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Urban Resilience: How to Apply in the Planning and Design Practice?

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ABSTRACT

The topic of urban resilience has been gain much interest in the field of sustainability yet the use of the concept particularly for urban planning and design is still in debate. This paper searches for the gap in the use of the urban resilience concept for planning and design practice. The resilience terminology itself emerges and is known from the socio-ecological perspective, therefore the development of the terminology into the built environment issue needs to be appropriately translated. 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 objectives among others: (1) to get insight into what is urban resilience concept 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 be 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 has the potential to reframe the perspective of planning theory that has been applied nowadays, particularly the theory of planning and theory in planning with the emergence of so-called transformative and recovery planning. Both planning approaches must be considered the urban system as the object of planning.

Keywords: topic of urban, urban and regional system, the potential of urban resilience

INTRODUCTION

We live in an era of uncertainty when unpredictable events could happen and have unforeseeable consequences (Davoudi et.al., 2012). The city is a complex and vulnerable socio-ecological system shaped by human beings (Moraci, et.al., 2018) and its sustainability is threatened both by nature-induced and human-made disasters (Sim, et.al., 2018). The catastrophic events would impact the livelihood of urban communities and affect the development of the cities in the long term (Sim, et.al., 2018). Begin 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 starts 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 resilience is mainstreaming rapidly, urban resilience has become the discourse among 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 with the interest focus on the urban context (Wang, et.al., 2018). Although it has been used in various studies nonetheless the unclear definition of resilience emerges the concern of what is the concept of resilience and how to apply the concept 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), therefore 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 wider approaches. The initial emerged and emphasized in the field of ecology but the development has been succeeded from a socio-ecological perspective. Thus, the development of the terminology into the built environment issue needs to be appropriately translated. In the urban sphere, resilience is fundamental at all levels of urban intervention, including architects and urban planners, but in fact, there is a gap within urban planning and governance related to the implementation of 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. As Friedmann said: "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, the fundamental of planning theory for practice become the highlight of this paper. The study is conducted through a literature review with objectives among others: (1) to get insight into what is urban resilience concept and how it has been used in the context of urban governance? and (2) to elaborate on the fundamental of 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 make sure the validity of planning, the scientific view is considering the role of planning theory and how to emphasize one another 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 that are (1) theory in planning: focus on the substantive or specialization planned; (2) theory of planning: focus on the process or practice of planning; and (3) theory about planning: focus 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). Though each scholar has its term for their perspective of what is planning theory, 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 theory of planning appears to be the rationale of planning practice which is assumed by scholars to be unuseful in the planning realm (Friedmann, 2003). The inevitable of how spatial planning considers not only the physical

aspect but also the social, economic, and political 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 broader its limit both 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 strong epistemological assumptions and scientific analysis (Friedmann, 2003).

DEFINING RESILIENCE

What is resilience?

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 that has the meaning of "to spring back" and is commonly used to express jumping activity. This term was later adopted into the French language resiler which means “to retract”. In its development, the term resilience begins with the use of 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 the field of engineering to elaborate on the stability of substances and their resistance to external shocks. Further, the term was used in the field of ecology which focused on the adaptation of natural ecological systems. The latest was the term application began to shift from natural ecology to human ecology which focuses on the discussion of human adaptation to extreme changes in the environment. (Alexander, 2013).

The Resilience Concept

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 published in the 1970s by Crawford Stanley Holling, an ecologist, has set the development in motion till today (Davoudi et.al., 2012). Holling made the distinction between 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, 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 returns to equilibrium is the measure of resilience” (Holling, 1996: 33). The emphasis of the definition is on return time as the measurement of efficiency, constancy, and predictability, as the main character 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 the development of studies in the sphere of ecology develops 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). Hereinafter, alternative stability domains are possible to 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 view of equilibrium in the resilience concept has been influenced by the range of social sciences. In many situations, resilience specifically addresses and applied the concept to the urban system context and the trend is increasing (Chelleri and Olazabal, 2012). Based on history, cities have the natural capacity to rebuild even from catastrophic destruction which makes cities logically fit the resilience principle (Campanella, 2006a,b). Although the concept of resilience has been employed in wide perspectives of disciplines for urban resilience particular 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 and Olazabal, 2012).

