Complex and context-dependent project evaluation across multiple spatial scales: Exploring the spatial dimension of urban regeneration in Lombardy, Italy

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Abstract Urban regeneration is a vital planning tool to foster inclusive, resilient, and sustainable cities by addressing climate change, urban health, and spatial inequalities. Aligned with New European Bauhaus (NEB) principles, it drives built environment transformation, contributing to climate goals and enhancing quality of life. Current definitions of urban regeneration lack explicit references to spatial dimensions, typically focusing on already urbanised, degraded or underutilised areas. Urban regeneration is, in fact, a complex, multi-scalar phenomenon, spanning from small-scale projects to large urban initiatives. However, understanding the spatial dimension is crucial for effectively planning these initiatives. This encompasses not only physical size (m⊠, hectares) and scale (district, neighbourhood), but also the coverage area, including factors like affected population, surrounding areas, and governance levels. Efficient regeneration strategies require considering cities' morphological organisation and the systemic relationships of their urban units. Studies on elementary urban units trace back to Howard's Garden Cities, Perry's "neighborhood unit" theory, Mumford's thought, and Columbo's "Organic Urbanism". The relevance of dimensional implications for urban regeneration is evident in the effects stemming from differences in size, scale, and coverage area, influencing policy formulation, stakeholder engagement, and the extent of benefits and impacts. Furthermore, dimensional aspects significantly impact how we evaluate the sustainability performance of alternative regeneration solutions. Accordingly, the NEB Self-Assessment Method integrates three spatial scales – building, neighbourhood, and urban – to accommodate diverse project sizes. Despite its importance, the spatial dimensions of urban regeneration remains underexplored in literature, and even the NEB Self-Assessment Handbook lacks detailed distinctions within its proposed spatial scales, particularly concerning existing transformation areas. To address this gap, we explore the spatial dimensions of urban regeneration by analysing the physical size and scale of provisional regeneration areas within the Italian Lombardy Region, asking: "What is the spatial extent of current regeneration initiatives?" and "Are there recurring sizes and scales?". We examine Urban and Territorial Regeneration Areas, and Urban Transformation Areas primarily occurring on built land, quantifying regional and sub-regional planning efforts by their spatial dimensions. Our main findings identify six dimensional classes for clustering regeneration areas in Lombardy. These classes, supported by a developed abacus of indicators, also serve as a sustainability assessment framework. While tailored to Lombardy, this methodology offers significant value for cities globally, enabling them to navigate the complex challenge of multi-scalar project assessment.