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## URBAN RESILIENCE: HOW TO APPLY IN THE PLANNING AND DESIGN PRACTICE?

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### ABSTRACT

The mainstreaming of building urban resilience still leaves the problem of unclear definitions and implementations in urban planning and design practice. This paper aims to explore the advocacy of how urban resilience should be put into the discourse of planning and design practice, especially the standing of the concept within planning theory. The study is conducted through a literature review with two objectives: (1) to get the insight into what urban resilience concept is and how it has been used in the context of the urban and regional system and (2) to elaborate on the potential of urban resilience concept used in the planning and design practice through the perspective of planning theory. The initial result of the study concludes that the urban resilience concept can reframe the perspective of planning theory that has been applied nowadays, particularly the theory of planning and theory in planning with the emergence of transformative and recovery planning.

**Keywords:** Evolutionary resilience; planning theory; resilient city.

### INTRODUCTION

We live in uncertainty when unpredictable events could happen and have foreseeable consequences (Davoudi et al., 2012). The city is a complex and vulnerable socio-ecological system shaped by human beings (Moraci et al., 2018). Its sustainability is threatened by nature-induced and human-made disasters (Sim et al., 2018). The catastrophic events would impact livelihood of urban communities and affect the development of the cities in the long term (Sim et al., 2018). Beginning with the agreed statement of the Hyogo Framework for Action 2005-2015, resilience is likely to become a buzzworthy term in recent years to tackle the issues (Irajifar et al., 2013; Wilson, 2012). The terminology has gained much interest while rethinking the integration of the concept of vulnerability, resilience, and sustainability into disaster discourse (Sim et al., 2018). The notion of resilience has started to replace sustainability as the political and policy-making rhetoric and philosophy of city development (Wilson, 2012). Taking into consideration how cities are very significant and how the resilience is mainstreaming rapidly, urban resilience has become the discourse among the scholars, government and NGOs (Wang et al., 2018; Irajifar et al., 2013; Davoudi et al., 2012), whereas building city resilience has become a global campaign in the last decade (Sim et al., 2018).

Many resilience studies have been published in the past decade, focusing on the urban context (Wang et al., 2018). Although it has been used in various studies, the unclear definition of resilience emerges from the core of the concept of resilience and how to apply it to the theory and practice of planning and design (Irajifar et al., 2013; Davoudi et al., 2012). Even defining urban resilience still becomes significant for future research (Wang et al., 2018). With the increasing importance of resilience in building sustainable cities (Wang et al., 2018), the concept should be developed and implemented in the more applicative realm of development. The development of a resilience model that can thoroughly evaluate the resilience of the urban system can direct the resilient planning and design of cities (Irajifar et al., 2013).

Resilience has become a notion that develops and transcends more comprehensive approaches. The initial emerged and emphasized in ecology, but the development has succeeded from a socio-ecological perspective. Thus, the terminology development into the built environment issue needs to be appropriately translated. In the urban sphere, resilience is fundamental at all levels of urban intervention, including among architects and urban planners. However, there is a gap within urban planning and governance related to implementing the resilience approach into action (Moraci et al., 2018).

This paper aims to explore the advocacy of how urban resilience should be put into the discourse of planning and design practice. Friedmann said that theory is, in fact, essential to a profession that, if it is to be relevant in practical affairs, must constantly redefine itself and its mission (Friedmann, 2011: 129). With the importance of the theory standpoint for urban resilience in planning practice, this paper highlights the fundamentals of planning theory for practice. This study is conducted through a literature review with two objectives: (1) to get the insight into what urban resilience concept is and how it has been used in the context of urban governance and (2) to elaborate on the fundamentals of the urban resilience concept within the planning and design context.