Resilience to disaster is defined by UNISDR as "The ability of a system, community or society is exposed to hazards to resist, absorb, timely and efficient manner, including the preservation and restoration of its essential basic structures and functions (UNISDR, 2009: 24). Resilience to disaster events has two characteristics, namely (1) the ability to resist and absorb disturbances and (2) the ability to reorganize and recover quickly towards 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 policymaking toward resilient urban areas. Precedents of urban development show that a city as a spatial entity is vulnerable to disasters but it also can apply the principle of resilience. Hereinafter, the city can build capacity and deal with various possibilities and stress in the future both social, economic, and infrastructure systems so that it can function well through structural, system, and identity adaptation.

Presumably, the premise of adaptation still does not align with the interpretation has been conducted by many who still applied the engineering approach of resilience rather than the ecological. So the main principle emphasized in resilience analysis was till the bounce back not the bounce forth. This implied the general statement of how resilience is regarded as the capacity to prevent destruction and to 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?

Urban Resilience Framework

Studies related to urban resilience, particularly about the conceptual building and operationalized framework have been conducted (Desouza and Flanery, 2013; Jabareen, 2013; Yamagata, 2014). Each framework of the studies has a certain characteristic that emphasized how should resilience is implemented in the spatial context. There is a framework that focuses

on describing the comprehensiveness concept of resilience by generalizing the complex adaptive system that consists of the components and the analysis elements which must be assessed within the process of planning, designing, and managing cities (Desouza and 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 are including the physical aspects and social aspects whereas the elements are covering 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).

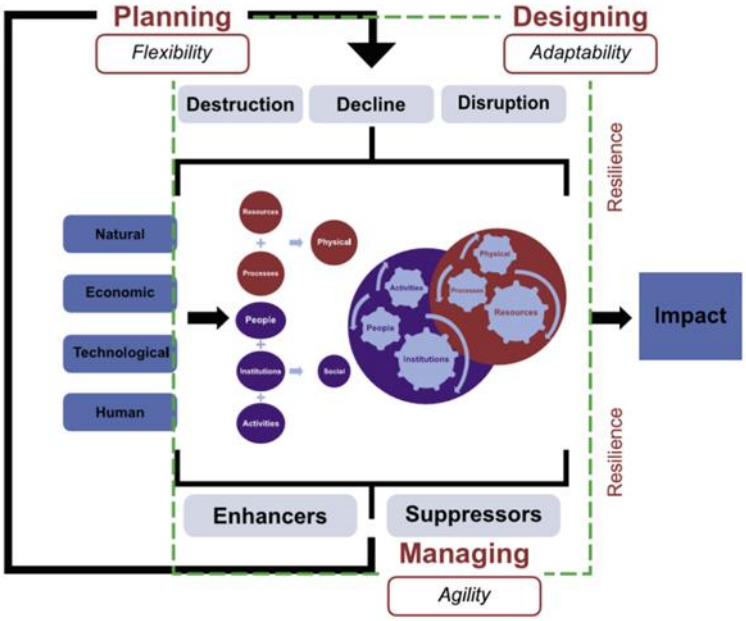

Figure 1. The Components and Elements of Resilient City (Desouza and Flanery, 2013)

Another framework has specifically addressed the cycle of building resilience in the urban area through concepts that together 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 so that it could be used as a measurement of the resilience state of cities. The Resilient City Planning Framework or RCPF presents a process that must be carried out by a city and its community to achieve resilient conditions in the future. A resilient urban planning framework is carried out through a process that involves 4 interrelated concepts. The concepts are (1) Vulnerability Analysis Matrix; (2) Urban Governance; (3) Prevention; and (4) Uncertainty Oriented Planning. The four concepts together with their respective components are mutually integrated to form the city planning cycle (Fig.2).

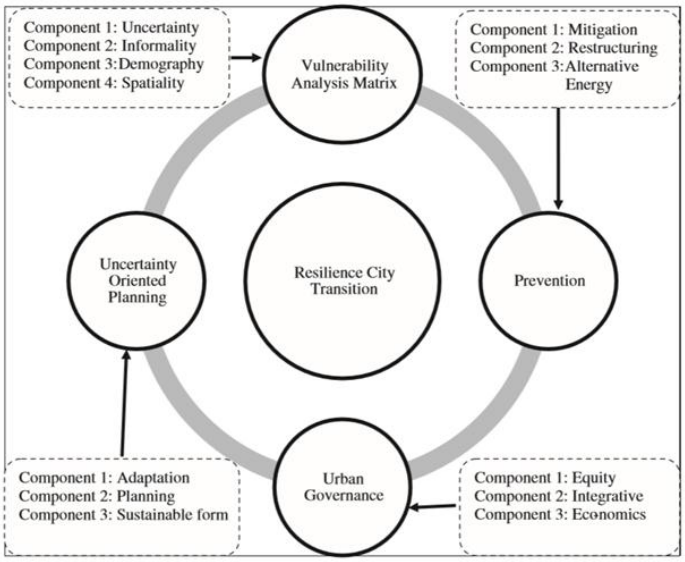

Figure 2. The Resilient City Planning Framework (Jabareen, 2013)

