

Learning from vernacular

A GENERATIVE APPROACH TO THE RE-URBANIZATION OF DISPERSED TERRITORIES.

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ABSTRACT:

By looking at time-tested recurrent design patterns drawn from Portuguese vernacular settlements, the present research tries to address the problem of developing sustainable urban solutions for scattered low density territories throughout Portugal. The research departs from the hypothesis that Portuguese vernacular settlements contain morphological characteristics that can be captured and reused in new designs: this may be particularly useful for rethinking extensive suburban territories' densification conditions, in order to enhance both their consistency and sustainability. Urban sprawl and uncontrolled space consumption have often hastened the problem of territorial sustainability, that's the reason why completing, restructuring and enhancing dispersed built environments is of paramount importance in order to foster both cultural and economical sustainability in contemporary Portugal. This project ultimately aims at contributing towards the definition of design procedures and planning tools for the re-urbanization of extensive urban fabrics. One of the major objectives is developing a decision making support tool for generating meaningful and coherent interventions in dispersed urban fabrics which could foster connectivity, integration and quality of life, by doing so this work tries to propose a novel methodology that could prove to be valuable in different contexts, even outside Portugal.

KEYWORDS:

Generative patterns; Vernacular urbanism; Bottom-up processes; Re-urbanization; Territorial sustainability.

1. INTRODUCTION

The present paper describes the current state of a work resulting from the confluence of two doctoral researches conducted at the Faculty of Architecture of the Technical University of Lisbon on the issue of dispersed urbanism – one focuses on the macro scale while the other focuses on the architectural scale. The work is still ongoing therefore we can't present any final results here. Nevertheless we can present the theoretical and operational framework that guides the research in order to provide a fresh insight on our approach to the current work.

Various researches in the field of urban studies and economics¹ already pointed out how compactness, diversity and integration constitute key elements for generating sustainable built environments through re-densification and re-urbanization. The concept of re-urbanization comes along with this primary need for completing, restructuring and enhancing the network systems that support urbanization. Such interventions are conceived not as a set of top-down operations – which, on the long run, would turn to be intrinsically disconnected from the traditional patterns of urban development– but rather as a bottom-up process capable to generate emergent urban solutions highly compatible with the design traditions rooted in the local community. The search for innovative concepts and operative instruments is absolutely decisive to enabling such new place-sensitive and community-rooted policies and design interventions, hence the adoption of a mixed methodology where urban policies, density studies, networks analysis and parametric design tools meet and integrate each other.

Previous researches² conducted in the attempt of codifying recurrent design strategies typical of Portuguese vernacular traditions already pointed out some of the design patterns that proved to be the most recurrent and most valuable in terms of performance and qualities for Portuguese urban context – out of the whole pool of design patterns present in the Portuguese tradition. Such recurrent design patterns, recognized and encouraged, appropriately supported and serviced, may prove to be a realistic and sustainable solution to the building and planning demands of continental Portugal, whose the contemporary situation and the future scenario are largely affected by spatial and functional rarefaction of the urban tissues.

1.1 STATE OF THE ART

Seminal studies on building typology by Rapoport³ and Habraken⁴ and on spatial organization by March & Steadman⁵ brought a great contribution in the two respective fields, introducing an objective approach to the studies of typology and spatial configurations as well as on the correlations between the organizational patterns of housing types and urban morphology. Space Syntax as developed by Bill Hillier⁶ provided then a set of tools allowing to understand the correlations between built form and the patterns of human behaviors in public space, up to the point of proving to be able to model patterns of pedestrian movement in urban space⁷. More recent publications on Space Syntax applications highlighted the mutual dependency between the social construction of space and spatial laws⁸ and clarified the relation between network effects and psychological effects in urban flows of movement⁹. Shape Grammars as developed by George Stiny and James Gips¹⁰, on the other hand, provides a method for visual computation that proved to be able to capture the rules underlying the generation of the (emergent) traditional types¹¹ as well as generating novel solutions in the design language. A clarifying contribution to the application of the formalism as well as to some issues related with the interpretation of forms in Shape Grammar can be found in latest works by the father of Shape Grammar (such as Stiny, 2006)¹².

