
URBAN FORM, WATER AND GREEN SPACES: TOWARDS AN INTEGRATED APPROACH OF RESILIENT URBAN SYSTEMS

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Urban planning has been engaged for a long time with one issue: how to plan the expansion of cities. The main aim of this paper is to determine why have such theory emerged and why it is not working any longer. In addition, it reflects on what does urban metabolism has to do with the urban form arrangements and urban infrastructures (water and green spaces in particular). This reflection is based on an examination of the urban planning options taken for Lisbon and its region during twentieth century, in particular in what relates to urban form, water infrastructures and green spaces. Finally, this presentation argues that to transform our cities into more resilient places it is important that Urban Form should be recognized as a strategic tool to transform the current metabolic functioning of our cities. However that will only be possible when a full understanding of the role Urban Form, which integrates also Green Spaces and water infrastructures, within the urban system metabolism is recognized by society itself.

Keywords

Urban Form, Water, Green Spaces, Urban Metabolism, Urban Resilience.

INTRODUCTION

Urban Planning has been engaged for a long time with one main issue: how to plan the expansion of cities. Indeed, since Ildefonso Cerdà (1815-1876) and his influential theories ‘*Teoría de la construcción de las ciudades*’¹² and ‘*Teoría General de la Urbanización*’¹³ that the growth of the city can be identified as the main problem that urbanism has assigned. Moreover, this is the same concern that appears to lead urbanism today. Indeed, since the postulation of Cerdà’s theory, more specifically throughout the implementation of the *ensanche* (extension) plan for Barcelona⁴, that the discipline of urban planning has not abandoned Cerdà’s main idea on how to persistently expand the city, thus predominating within as part of contemporary urban planning culture. For example, during twentieth century investigation about the ‘Forms of Urban Growth’⁵ was conducted also by a Spanish Architect and Urbanist Manuel de Sola-Morales (1939-2012), throughout investigation within the Barcelona School of Architecture, at the Laboratory of Urbanism.

Based on a review of the different urban planning theories that have shaped the urban history of XIX and XX centuries, this presentation would like to offer a reflection on i) why did the expansion of cities theory emerged?; ii) why it is declining now?; iii) how should urban planning interpret this change?; iv) what lessons can we take to improve our cities and territories and transform them in more resilient places?; and finally v) how can water and green spaces contributes to such change?

In order to respond to the above-identified questions, this paper is organized in two parts. The first part introduces the topic under analysis. The second part exposes the problematic under consideration applied in a specific territorial context, Lisbon and its region. More precisely, it investigates how the work conducted by the architect-urbanist Étienne de Groër (1882-1974), for the city council of Lisbon between 1938 and 1948, but also for other Portuguese municipalities and regions as Costa do Sol⁶, aimed to counteract the expansionist urban theory that was in practice worldwide, including Portugal.

Furthermore it analyses how both green areas and water infrastructures were regarded in Groër’s urban proposals. For example, it identifies how Groër and the Portuguese authorities envisaged the expansion of the city through the planning of new water infrastructures, to benefit new residential neighbourhoods within the city but also in new urban areas outside the city limits. As expressed by Gandy⁷, Bell and Teh⁸ water infrastructures constitute one of the most expressive elements to explain the relationship between society and urban space over time, at the same time that accounts about the evolution of society’s metabolism. Therefore, in Lisbon a new social and urban metabolism was now being implemented, contrasting with a previous one, which was inherited from an agrarian society as witnesses by Niza et al⁹. Furthermore, a new urban form would emerge in Lisbon but also outside the city, while accommodating space, direction and opportunity for the insertion of the new water infrastructures, as it had already happened during eighteenth century¹⁰.

LIFE CYCLE STAGES OF THE EXPANSIONIST PLANNING THEORY

In order to analyse the lifecycle evolution of the Expansionist Planning Theory this section is organized according to three main questions: (i) how did the expansion theory emerged? (ii) Which were the problems that such expansionist theory aimed to solve?; and (iii) what are the consequences of such theory today, in terms of urban problems?. With this we aim to demonstrate how and when did the expansionist urban theory emerged but also why it has failed and should be abandoned.

Which has been the problem that urban planning has tried to solve?

