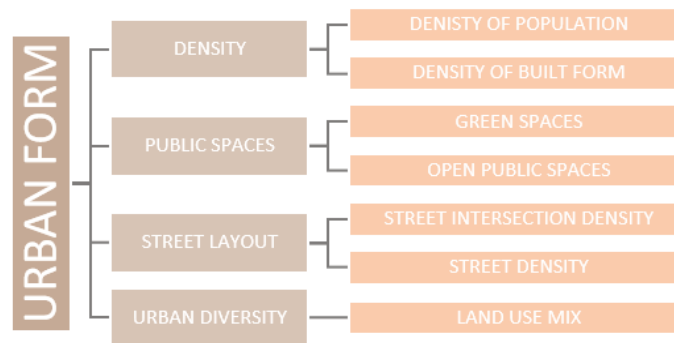


Fig. 2: Elements of the urban form. Source: Author

4.3 Hazards to urban resilience

Studies on urban resilience tend to be divided between two major concepts. The first focus on drastic change in the form of sudden shocks such as earthquakes, hurricanes, or terrorist attacks. While the second focuses on those which explore slower processes of transformation in economic, social, and environmental fields. Researches focusing on traumatic events aim to learn the way cities can survive future shocks, while those focusing on gradual transformation concentrate on the aspects that enable cities to maintain stability over long term (Juliet Davis et al., 2013). Responding to the research aim, the paper try to identify how the elements of the urban form manage the relation between change and stability as a dynamic process.

The UN-Habitat in its publication CRPT described that hazards to resilience can be sudden and slow burning, natural or human-made, rare or regular, foreseen or not; and divided them into three categories as follows:

- Shocks are defined as potential uncertain abrupt or long-onset events, whose main consequence is shifting the city from its current state to a disturbed one.
- Stresses, on the other hand, are defined as chronic and ongoing dynamic pressures originated within the urban system, whose cumulative impacts undermines city's capacity for sustainability and resilience and renders it fragile and vulnerable.
- Challenges, such as long-term contextual changes, pressures originated outside of the urban system or climate change impacts, also undermine the city's capacity for sustainability and resilience (City resilience profiling tool, 2018).

5 RESILIENCE INDEX

Since cities are considered as complex, dynamic environment made multiple inter-related systems, measurement is essential to monitor, benchmark, and manage performance within these systems. Based on the principle that you cannot manage what you do not measure, assessing urban resilience was critical for the adaptation of the cities for the future stresses and shocks. Resilience within the urban form is considered challenging and is not visible by itself as it is the system response to future events. Subsequently, resilience in order to be assessed, it must be related to other properties that can be realized through observation. Upon previous literature, urban resilience cannot be readily measured, therefore -to be better understood- a framework that can organize data to create concise views and interrelationships is needed. (Jo da Silva et al., 2014). Therefore, proxy indicators were used in this research for assessing the resilience of the urban form.

Understanding the purpose of the research is essential to defining an appropriate framework and indicators to assess the resilience within the urban form. This research motive is to understand deeply and diagnose the performance of a selected urban area over time rather than ranking. Accordingly, this implies variables can incorporate different aspects, but need to be in standardized figure.

5.1 Computation

The resilience index of the urban form is constituted of four dimensions. Each dimension is integrated by a series of indicators that allow for the calculation of the specific index. In this sense, the index produces four sub-indices related to the four dimensions of the urban form: Density, Open Spaces, Street layout and urban diversity. The aggregation of these four sub-indices generates a consolidated value that represents the urban form resilience index. The computation of the index is done through the following tasks:

- Variable standardization

Variable standardization is needed as the urban form resilience index is constructed of a broad and varied range of variables with proxy indicators that are different in units and scales. This step transfers a variable from its original measurement unit into a dimensionless measure that ranges between 0 and 100 where the higher value of the variable indicates a better performance. The table below includes standardization equations for each indicator.