### PLANNING THEORY: RE-VISITED

Planning is part of public policy decision-making with the attitude of scientific methods. Thus, to ensure the validity of planning, the scientific view considers the role of planning theory and how to emphasize one another's perspectives within planning practice (Faludi, 1973). The discourse by Faludi identified three standpoints including the 'object-centered', the 'control-centered', and the 'decision-centered' paradigms (Ferreira et al., 2009: 33). Friedmann distinguishes this matter into three theories: (1) theory in planning focuses on the substantive or specialization planned; (2) theory of planning focuses on the process or practice of planning; and (3) theory about planning focuses on the planning goals influenced by the critics look at how planning practiced (Friedmann, 2003). Meanwhile, Alexander distinguishes planning theory into three major approaches: (1) substantive: type of planning differs from the object of concern; (2) instrumental: type of planning differs from the goal and the tools deployed; and (3) contextual: type of planning differ from the context and ideologies of social and political agenda (Alexander, 1986). However, each scholar has its term for their perspective of what planning theory is, and the elaboration remarks on the distinctions of approach and model for planning practice.

The distinction of each planning theory is not intended to separate, instead to highlight the potential use of each type and the possibility of one becoming the envelope to others. The importance of each standpoint of planning is explained by Faludi, particularly about the shifting role from theory in planning into the theory of planning in the planning practice (Faludi, 1973). The issue related to the planning theory appears to be the rationale of planning practice which scholars assume to be useful in the planning realm

(Friedmann, 2003). The inevitable of spatial planning considering the physical aspect and the social, economic, and political aspects has required planning to engage with another substantive theory. Thus, the contents of planning have little to debate. On the contrary, the need for planning to broaden its limits from the conceptual-based and a practice-based view has been emphasized (Ferreira et al., 2009). When planning argues as the reflection of public interest, the rationale of how planning is formulated should be consciously conducted with the foundation of the theory of planning. Then, the decision-making was built with solid epistemological assumptions and scientific analysis (Friedmann, 2003).

### DEFINING RESILIENCE

#### What is the resilience concept?

The word resilience has a long history with diverse and interrelated meanings both within the scope of art, literature, law, science, and engineering. Before the 20th century, resilience was interpreted as "to bounce back". The origin of the word resilience is *resilire* or *resilio*, a Latin language meaning "to spring back" and is commonly used to express jumping activity. This term was later adopted into the French *resiler*, which means "to retract". In its development, the term resilience begins with using the word *resile* in English, which is intended to describe the condition of "returning to its original position". That development of resilience terminology occurred in the 16th century. The meaning and description of the word resilience mentioned were still used until the mid 19th century. After the 19th century, resilience began to be used contextually to represent conditions in various fields of science such as mechanics, medicine, ecology, and psychology. The term was prevalent at first in engineering to elaborate on the stability of substances and their resistance to external shocks. Further, the term was used in ecology, which focused on adapting natural ecological systems. The latest was the term application that began to shift from natural ecology to human ecology, which focuses on the discussion of human adaptation to extreme changes in the environment. (D. E. Alexander, 2013)

Based on the journey of the etymology and the use of the term contextually in different fields, multiple meanings of resilience have since emerged. The seminal paper published in the 1970s by Crawford Stanley Holling, an ecologist, has set the development in motion till today (Davoudi et al., 2012). Holling distinguished two approaches to resilience from the ecological perspective (Davoudi et al., 2012;

Holling, 1996). The two were differentiated by the stability aspect that has consequences for the ecological system (Holling, 1996):

#### 1. Engineering Resilience

Engineering resilience, the traditional view, is defined by Holling as the ability of a system to return to a steady state equilibrium after a disturbance where the resistance to disturbance and the speed to return to equilibrium is the measure of resilience (Holling, 1996: 33). The definition emphasizes return time as the measurement of efficiency, constancy, and predictability as to the main characteristics of fail-safe engineering design.