The latest framework is a model of resilience assessment through the identification of resilience-related principles and criteria attached to the resilience assessment framework (Syarifi and Yamagata, 2014). This kind of framework is a model of measurement of resilience for a built environment that uses resilience attributes that have 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 the discovery of attributes as resilience assessment tools. Based on principles and criteria of urban resilience, the city planning process must be carried out by involving a fundamental analysis through several themes of sustainability dimensions namely physical and environmental, economic, social, and institutional (Syarifi and 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?

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 aspects, process aspects, and scale aspects. These three aspects are benchmarks in assessing the achievement of the resilience of a city against the potential for extreme events that occur and will occur in the future (Fig. 3).

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 is an embodiment of the principle of resilience that

can be translated into components and criteria according to the spatial and temporal context of an urban area.

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 (1) Risk Assessment; (2) Preparedness; (3) Spatial Planning; and (4) Governance :

(1) 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 results of the risk assessment form the basis of the subsequent urban development process.

(2) Preparedness
Risk analysis of disasters, climate change, and the dynamics of other urban areas are used to develop infrastructure and facilities that support the preparedness process to respond to extreme events that occur. The development of early warning systems, emergency response systems, and disaster management systems is an important part of the preparedness development process. Therefore, in this process, sectoral and partial approaches are carried out under the authority of managing disasters and climate change, and other urban dynamics.

(3) 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.

(4) 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 scope of the region and temporal 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 be able 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 be able to achieve adaptive conditions in the entire urban area system against the pressure that occurs.

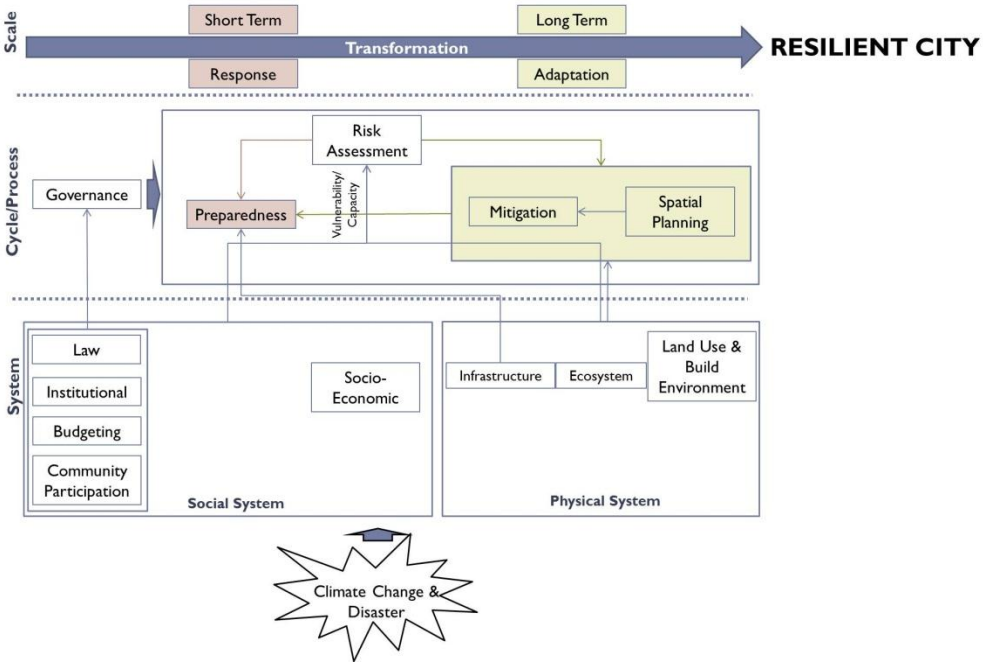

Figure. 3 The Resilient City Framework

Challenges for Planning and Design

The idea of equilibrium of 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 transformation (Carpenter et al., 2005). Thus, unlike the engineering resilience perspective, socio-ecological resilience is called 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, the so-called interpretive planning becomes the new framework to respond to the new highlight of what urban resilience is (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 be emphasizing 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 response of the system by evolving to a new condition which considered more sustainable in the contemporary context. Thus, the radical approach is regarded as appropriate to be conducted within the planning practice and design.