- The construction of a weighting scheme

This research follows the assumption of the City Prosperity Index made by the UN-Habitat that all dimensions have an equal effect in determining the urban form resilience index, while also this applies to sub-dimensions within each dimension. This assumption of equal weighting scheme relies on the following:

- (1) The resilience of the urban form depends on the equilibrium between its elements, which form the dimensions and sub dimensions of the index.
- (2) Equal weighting scheme is a common practice for indices with multiple dimensions and indicators.
- (3) The elements of the urban form, which construct the dimensions of the index integrate and connect together in a way that they effect each other directly or indirectly (UN-HABITAT, 2016).

- Aggregation of the composite index

5.2 Dimensions, sub-dimensions and indicators

Dimension	Indicator	Methodology	Benchmark	Weight
Density	Density of Population	Population/Urban area= People/ km2 Standardisation= $100 \left(1 - \left \frac{Population\ Density - 15,000}{15,000} \right \right)$	15,000 /km2	0.125
	Density of regular Built Form	(Regular Buildings/Total buildings)x100=% Standardisation= Not Required	Min= 0% Max=100%	0.125
Open Spaces	Green area per capita	Total green area/ Population = m2/ inhabitant standardisation= $100 \left(1 - \left \frac{Green\ area\ per\ capita - 15}{15} \right \right)$	15 m2/hab	0.125
	Accessibility to open public Spaces	(urban area less than 400 away from open public spaces / Total urban area)x100= % Standardisation: Not Required	Min= 0% Max=100%	0.125
Street Layout	Street Intersection Density	Verify the topology by connecting all segments of the area on a map Collect events from start and ends Exclude points with less than 3 events Count the remaining points and divide by the urban area. = number/ km2 Standardisation= $100 \left(1 - \left \frac{Street\ intersection\ density - 100}{100} \right \right)$	100 intersections/km2	0.0833
	Street Density	Total length of urban streets/ Total urban area= km / km2 Standardisation= $100 \left(1 - \left \frac{Street\ density - 20}{20} \right \right)$	20 Km of urban streets per km2	0.0833
	Land Allocated to Streets	(Total surface area of streets /Total urban area) x100 =% Standardisation= $100 \left[\frac{Land\ allocated\ to\ streets - 6}{36 - 6} \right]$	Min= 6% Max= 36%	0.0833
Urban Diversity	Land Use Mix	Calculate de Shannon-Wiener diversity index for each cell j as follows: Shannon - Wiener index = $-\sum_i P_i * \ln(P_i)$ Land use mix = - [p_house * ln (p_house) + p_work * ln (p_work) +...] = Unitless Standardisation= $100 \left[\frac{Land\ use\ mix}{1.61} \right]$	Min = 0 Max = 1.61	0.25

Table 1: Resilient urban form index. Source: Author.

6 CASE STUDY: ALEXANDRIA, EGYPT

For investigating the case study, this section is divided into 2 parts. First is illustrating the building laws that had been shaped by the different urban governance forms while the second will be applying the resilience index and summaries the process, challenges and outcomes of the fieldwork of the selected case study and provides an analysis of key findings.

6.1 Urban governance legislation

Since the Egyptian revolution in 1952, Egypt has witnessed several changes in its building laws as shown in figure 4. This part of the research will be illustrating briefly the urban governance reflected in the building laws of three main periods (the socialist era, the capitalist era and the current era). The first law after 1952 revolution was law (344/1956), at this period the ruling system in Egypt has changed from kingdom to republic under the rule of the president Gamal Abd El Naser with a socialist system. The law (344/1956) was followed by some amendments up till the year 1964. In 1964 under the same socialist ruling system the new building law (6/1964) was published followed by some amendments and a decree by the minister of housing. In 1976, Egypt was shifting to a new era in its governance system under the rule of the Mohamed Anwar El Sadat, where the ruling system shifted from a socialist to a capitalist system. At this time, the new building law (106/1976) was publish followed by some amendments and several decrees till the year 2008. The building law (119/2008) published in 2008 with its amendments in the following years is considered the final building law up till the current moment (Alamiria, 2019).