#### 2. Ecological Resilience

Ecological resilience, the more contemporary view, is defined by Holling as the magnitude of the disturbance that can be absorbed before the system changes its structure is the measure of resilience (Holling, 1996: 33). The emphasis of the definition is on another stability domain as the measurement of persistence, change, and unpredictability, as the main character of an evolutionary perspective.

Fundamental differences from the definition of resilience arise when studies in ecology develop with different scientific foundations and traditions. Nevertheless, the essence of the two approaches is how each defines the stability aspect, with one focusing on the efficiency of function (engineering) and another focusing on the existence of function (ecological) (Holling, 1996). Therefore, there is no single, stable equilibrium in ecological resilience but multiple equilibria (Davoudi et al., 2012). In the future, alternative stability domains happen in the ecological system, and the resilient system no longer called bounces back (engineering) but bounces forth (ecological). The main focus of ecological resilience is the persistence and adaptation of the urban system.

### Resilience in The Urban Perspectives

The range of social sciences has influenced the view of equilibrium in the resilience concept. In many situations, resilience specifically addresses and applies the concept to the urban system context, increasing the trend (Chelleri & Olazabal, 2012). Based on history, cities have the natural capacity to rebuild even from catastrophic destruction, making cities logically fit the resilience principle (Campanella, 2006). Although the concept of resilience has been employed in comprehensive perspectives of disciplines for urban resilience, selective uptake has

been conducted on climate change and disaster management issues. Here, the context of urban resilience is related to the risks and vulnerabilities assessments against various pressures, institutional capacity, sectoral capacity, and transformation of urban space (Chelleri & Olazabal, 2012).

UNISDR defines resilience to disaster as the ability of a system, community or society to resist, absorb, and efficiently, including the preservation and restoration of its essential basic structures and functions (UNISDR, 2009). Resilience to disaster events has two characteristics: (1) the ability to resist and absorb disturbances and (2) the ability to reorganize and recover quickly to the original structure and function (Mayunga, 2009). Further understanding of the term resilience can be understood through discussion: (1) whether resilience is a result of a process; (2) what types of resilience are discussed (various system characteristics); and (3) what policy domain is targeted in an analysis of resilience (Cutter et al., 2010). Accordingly, urban resilience could be understood as the approach of resilience analysis that focuses on the urban system to produce decision policy-making toward the resilient urban areas. Precedents of urban development show that a city as a spatial entity is vulnerable to disasters, but it can also apply the resilience principle. From now on, the city can build capacity and deal with various possibilities and stress in the future in social, economic, and infrastructure systems to function well through structure, system, and identity adaptation.

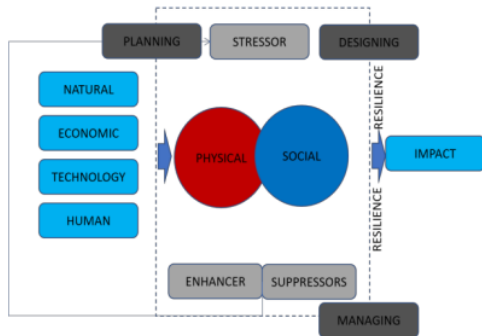
Presumably, the premise of adaptation still does not align, with the interpretation that has been conducted with many still applying the engineering approach of resilience rather than the ecological. Therefore, the main principle emphasized in resilience analysis was till the bounce back, not bounce forth. It implied the general statement that resilience is regarded as the capacity to prevent destruction and recover the system to its original condition. Hence, many pieces of literature on building a resilient city mostly discuss the response to the catastrophic events, not the long-term adaptation effort. (Davoudi et al., 2012).

