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Circular Economy and the Built Environment: Zelfbouw in Amsterdam

Addressing Resource Scarcity through Architecture

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Synopsis

The paper intends to illustrate the application of Circular Economy to the design of the built environment, with a focus on the Dutch case. CE is a flexible framework supporting the optimization of resource use through a global redesigning of production processes and supply of services, according to a model which involves the employment of waste as an input material for new production cycles; the sharing of physical assets; the virtualization of processes; the reuse of goods and materials. CE represents a promising option to design a sustainable built environment in the current condition of resource scarcity. In the Netherlands, CE is implemented in the urban development through a bottom-up, widespread planning approach, sustaining citizens in developing individual housing projects to build through zelfbouw - self-construction. Zelfbouw adapts circular methodologies, tools and strategies to implement innovative sustainable solutions, control construction costs and develop experimental forms of living. This process leads to a specific architecture, with peculiar characteristics: the investigation on this 'circular architecture' opens promising perspectives for the definition of new design strategies to deal with current conditions of resource scarcity.

Key words: Circular economy, resources, scarcity, self-construction.

1. Foreword

The growing awareness about the global resource scarcity makes the limitation of the use of non-renewable raw materials and the need to overcome the linear consumption model take, make, dispose look more and more urgent. The idea of “sustainable development” permeates today the global debate in any field of knowledge; architecture and urban design have followed this motion, turning their value, appeal and mission towards the purpose of “sustainability”. In the last years the focus of the global research is on the investigation of the materiality of architecture, its physical legacy, its reuse and recycle. Form, duration, necessity of architecture are deeply challenged by global changes in terms of living and consumption, affected by intertwined phenomena such as information revolution, digitalization of services, deregulations of many markets, recession. Innovative fields of action have been enabled, as well as exchange opportunities and business formulas: architectural and urban design are involved in this shift, responding to changing needs and following evolving processes. The emerging paradigm named Circular Economy (CE) represents a relevant case study to investigate new forms of design and production, as it is a flexible framework recognizing mutual relations among global issues and proposing to address them as a whole, without preaching austerity but depicting a prosperous growth compatible with resource preservation.

2. The Circular Model

The main idea of the circular model is to employ waste as a resource, using the value retained in waste within production processes to close resource cycles and optimize materials, products and processes (Ellen MacArthur Foundation 2015), making them more efficient. To “employ waste as a resource” encompasses the discarded material output of processes as well as wasteful uses of products, redundancies and inefficiencies: CE encompasses indeed the sharing of physical assets too; the virtualization of processes; the reuse of goods and materials.

In recent years, the study of CE application to the design of the built environment and the urban domain is a widespread topic, opening promising perspectives in many terms. In the field of architectural and urban design, CE is assumed in its technical aspects as a model to rethink the material resources supply, employment and discarding within the process to design, build, live and dismantle buildings and fragments of built environment. Materials and resources are then studied and examined in their provenience, employment and in their potential to be reused after the end of their first operative cycle, to identify opportunities to improve the efficiency of their use.

3. Zelfbouw in the Netherlands: Testing Circularity in the Built Environment

Among European countries working on the transition towards CE, the Netherlands constitutes a relevant case study: in September 2016 the government program *A Circular Economy in the Netherlands by 2050* was issued, fixing guidelines, strategies and objectives to lead the country towards a better optimization of resources within 2050. National economy presents a widespread application of circular model; among several implementations, some specific

researches and experimentations employ this model to meet the challenge to design a sustainable urban environment.

A relevant case study is the city of Amsterdam: the municipality made EC one of the main points of their sustainability policy, as illustrated in their 2015 sustainability agenda (Gemeente Amsterdam 2015). Among the initiatives for the transition, Amsterdam municipality is promoting bottom-up forms of planning, selling off plots in development areas where they institute special statutes, to let experimentations towards alternative kinds of growth take place.

In Amsterdam, as well as in other parts of the Netherlands, the illustrated planning approach develops in a specific architecture: *zelfbouw*, 'self-building' is growing and supported by the government, in partial fulfilment to the circular and sustainable development ambition for the country and in partial response to the financial crisis. *Zelfbouw* allows individuals to supervise which materials are employed to build their houses, to choose good performances controlling the costs; they can control energy supply solutions, to implement in their house techniques allowing them to be independent from public supply and fulfill the desire to rely on renewable sources; furthermore, *zelfbouw* represents a strategy to control housing costs, because it releases from the floating real estate market. Above all, self-construction unlocks the opportunity to have a house responding to specific requirements and taste, able to evolve with dwellers' necessities and desires.

Self-construction is conducted under different forms, from the initiative of private individuals to the organization of groups of citizens, acquaintances or like-minded people looking for forms of common living to face real estate crisis. Self-builders act under low restrictions: they adopt innovative solutions in terms of sustainability, affordability and design; they take advantage of this freedom, implementing in their designs different spaces to fit different forms of living, often experimenting in mixing private and public spheres and in sharing spaces and facilities. Spaces are also shared when housing has to be reduced to stay affordable: neighbors share few square meters to build common, extra comforts, as a common workspaces or guest rooms.

4. Conclusions

Zelfbouw production represents an ensemble of relevant examples of architecture derived from circular processes, opening wide interpretation perspectives. First of all, *zelfbouw* realizations are the output of architecture processes driven and performed by final users: houses are illustrated and communicated as manifestos of their dwellers' lifestyle and ambitions. Architects are involved and hired as technicians: the necessity of their professional role is stressed by the majority of self-builders, but the authorship of the design is attributed to the dweller, even if shared. In case of collective *zelfbouws*, architects act as managers of the common process. Their task is organizing individual requirements and desires in a system, getting close to the role depicted by Carlo Ratti as 'the choral architect': a programmer, devoted to the activation of space rather than its creation, studying the collective ecology of a group and setting a self-determining process. The choral architect leads the autonomy of the individual in the design: he or she acts as editor, able to take top-down decisions thanks to

their competences, fulfilling a curatorial role (Ratti and Claudel 2014). This aspect opens interesting perspectives in terms of programming a building life cycle: designed by their own residents, tailor-made on dwellers' own needs, houses are less exposed to obsolescence of trends and declines of taste, avoiding being dismissed for inefficiency or disenchantment. Their structure allows flexibility and possible reinterpretations, unlocking new configurations for new dwellers after the first one. Their future evolution will tell if their flexibility will have activated new arrangements or if they will have fit just their first initiators.

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Biography

Francesca Zanotto. Architect and PhD candidate in Architectural, Urban and Interior Design at the Department of Architecture and Urban Studies (DAStU) of Politecnico di Milano, where she is teaching assistant at Architectural Design Studio and Architecture Theory and Practice courses. Her research focuses on the spatial dimension of waste and the implications for architectural culture of changing consumption patterns towards reuse and reduction, studying the application of the paradigm of Circular Economy to the built environment. She has been visiting PhD candidate at TU Delft, working on the development of a circular design framework for complex systems within H2020 project REPAiR at the Department of Urbanism, Chair of Environmental Technology and Design.