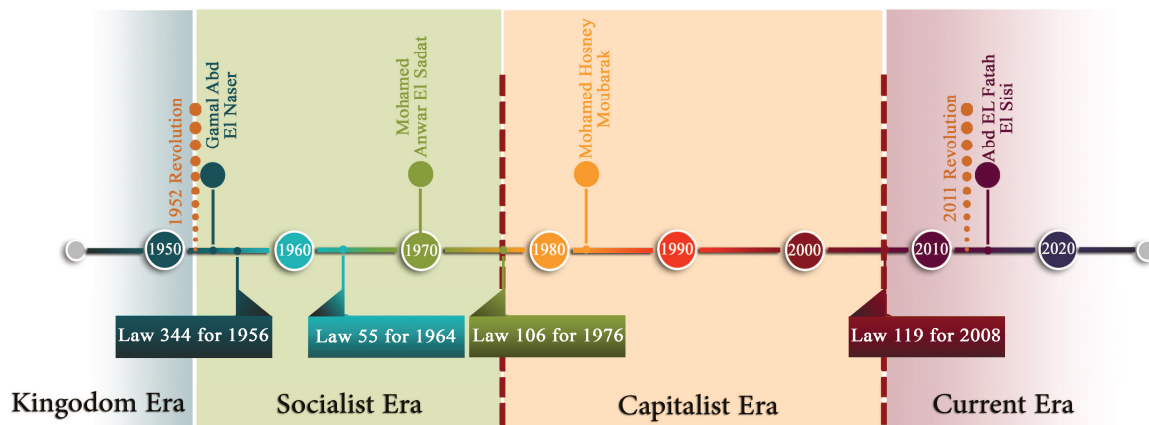


Fig. 3: Egypt ruling systems and Building Laws timeline. Source: Author

6.1.1 Building Law (344/1956)

The law 344/1956 was the first building law promulgated after the 1952 revolution. This law was simple and short formed law which consisted of 12 articles. The first four articles were concerned with the process of approval of construction, modifying or restoring existing buildings. The law states that a committee formed by the Minister of Municipal and Rural Affairs is responsible of the process of approval of the construction, modifying or restoring an existing building that exceed 500 LE after the fulfilment of the required documents. While the authority regulating municipal councils is prohibited from granting licenses for construction, modification or restoration without the committee approval. Article 5 is concerned with the process of approving the demolishing of existing buildings. The demolishing approval required the approval of the committee and the Minister of Municipal and Rural Affairs. The final articles were concerned with the Penalties for whoever violates the previous articles within this law (Alamira, 1956).

6.1.2 Building Law (6/1964)

The building law (6/1964) was the second law after the 1952 revolution while Egypt was still under the socialist rule with the president Gamal Abd El Nasr. This law was simple and short formed consisting of 12 articles as the previous law but it was accompanied with a decree by the Minister of Housing and Utilities for further details. This law didn't abolish the previous law (344/1956) but was for completing the missing needs that wasn't mentioned previously.

Article 2 in this law forms the legal basis for the series of Egyptian codes developed by the Housing and Building National Research Centre (HBRC). While article 4 of this law requires the different institutions

with their partners to work according to the design and implementation essentials specified in the decisions of the Minister of Housing, Article 5, exempt the to the buildings and structures of the armed forces from working with the requirements of this law (Alamiria, 1964).

6.1.3 Building Law (106/1976)

The law 106/1976 was promulgated at the late 70s with the beginning of the open market system and changing from socialism to capitalism under the rule of president El Sadat. This law abolished the previous law (6/1964) completely as mentioned in its article 35. Although the country was shifting to a new system but still the laws at this time showed centralized decision making process. The first article of this law was similar to that of law (344/1956). It states that a committee formed by the Minister of Municipal and Rural Affairs is responsible of the process of approval of the construction, modifying or restoring an existing building but not with the cost of 500 LE as previously mentioned but which cost 5000 LE due to the inflation.