### RESILIENCE AS AN INTEGRATED APPROACH IN THE URBAN CONTEXT

Studies related to urban resilience, particularly the conceptual building and operationalized framework, have been conducted (Desouza & Flanery, 2013; Jabareen, 2013; Sharifi & Yamagata, 2014). Each framework of the studies has a specific characteristic that emphasizes how resilience should be

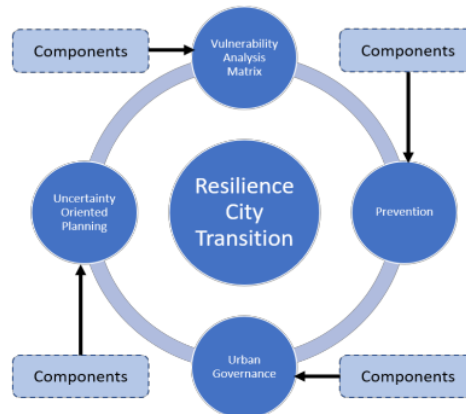


implemented in the spatial context. A framework focuses on describing the comprehensiveness concept of resilience by generalizing the complex adaptive system that consists of the components and the analysis elements that must be assessed to plan, design, and manage cities (Desouza & Flanery, 2013). Although without discussing the detailed attributes of each element, the framework gives the essence of urban dynamics through the interaction of components and elements and the importance of those to be included in the process of city-building. The components include the physical and social aspects, whereas the elements cover the stressor and outcomes, the enhancer and suppressor, the impact, and the interventions. In this sense, the stressor is the kind of pressures context that cities want to be resilient against; the enhancer is the vulnerability while the suppressor is the capacity that influences the intensity of the stressor; the impact is the result of the interaction; and the intervention is the process of planning, design, and management of the cities that influence the impact (Fig.1).



**Fig. 1.** The Components and Elements of Resilient City (Source: Desouza & Flanery, 2013, re-illustrated.)

Another framework has specifically addressed the cycle of building resilience in the urban area through concepts that give a comprehensive perspective of planning a resilient city (Jabareen, 2013). The conceptual framework is a construct of concepts and sub-concepts that are integrated and linked to each other to measure the resilience of cities. The Resilient City Planning Framework (RCPF) presents a process that a city and its community must carry out to achieve resilient conditions in the future. A resilient urban planning framework is carried out through a process that involves four interrelated concepts: (1) Vulnerability Analysis Matrix; (2) Urban Governance; (3) Prevention; and (4) Uncertainty Oriented Planning. The four concepts and their respective components are mutually integrated to form the city planning cycle (Fig.2).



**Fig. 2.** The Resilient City Planning Framework (Source: Jabareen, 2013 re-illustrated.)

The latest framework is a model of resilience assessment through the identification of resilience-related principles and criteria attached to the resilience assessment framework (Sharifi & Yamagata, 2014). This kind of framework is a model of resilience measurement for a built environment that uses resilience attributes commonly embedded in the urban theory (Irajifar *et al.*, 2013). The same approach has been generated with the development of so many models of urban resilience-related disasters (Irajifar *et al.*, 2013). This approach is more practical with discovering attributes as resilience assessment tools. Based on urban resilience principles and criteria, the city planning process must involve a fundamental analysis through several themes of sustainability dimensions: physical and environmental, economic, social, and institutional (Sharifi & Yamagata, 2014). Through this approach, resilience can be understood and implemented well operationally in a disaster risk-based development. The process of transforming urban space through principles and criteria for resilience is considered capable of internalizing the concepts of resistance, coping capacity, recovery, and adaptive capacity.

### URBAN RESILIENCE: THE PARADIGM SHIFT FOR URBAN PLANNING AND DESIGN

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Mainstreaming the concept of resilience in urban development emphasizes the importance of implementing the concept in creating a sustainable city. Based on a review of the current study, the concept of urban resilience can be explained based on system, process, and scale aspects. These three aspects are benchmarks in assessing the achievement of a city's resilience against the potential for extreme events that occur and will occur in the future (Fig. 3).