Based on the idea that design process can be encoded into a set of spatial-configurational patterns drawn from traditional examples, the concept of Pattern Language¹³ by Christopher Alexander encouraged the rise of several theories based on the concept of bottom-up design processes whose application, as later theorized by Stan Allen, permits the overall shape to be “highly fluid and less important than the internal relationships of parts”¹⁴.

In fact, such bottom-up approach to architectural design, being open to the constant change and the role of multiple agents, is claimed to better capture the real world dynamics acting at urban level compared to what a formalistic approach is capable of. As Habraken states “with all studies of physical phenomena, patterns of change reveal the laws it is subject to. At the same time, change is caused by our interventions. Therefore, by learning to see environment in terms of change, we also learn to understand the ways in which we organize ourselves as agents acting upon it.”¹⁵

2. METHODOLOGY

The present research builds up from a previous work consisted in the definition of a computational model (a descriptive grammar) for Portuguese vernacular urban settlements performed by the research team in 2012¹⁶. The continuation of the work is now focused on the application of time-tested design patterns – which proved over time to be able to sustain urban qualities such as urbanity and compactness – in Portuguese contemporary dispersed contexts.

At the core of the methodological approach employed by the current research is the intersection of four independent research areas: urban policies, density studies, networks analysis and parametric design.

The current rise of connections between density studies, topology and networks analysis plus the convergence between them and parametric design methods¹⁷ offers a promising framework for novel contributions in the field of regional and urban planning which is at the base of the present work. Moreover the integration of Space Syntax analysis into GIS branch opened further possibilities for correlating location data and geometries to network configuration. In several contexts traditional planning approach proved to have difficulties in guiding interventions in contemporary hybrid dispersed landscapes, nor urban nor rural, and in modeling their complex dynamics. For this reason, we think that traditional urban policy approach needs to be implemented by means of flexible, configurational and generative codes. At the present stage of the work we are working implementing the generative process through means of visual programming.

The advantage of such approach is that of being able to retrieve data about urban indicators, topological configurations, quantitative parameters at any stage of the design process feeding the computational model and assessing in real time the results of each proposed design move. Embracing this integrated workflow offers promising basis for the future development of decision making support tools for municipalities, policy makers, planners and stakeholders.

3. STATE OF THE RESEARCH

The work is structured into five consequential steps. The first step of the research is represented by the analytic work on the historical case studies of vernacular urbanism, a task already partially accomplished by previous works developed by the research team. The work on vernacular towns already provided some interesting outcomes resulting in the definition of a Shape Grammar model describing such language in good detail. In this stage the operation of inferring the configurational rules from the previously developed descriptive grammar of Portuguese vernacular urbanism will be completed.

The continuation of the work – the second step, the one on which we are currently work the most – will be represented by the same analytical procedures employed in the previous step applied to the contemporary case studies of dispersed urbanism. Here features like route-structure analysis and patterns of agglomeration are analyzed and their effects on overall urban form and performances discussed.

The third step will be constituted by the comparative study between the two systems, the historical and the contemporary one, in order to be able to objectively compare and evaluate with quantitatively measurable methods the differential performances of the analyzed urban fabrics. The performances of each system will be evaluated and compared in order to spot criticalities and potentials of both systems.

To do so the construction of equally structured, reasonably comparable databases containing all the relevant information (topological, demographical, topographical, hydrographical, land use, economical attractors) on the study areas will be crucial. This step also includes the identification of the parameters to be manipulated in the design step. The comparative study will allow the definition of the areas of intervention and the selection of the desirable design patterns to be employed in each case.

The last step is constituted by the implementation of a parametric model capable of guiding through the design process and supporting the selection of alternative design solutions. Such solutions will be constituted by a synthesis between the positive features of the vernacular architectural context and the needs of contemporary living into a common language to be used to support the formulation of urban policies fostering compactness and coherence of the urban tissues. The model will be implemented by means of visual programming (i.e. Grasshopper interface for Rhino 3D software). The accurate translation of the configurational patterns and hierarchies structuring the traditional settlements into contemporary-fitted patterns will be of paramount importance in this phase of the research.

The set of tools and procedures resulting from the aforementioned implementation will be then made available to municipalities, policy makers, stakeholders in order to build up information-based policies and computational-driven assessment tools for spatial planning. This working package will be at the core of the research and aims at envisaging the formulation of multidimensional, information-based parametric models to underpin planning and design of complex extensive urban fields in a compact city policies basis.

ENDNOTES

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