The second part of this law delegated the authority of decision making and all other details regarding construction, modifying or restoring an existing building which is less than 5000 LE to the local governments. The third part of the law is concerned with the penalties for whoever violates the articles within this law. In the final part of this law the local governments were delegated the suggestion of exceptions for certain buildings if it's in the favor of the public while the final approval is made by the minister of housing after the revision of a selected committee (Alamiria, 1976).

6.1.4 Building Law (119/2008)

The law 119/2008 accompanied with its list of executive regulations was promulgated during the rule of president Mubarak and was still valid after the 2011 revolution till the current moment. This law abolished the previous law (106/1976) completely as mentioned in its third article. The law 119/2008 consists of 4 parts where the third part is concerned about the regulations of the building works. This law moved a little for more decentralization as it delegated the authority of decision making and all other details regarding construction, modifying or restoring an existing building to the local governments.

In addition, the article 44 of this law, the governor of the city is delegated the authority to prohibit the provision of the licences for construction works in the city or any of its parts after the approval of the local council if that was in the favour of the public. Also the governor of the city is responsible for specifying the fees for the provision any type of licences (Alamiria, 2008).

6.2 Applying the urban resilience index

The assessment of the case study went through three-stage process summed up below.

6.2.1 Timeline

For applying the urban form resilience index in the aim of comparison between the different building laws produced by the different ruling systems, it was essential to follow up the building laws gradation against the ruling systems which is shown in figure 4. Accordingly, the selected points for assessment starts with the year 1976 when a new building law (106/1976) published overtaking the laws of the previous era. The assessment of this year will reflect the resilience index of the preceding period of the socialist system. The following building law (119/2008) was published in 2008. While the second assessment should have been made for the year 2008 but as the detailed data used for the assessment is produced every 10 years so the year 2006 will be taken instead to reflect the preceding period of the capitalist system. The final year for the assessment is 2017, which reflects the current situation that is shaped after the law (119/2008).

6.2.2 Urban area selection

Alexandria is considered as the second capital of Egypt and is one of its four urban governorates. The city is divided into 17 precincts and those precincts are divided into smaller areas of 137 localities. The area selected for the study was chosen according to two main criteria:

- Spatial scale: the case study is a region in Alexandria city of between 0.5 - 2.5 km² in area. This is both small enough to enable close focus on patterns of use and specificities of urban form, but large enough to denote neighborhoods, small administrative areas and urban landholdings.

- Temporal range: the selected region of the city began to be developed more than hundred years ago and can thus be evaluated in terms of processes of evolution over at least this period.

Accordingly, the locality of Mostafa Kamel and Bolkly was selected which is Located in Sidi Gaber precincts and is about 0.8 km² in area and ages more than 100 years as shown in the below figure.



Fig. 4: selected area for the study. Source: Google earth and Egyptian General Authority of Survey

6.2.3 Assessment

After the selection of the urban area and the years for the assessment, and based on the drafted index, data was collected according through different sources. Due to the lack of data available online site visits were made for different governmental institutes in Alexandria and Cairo mainly which reflects the issues of centralization. One of the limitations was the total absence of data especially for the previous years, which led to modifications to the indicators used in the index. Data collected from maps and the Central Agency for Public Mobilization and Statistics