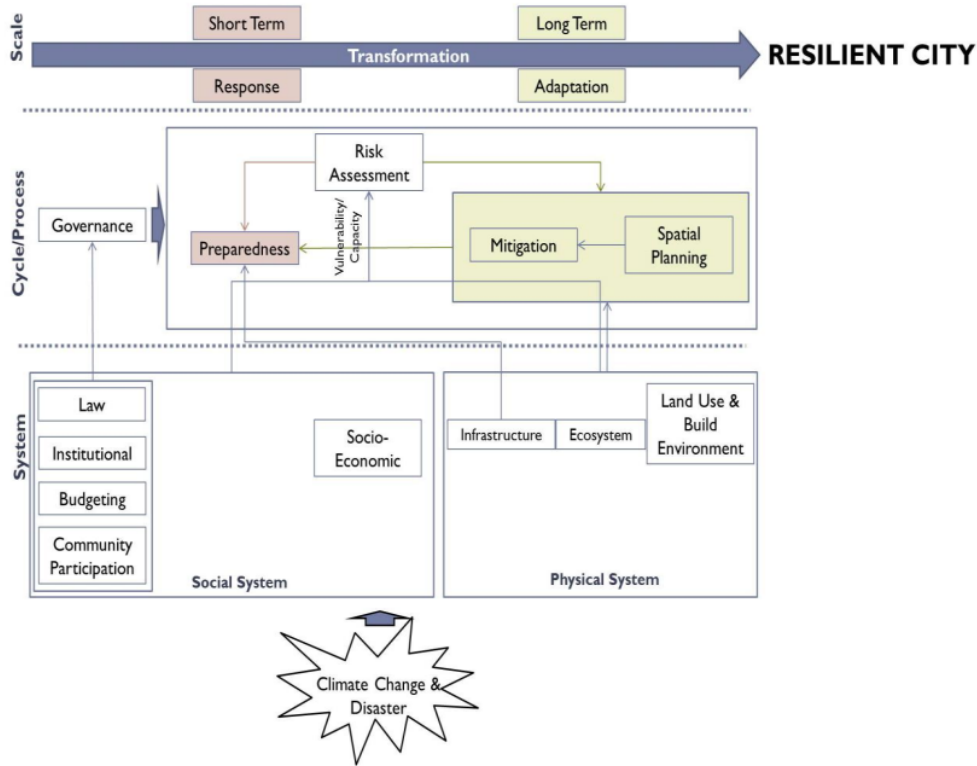


Fig. 3. The Resilient City Framework (Source: Author’s Analysis, 2019.)

**System Aspects**

The system aspect of the concept of urban resilience focuses on developing the capacity that must be carried out in urban area systems, both physical and social systems, to increase the level of adaptation to the urban environment towards extreme events. The system component aspects consist of (1) both natural and artificial physical systems that can be categorized into land use and environmental, ecosystem and infrastructure structures, and (2) social systems that can be categorized into socio-economic and institutional conditions (institutional, budget, and community participation). The system embodies the principle of resilience that can be translated into components and criteria according to an urban area’s spatial and temporal context.

**Process Aspect**

The process aspect of a concept of city resilience focuses on the city development process, which must include the concept of resilience to achieve adaptive

urban space transformation. Some resilient components of city development include (a) Risk Assessment; (b) Preparedness; (c) Spatial Planning; and (d) Governance:

- a. Risk assessment
 

At this stage, the first process in the form of a risk assessment of the urban area system to pressure is carried out. Risk assessment is a benchmark for the extent to which a transformation must be carried out to achieve the adaptive conditions of the system. Risk identification of a region towards future changes will be carried out comprehensively through several themes of sustainability dimensions, namely physical and environmental, economic, social, and institutional. The risk assessment results form the basis of the subsequent urban development process.
- b. Preparedness
 

Risk analysis of disasters, climate change, and the dynamics of other urban areas is used to develop infrastructure and facilities that support the preparedness process to respond to extreme events. The development of early warning systems,

emergency response systems, and disaster management systems is a significant part of the preparedness development process. Therefore, the authority carries out sectoral and partial approaches to managing disasters, climate change, and other urban dynamics in this process.

c. Spatial Planning

Risk analysis also forms the basis of spatial planning in urban areas through spatial planning tools both on a macro and micro scale. If on the aspect of preparedness, the process towards resilient conditions is carried out with partial development and focuses on components that are directly related to overcoming extreme events so that the development of spatial aspects is carried out more thoroughly and focuses on achieving adaptive land-use conditions based on the risk assessment of events extreme that can occur in the future.

d. Governance

In the whole process of resilient city development, good governance is needed in terms of legal instruments, institutions, budgets, and community participation.