The main problem that the urbanism has tried to solve since the advent of Industrial Revolution, as identified in a number of authors whose lines of thoughts are common to what the author of this paper argues, corresponds to the growth of cities. Such growth theory is here defined as 'The Expansionist Theory'. From all the analysed references we would like to focus on three specific ones, because they do clearly express the problem of the city growth as the central problem of modern urbanism. Namely the ideas introduced by Ildefonso Cerdà in 1887¹¹, Manuel de Solà-Morales¹² in 1971, and Antonio Font in 2004¹³.

Besides to those authors, which came from the architecture and urbanism disciplinary areas, we can also identify other authors that have addressed the problem of growth in their theories. Namely, Adam Smith¹⁴ through his 'Inquiry into the nature and causes of the wealth of the Nations' in 1776 and Thomas Malthus¹⁵ with his essay on the 'Principle of population' in 1796, which had already pointed out the economic and the demographic consequences of the Industrial Revolution, during the second half of the eighteenth century. The consequences of such Industrialization in terms of economy and demographic changes were huge, but in terms of the urban form of the cities it was also very expressive, as testified by the construction of new housing and the provision of new infrastructures. Therefore, since the Industrial revolution that society witnessed a new interaction with the built environment, throughout the demand for more housing and required space for the mobility of urban fluxes (such as water and circulation of people and goods).

Greatly influenced by the hygienist ideas of the time and by his capacities to perceive the social and economical changes that new industrial productive model would guarantee, Ildefonso Cerdà previewed in such transformations the opportunity to implement his new urban model¹⁶, that could respond to the emergent requirements of the industrial society. Thus, throughout a new city urban and social model, Cerdà proposed the 'unlimited city' concept which would respond to the need of more space, as requested by the exodus of the rural population to the urban centres, but also to the mobility needs in terms of local and territorial scales as requested by the new industrialized urban economy¹⁷.

The 'Teoria General de la urbanización' enunciated by Cerdà in 1867, would be in part realized in Cerdà's proposal for Barcelona's *Ensanche* and illustrates the urban and social solutions proposed by Cerdà. The new urban solution aimed to resolve an emergent problem, at that time, which was the continuous growth of the industrialized city. This new urban model, proposed by Cerdà, reveals the acknowledgement of a new productive model and its intrinsic emerging social and economic model, which resulted from such productive model. As claimed by Solà-Morales¹⁸, this understanding of the nineteenth century society expressed by Cerdà allowed a new historical interpretation of the city. But, it mainly represents an important moment of change in the history of urbanism, because it placed the main focus of modern urbanism on the problem of the growth of cities.

During 1970's the interest on the problem of city growth constituted an issue of research at the Laboratory of Urbanism of the Universitat Politècnica of Catalunya (UPC). The interest and the actuality of such research have also allowed a pedagogic practice at the University course of Architecture and Urbanism, with the foundation of the course 'Urbanística I- Las Formas de Crecimiento Urbano' in 1971-1972 which was later published as a book in 1997¹⁹.

It is here argued that the research conducted by Font, at the University of Barcelona, has allowed an actualization of the problem of city growth already placed by Cerdà's *Ensanche* theory, however taking into consideration new urban realities. Furthermore, Font²⁰ promoted also an international point of view, while investigating this urban phenomenon also in thirteen urban regions of South Europe. Namely, Lisbon, Porto, Marseille, Bologna, Genoa, Milan, Naples, Veneto-Central, Barcelona, Donostia-Bayonne, Madrid and Valencia.

It is therefore possible to verify that in this last century of modern urban activity, since Cerdà (1887) to Font (2004), the main concern of the urbanism has centred his focus on the problem of the city growth. This, through the (i) identification of the different levels of urban growth phenomenon, as compiled by Solà-Morales (1997) in a number of analysis of different urban morphologies; the (ii) international analysis of the phenomenon of the explosion of the city as conducted by Font (2004); and the (iii) understanding of the processes of social and physical transformation of the territory, and their inherent processes of transformation of the current urban model, as verified by Cerdà in 1887, Solà-Morales in 1997 and Font in 2004. Thus, it is possible to conclude that the city growth has been indeed for the past 120 years the main object of analysis of urbanism - the modern urbanism – as testified for Barcelona.

Which are the causes of the urban problems that we face today?

After the identification of the explosion of the city as the main problem, in the urban agenda for the past 200 years, the main question that should be now placed is: Which are the causes of the urban problems that we face today?