Indicator	1976	2006	2017
Density of Population	10450/0.8=13062 hab/km2 Standardisation:87 Weight:87x0.125=10.88	15943/0.8=19928 hab/km2 Standardisation:67 Weight:67x0.125=8.38	14481/0.8=18101 hab/km2 Standardisation:80 Weight:80x0.125= 10
Density of Regular Built Form	(515/515)x100=100% Standardisation:100 Weight:100x0.125=12.5	(529/646)x100=82% Standardisation:82 Weight:82x0.125=10.25	(465/599)x100=77% Standardisation:77 Weight:77x0.125= 9.63
Green area per capita	92500/10450=8.85m2/hab Standardisation:59 Weight:59x0.125=7.38	119375/15943= 7.48m2/hab Standardisation:50 Weight:50x0.125=6.25	111250/14481=7.68m2/hab Standardisation:51 Weight:51x0.125=6.38
Accessibility to open public Spaces	(0.429747/0.8)x100=53% Standardisation:53 Weight:53x0.125=6.63	(0.792/0.8)x100=99% Standardisation:99 Weight:99x0.125=12.38	(0.792/0.8)x100=99% Standardisation:99 Weight:99x0.125=12.38
Street Intersection Density	91/0.8= 113.75/ km2 Standardisation:86 Weight:86x0.0833=7.16	124/0.8=155/ km2 Standardisation:45 Weight:45x0.0833=3.75	124/0.8=155/ km2 Standardisation:45 Weight:45x0.0833=3.75
Street Density	13.940/0.8=17.43 km/km2 Standardisation:87 Weight:87x0.0833=7.25	17.485/0.8=21.86 km/km2 Standardisation: 91 Weight:91x0.0833=7.58	17.485/0.8=21.86 km/km2 Standardisation: 91 Weight:91x0.0833=7.58
Land Allocated to Streets	(0.198745/0.8)x100=25% Standardisation: 63 Weight:63x0.0833=5.25	(0.236305/0.8)x100=30% Standardisation:80 Weight:80x0.0833=6.66	(0.236305/0.8)x100=30% Standardisation:80 Weight:80x0.0833=6.66
Land Use Mix	0.56 Standardisation:35 Weight:35x0.25=8.7	1.15 Standardisation:71 Weight:71x0.25=17.75	1.23 Standardisation: 76 Weight:76x0.25=19
Total	65.75	73	75.38

Table 2: Computon of Resilience index

7 CONCLUSION

Studying the building laws in the context of decentralization, participation and functional effectiveness of law showed different gradation in the three aspects over time. The building laws showed a progress within the decentralization decision making process. While the building law (344/1956) offered a very strong centralized decision-making process as only one committee is in charge for the issuing license for the whole country, the following law (106/1976) delegated the local units a little more authority. The final law (119/2008) offered a wider range of decentralized decision making process as the local units and the governor of the city is delegated the authority of the provision or prohibiting the building license. The law (344/1956) offered no building regulations at the local level while the law (6/1964) and the law (106/1976) offered National building code that establishes rules for the whole country but no local adaptation is possible.

As for the aspect of participation of the private sector and the civil society in the decision making process, none of the building laws at any time offered provisions for the inclusion of the different stakeholders.

Studying the effects of these consequent building laws on the resilience of the urban form showed changes in the conducted index over time. The final index result shows progress in the resilience of the urban form overtime where the index showed a total result of 65.75 in the year 1976 and increased to 73 in the year 2006 and a final smaller increase till 75.38 in 2017. In the aim of identifying the exact changes leading to the final results, each dimension had to be viewed separately. The density of population showed a better performance in 1976, then a degradation in 2006 with a slight increase again in 2017. The density of the regular built form had the best performance in 1976 with degradation in 2006 and more degradation 2017. While the green area per capita also showed a slight degradation over time the accessibility to open public spaces was made better over time with almost double the result. As for the dimensions of the street layouts the street intersection density had better performance in 1976 with big degradation in 2006 and 2017. The street density shows a steady result over time with no much changes while the land allocated to the streets shows very slight progress in performance. The land use mix indicator for the urban diversity dimension shows a much better performance over time where 2017 has the best index of almost double that of 1976.

Finally, it could be noticed the better performance results made in the year 2017 was mainly depending on the increase in the open public spaces and the increase in the urban diversity, while most of the other indicators showed degradation. One of the indicators that made a decrease in 2017 final index is the density of the regular built form. This indicates that although there had been a little better formulation of the building law regarding decentralization but the percentage of the built buildings in violation of law had increased. This can lead to the conclusion that the missing aspect of the participation of the civil society and private sector in the decision making process decreased the sense of the ownership. While also this increase in the percentage of the built forms in violation of law indicates that legal provisions hold no sway and government cannot enforce compliance leading to decrease in credibility and more violations.

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