### Scale aspect

The scale aspect of the concept of city resilience focuses on affirming the region's scope and temporality in the process of urban development. The regional and temporal scope will influence development policy towards a partial or comprehensive context. In the scope of a small area with short-term temporal time, the development policy will focus on system components that tend to be partial to respond to the pressure that occurs on the system. Whereas in the broader scope of the region with long-term temporal time, development policies will focus on comprehensive development planning to achieve adaptive conditions in the entire urban area system against the pressure that occurs.

### Challenges for Planning and Design

The idea of equilibrium of the socio-ecological system – the nature of the system to always change – is essentially conceived as the ability of the systems to evolve in response to the disturbance – the process of change, adapt, and eventually transform (Carpenter *et al.*, 2005). Thus, unlike the engineering resilience perspective, socio-ecological resilience is evolutionary resilience (Scheffer, 2009). Evolutionary resilience promotes the understanding of places not as units of analysis or neutral containers, but as complex, interconnected socio-spatial systems with extensive

and unpredictable feedback processes which operate at multiple scales and timeframes (Davoudi *et al.*, 2012: 304). This paradigm emphasizes the context of the stability of resilience for the socio-ecological system into the ability of the system to transform into something radically new from the previous state to sustain (Kinzig *et al.*, 2006). In terms of planning and design spheres, interpretive planning has become the new framework to respond to urban resilience's new highlight (Davoudi *et al.*, 2012). Interpretive planning emphasizes the issues of uncertainty, discontinuities, dynamics, adaptability, and transformability of the socio-ecological system. Reframing resilience should consider how to direct the meaning of resilience is more contextual. Considering the duality meaning of resilience, urban resilience should emphasize the idea of the bounce forth rather than bounce back. The bounce forth or forward is considering more the discourse of adaptation that would unfold reinvention and innovation for urban development. The renewal or redevelopment of urban areas is the system's response by evolving to a new condition that is considered more sustainable in the contemporary context. Thus, the radical approach is appropriate for the planning practice and design.

The principle of evolution regarding urban resilience has shifted the planning paradigm (Davoudi *et al.*, 2012). The positivist social science that has become the assumption for urban planning for decades is gradually insufficient to answer the unpredictable condition of the urban system. The shifting look upon the common ground of the blueprint aims to find the stable system that reflects from its order, certainty, and static condition of urban system change into the optimistic view of the continuous change of urban system that should be accommodated through spatial planning and design. Urban resilience is about dynamic and transformation. Therefore, planning and design practice is no longer about assuming stability and explaining change but should be about assuming change and explaining stability (Folke *et al.*, 2003). The continuous reinvention and innovation for urban development need a scientific and pragmatic approach to planning for a resilient city. Thus, the appropriate vision and strategies that enable managing the urban transformation can be produced immediately (Moraci *et al.*, 2018).

The alteration of the natural system into the social system as the highlight of the urban resilience debate requires the changing of the traits of the decision-making process and governance, which focus on how to build the capacity to adapt. Thus, planning is one of the instruments that must be reaffirmed (Campanella, 2006). In disaster risk



reduction, "...adaptation is a mid-to-long-term process, based on predictions regarding possible stressors or shocks, whereas recovery is a short-to mid-term reaction to the crisis, disturbances, or shocks..." (Sharifi et al., 2017: 7). As resilience is seen as a goal for urban development, the synergies of recovery and adaptation approaches for planning and design should be balanced. Both are mutually interdependent as a collective action for planning, designing, and managing urban development. The recovery planning eventually will be followed by the adaptation measures. Each approach has its role in building urban resilience. While incremental adaptation actions in the form of recovery planning might be sufficient for responding to the minor disruption, in some cases, the predictable severe disruption should be anticipated by the transformative adaptation to obtain the stability of the urban system.