It is possible to situate the origin of the problem identified in the previous point in the moment that witnessed the implementation of the new industrial productive model – the industrialization. This new productive model worked as an important social transformation shift, from a traditional society into a new industrial society. The implementation and the continuation of this new productive industrial model was only possible because society believed in the idea of an unlimited economic growth, guaranteed by such new industrial productive model. An economic growth that needed however to be supported on a productive system based on the continuous extraction of mineral resources; which would allow maintaining and guaranteeing its growth.

The extraction of mineral resources enabled by this new productive model was experimented at a scale, which was never witnessed before. Thus, for the first time in the history of humanity man witnessed the availability of an unlimited base of resources that would allow a continuous production and therefore economic growth and development. An industrial model supported this economic growth, which was however built over a social consensus that economic efficacy was only possible through growth.

However, this economic growth depended on the capacity to increase the material fluxes generated from the production and consuming, which allowed the concentration of population in the urban centres. Thus, the city growth – the problem of modern urbanism – would also become the corollary of the economic growth, growth of production and consuming.

Moreover, the systematic extraction of mineral resources allowed by the industrialization opened a new chapter in the history of urban metabolism. Thus, from a previous circular metabolism, which agrarian societies depended on to survive, it was implemented a new linear metabolism, which was something new in the history of humanity. This transformed completely the previous relationship between man and nature and its intrinsic need to close the material cycles that operated within the urban environment. Furthermore, this new economic model, allowed a new metabolic model, enabled by the reorganization of the society needs and requirements for its own satisfaction, including heat, light, mobility, among others. Society would now depend on accessing in a continuous manner to different resources in order to guarantee its growth and maintain of its own needs.

Therefore, society, explored urban planning as a way to respond to the new requirements of the industrial model, generating new urban phenomenon. Thus, for the past 120 years, society implemented a new planning practice based on urban growth, which was granted by the opportunity of productive growth allowed by industrialization and its inherent economic model.

However, because we are not yet sure of what productive model will follow the current one, and what are the possibilities to transform the actual social and the economic productive model, that fortunately Cerdà had the opportunity to witness and take profit at his own time, we should however try to understand that we are living a necessary moment of social change against the environmental degradation imposed by the current industrial productive model.

After the analysis and confirmation of the causes of the environmental degradation, that do result from the continuous implementation of the industrial productive model, inherited already 200 years ago, it is urgent to understand that urbanism should be regarded as an instrument to counteract the urban models imposed by the industrial productive model. Thus, new urban visions should be able to respond to society demands, at the same time that protect the natural environment. It is precisely because of this believe that the following example of Lisbon urban proposal conducted by Étienne de Groër in Lisbon between 1938 and 1948 seems important to be here analysed, as it encapsulates some clues against the advancement of the expansionist theory.

LISBON URBAN PLANNING

At the 21st of December of 1934, through the implementation of the Law number 24802, the Portuguese Government would institutionalize the *Planos Gerais de Urbanização* – PGU (General Urbanization Plans), which would replace the previous *Planos Gerais de Melhoramentos* - PGM (General Improvement Plans) implemented in January 1865. With the PGU all localities with more than 2.500 inhabitants would need to pursue new topographic plans to better portrait their territorial realities and allow the development of future planning proposals. However, an updated survey of the territory was needed, specifically for those urban areas. Furthermore, water supply systems, sewage systems and lighting, as well as the location of parks and forests were important aspects to be considered in the needed survey as request by the legislation.