The principle of evolution concerning 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 blueprint which aims to find the stability 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 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 which enable the management of the urban transformation can be produced in immediate time (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, 2006a). In the context of 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 approach for planning and design should be conducted in a balanced manner. 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 to build 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.

How To Implement Urban Resilience Concept: Planning Theory Perspective

A basic understanding of the concept of resilience confirms the evolutionary context of the condition of urban areas that need 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) :

A basic understanding of the concept of resilience confirms the evolutionary context of the condition of urban areas that need 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 itself 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 and one of the considerations is the scale of planning both time and spatial. Here, transformative adaptation embodies a new equilibrium and sustainability state through spatial planning and mitigation measures. Whereas, incremental adaptation emphasizes the need for preparedness measurement alongside

spatial planning to respond and recover from the immediate shock that happened in the urban area. Both, the transformative and incremental adaptation conduct are implemented based on risk assessment to assume the change and to explain the stability.

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

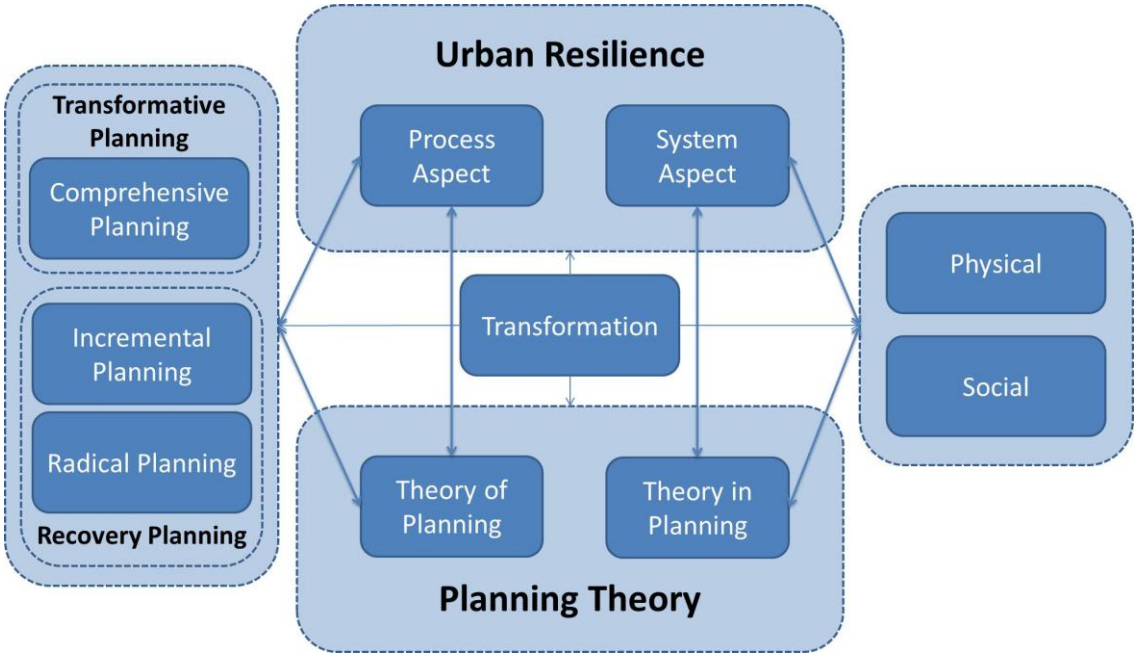

Figure. 4 Relation of Urban Resilience Concept with Planning Theory

CONCLUSION

Urban resilience, a concept that has often been debated by scholars for a decade has enormous potential in influencing the paradigm of urban development. However, urban resilience meaningfully and context must be emphasized so that it can be applied in the realm of planning and design. Resilience has the meaning of 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 the stability of the system will always change according to the evolution that is happening. The evolution of resilience changes the planning and design practice paradigm for urban areas, in a particular theory of planning and theory in planning. The interdependence of recovery planning and transformative planning in urban development is applied to develop a process of adaptation 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 comprehensive planning but with the idea of "continuous reinvention and innovation". Thus, the previous positivist paradigm in the planning process must be re-think to answer the need for contemporary development. The overall process that is reciprocal has several elements that must be considered, namely the system, the process, and the scale.

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