### The Implementation for Urban Resilience Concept: Planning Theory Perspective

A basic understanding of the concept of resilience confirms the evolutionary context of urban areas' condition that needs to be continuously anticipated for changes. Thus, the planning practice requires a new perspective on the change in paradigm and the appropriate planning model. Based on the description of the concept of urban resilience and the perspective of the current developing planning theory about the concept, several things that can be discussed are (Fig. 4):

1. The interlinked between the aspect of urban resilience with planning theory, particularly with the theory in planning and theory of planning. Urban resilience is a particular substantive that contextually underlies what should be planned. In particular, the urban systems and their components represent the object of concern, whether the planning would be more physical or social.
2. The change in perspective of the previous comprehensive spatial planning becomes radical and incremental planning to anticipate the speed of change and the dynamics of urban conditions. The planning process in the urban resilience conceptual framework discloses the necessity to distinguish between short-term and long-term scale planning. Indeed, evolutionary resilience has mentioned incremental adaptation and transformative adaptation, in which one of the considerations is the scale of planning, both time and spatial. Through spatial planning and mitigation measures, transformative adaptation embodies a new equilibrium and sustainability state. In contrast,

incremental adaptation emphasizes the need for preparedness measurement alongside spatial planning to respond and recover from the immediate shock in the urban area. The transformative and incremental adaptation conduct are implemented based on risk assessment to assume the change and explain the stability.

3. The planning paradigm tends to alter from positivist to pragmatism, especially to accommodate disaster response activities.



Fig. 4. Relation of Urban Resilience Concept with Planning Theory (Source: Author's Analysis, 2019.)

### CONCLUSION

Urban resilience, a concept that scholars have often debated for a decade, has enormous potential in influencing the paradigm of urban development. However, urban resilience meaningfully and context must be emphasized to be applied in planning and design. Resilience means bounce back which, unfortunately, contextually the meaning is not appropriate to be applied in social-ecological systems. Understanding the theory of space and time has proven that the process of evolution will apply to the universal system. Therefore, resilience no longer refers to the meaning of bounce back but rather to bounce forth, which confirms that the system's stability will always change according to evolution.

The evolutionary resilience changes the planning and design practice paradigm for urban areas in a particular planning theory and theory in planning. The interdependence of recovery planning and transformative planning in urban development is applied to develop an adaptation process of sustainable urban space. For the immediate recovery process of extreme events, radical and incremental planning would be appropriate and sufficient. Nonetheless, long-term adaptation for the resilience and sustainable urban areas must be accommodated with the comprehensive planning but with the idea of continuous reinvention and innovation. Thus, the previous positivist



paradigm in the planning process must be rethought to answer the need for contemporary development. The overall reciprocal process has several elements that must be considered: the system, the process, and the scale.

Concerning the Decade of Action, a ten-year period in which the global community is encouraged to accelerate efforts to achieve the Sustainable Development Goals (UN-HABITAT, 2020), discoveries and innovations in urban planning and design practices are essential. Therefore, the novelty of planning methods and techniques relevant to the era of uncertainty also needs to be explored in future studies. Contemporary urban planning and design must respond and adapt to the acceleration of world urbanization which is predicted to be more than 60% in 2030 (UN-HABITAT, 2020). The future studies would be aligned with the New Urban Agenda framework that essentially supports the implementation of SDG 11 for better urban policies and spatial planning (UN-HABITAT, 2020).

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