

COMPARATIVE ANALYSIS OF RESILIENCE DEFINITIONS TO DETERMINE RESILIENCE FACTORS APPLICATION FOR URBAN DISTRICTS' DISASTER SAFETY

S.DASHTI¹ T.A.KATO²

¹ Ph.D. student, Urban Planning Department, The University of Tokyo, Tokyo, Japan,

² Professor, Urban Planning Department, The University of Tokyo, Tokyo, Japan,

Correspond to S.DASHTI (soheildashti@g.ecc.u-tokyo.ac.jp)

Keywords: Urban Resilience, Definition, Planning measures, Natural Disasters

1. Purpose: This article shows the diversity of resilience dimensions and constructs influential resilience factors for applying to urban planning measures at district level. Natural disasters have been on the top highest global risks for the last decade; and according to United Nations the frequency and intensity of such natural disasters are increasing.[1] Resilience concept has gain accelerating attention in the scientific world to promise less vulnerable communities and safer habitats. However, the multidisciplinary concept has been still relatively vague in urban studies and practice since there hasn't been a consensus on its meaning and measures [2]. The disciplinary foundation of this paper starts from the conceptual domain of resilience definitions and ends with structuring resilience factors against natural disasters that are applicable to urban planning measures at districts scale. These urban planning measures include land use zoning, building code, morphology, spatial configuration of urban district. Some researchers have discussed three resilience types: adaptive, single equilibrium and multi-equilibrium [2]. but the applications of these typologies and characteristics have not been explained for planning resilient urban districts.

2. Outline: Reviews of resilience research epistemology shows major science fields that have shaped disaster resilience knowledge are: Planning & Development, Environmental studies, Urban studies and Engineering [3]. Therefore, the scope of researched definitions will focus on them. this article analyzes definitions to infer disaster resilience applications for urban planning and attributes them to measures at district scale. Scholars and Global institutions such as Intergovernmental Panel on Climate Change (IPCC) have defined resilience depending on their targets. According to IPCC "resilience is the ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning,

the capacity for self-organization and the capacity to adapt to stress and change".[4] such definitions need to be further explained to achieve these goals in each scale.

3. Conclusion: Investigating resilience definitions reveals diverse characteristics such as Resourcefulness, Redundancy, Robustness, Rapidity, Inclusion, Flexibility, and suggests processes to plan, absorb, respond, recover, adapt, and learn. These influential resilience attributes can be implemented by urban planning measures proposed in this paper. In urban district planning, resourcefulness and redundancy can be achieved by land use measures to consider diverse material and human resources by mixed-used functions and provision of blue-green spaces. In face of natural disasters building code measures can acquire both robustness and flexibility; morphology and special configuration of urban district absorb disaster impact and can be planned to enable rapid response and recovery process. Providing hazard maps and community-based planning are useful measures for adaptation and learning process.

References:

- 1- United Nations Office for Disaster Risk Reduction (2022). Global Assessment Report on Disaster Risk Reduction 2022: Our World at Risk: Transforming Governance for a Resilient Future. Geneva.
- 2- N. Singh, A. Sharifi in: A. Sharifi, P. Salehi(Eds.), Resilient Smart Cities, Springer, Cham, 2022, pp.67-92.
- 3- L. Wang, X. Xue, Y.Zhang, X.Luo, Exploring the Emerging Evolution Trends of Urban Resilience Research by Scientometric Analysis, Int. J. Environ. Res. Public Health, 15(2018), p.2181
- 4- IPCC, Change IC. Impacts, adaptation and vulnerability. Contribution of working group II to the fourth assessment report of the intergovernmental panel on climate change. Cambridge University Press, Cambridge, UK. 2007

Table1 -Resilience types, factors and application examples in urban district planning (Concise)

Scholar	Type	Resilience factors	Planning Application
Holling 1973	Ecology Multi-Equilibrium	ability to absorb changes and persist	blue-green infrastructure, water sensitive urban design
Pimm 1984	Engineering Single-Equilibrium	the speed with which a system returns to its original state following a perturbation. robustness & flexibility	Robust and Flexible Building Code
Folke et al. 2002	Socio-Ecologic Adaptive	Degree of (1) absorbing shock & remain within a given state (2) self-organization (3) learning and adaptation capacity	resourceful and redundant Land use, Learning through community-based planning
Meerow et al. 2016	Urban Studies Multi-Equilibrium	socio-ecological and technical networks maintain or rapidly return to desired functions, adapting to change, transforming limitations, adaptive capacity.	Response and Recovery by adaptive morphological and spatial performance