Lisbon, the Portuguese capital city, also needed to pursue such topographic survey and the preparation of the PGU. However there were no Portuguese urban professionals to support such work. It would be in 1934 that Guilherme Faria da Costa (1806-1971), a recent Portuguese graduated architect, would pursue his studies of Urbanism at the Institut de Urbanism de Paris, and become later the first Portuguese Urbanist. Indeed, Portugal had no urbanists to support the work planned by the Portuguese government (PGU and topographoca plans) and because of that the *Serviço de Urbanização da Secção de Melhoramentos Urbanos da Direcção-Geral dos Edifícios e Monumentos Nacionais* (Urbanization Service from the Section of Urban Improvement of the General Directorate of National Buildings and Monuments) had to hire a number of foreign professionals to work in its various municipalities²¹. It would be in 1933, that Duarte Pacheco, the Minister for Public works between 1932 and 1936 and again between 1938 and 1943, would contract the French urbanist Alfred Hubert Donat Agache (1875-1959) to study and prepare an urban plan for Lisbon²², comprehended between Lisbon's main square (Terreiro do Paço) to Cascais, a village located further west of Lisbon Region. Etienne de Groër (1882-1974), a collaborator of Agache office would also be called to support Lisbon City Council and peruse Agache work, as an urbanist-consultant between 1938 and 1948, as stated by Groër himself in his the introductory note of the *Plano Director de Lisboa* (Lisbon Urbanization Master Plan)²³, which he had prepared according to the contract signed between him and City Council of Lisbon (CML, 1947). This contract established a work plan for 12 months. Etienne, which aimed to: i) “Provide supplementary analysis of the current state of the city”; ii) “Expose the fundamental principles of the Master Plan”; and iii) “indicate the legislative elements to apply such principles” (Groër 1948, p. 2). Thus, by giving continuity to the geographic, geological, climatic, historical and economic studies conducted by engineer Antonio Emídio Abrantes, and that would be published in 1938 by the City Council²⁴, according to a detailed program elaborated by Groër himself²⁵, the report included in “Plano Director de Lisboa” (Lisbon Master Plan) indicated the principal principles that should be considered for the future urban planning of Lisbon. One of these principles was the obligation for the plan to include a rural area limiting the city and separating it from the surrounding areas and neighbouring agglomerations.

GREEN AREAS AS A LIMITING TOOL FOR LISBON EXPANSIONIST THEORY.

Greatly influenced by Ebenezer Howard (1850-1928), the author of the Garden Cities theory, whom claimed that the city depended on the rural space to promote fresh air, agricultural goods for food provision, and protection against the further development of urban clusters adjacent to the city²⁶, Étienne de Groër proposed for his Master Plan for Lisbon Urbanization, *Plano Director de Urbanização da Cidade de Lisboa*, the creation of a peripheral rural area of about 3km wide around Lisbon city. Its purpose was for agriculture uses but also to protect the future development or extension of the city of Lisbon, as it was already happening at that time. In addition to this rural area, Groër also previewed the establishment of new green spaces, to provide the 'City lungs', which would be classified according to four categories: *parques* (parks), *jardins* (gardens), 'squares' (or small decorative gardens) and *terrenos de desporto* (sports fields). According to this architect-urban planner, it was important to preserve not only the parks, public gardens and wooded land to provide permanent fresh air, but it was also important to protect the backyards located within the private residential areas, which were located inside the urban blocks, because these would provide the place for the growing of fruit trees and vegetables in the city. Furthermore, he claimed that it would be in the "backyard that a housewife could cultivate fruit trees and vegetables and spend happy hours to relax outdoor"²⁷ as well as a vegetable garden is a "piece of land to cultivate vegetables and fruits necessary for feeding their families"²⁸.

WATER INFRASTRUCTURES AND THE IMPLEMENTATION OF THE EXPANSIONIST THEORY IN LISBON

The *Plano Director de Lisboa* (Lisbon Master Plan) prepared by Étienne de Groër was never approved by the Portuguese government although the City Council of Lisbon approved it, in 1948. Despite this political situation this plan was partially implemented, including the main street layout and the building of several neighbourhoods. Nevertheless, the planning principles advocated by Groër, which aimed to counteract the Expansionist theory seems to have been promptly interrupted, as most of the outskirts of Lisbon were rapidly developed and urbanized. For example, the rural area previewed for Lisbon outskirts was never implemented. However, the new street layout, delineated by Groër, would allow however the construction of the new residential areas and water infrastructures, contributing to the further expansion of new urban areas.

CONCLUSIONS

The Expansionist theory seems to have been an urban vision in practice for more than 200 years. This paper argues that to transform our cities into more resilient places it is important that Urban Form should be recognized as a strategic tool to transform the current metabolic functioning of our cities, wherein green spaces but also water seems to be important elements to be considered by urban planning. However that will only be possible when a better understanding of the integral role of urban form itself can be recognized by society itself.

This paper has confirmed that since Ildefonso Cerdà (1815-1876) *Ensanche* for Barcelona²⁹, to Sola-Morales 'Forms of Urban Growth'³⁰ that the discipline of urban planning has assisted to predominance of Cerdà's main idea based on how to persistently expand the city. Indeed, this has been the same concern that predominates urbanism even today, as testified by Solà-Morales³¹ and Font³².

This same argument can be found in a particular territory analysed in this paper, Lisbon and its region. This urban example was here identified because it is believed by the author that its urban proposal aimed to counteract the expansionist urban vision, in Lisbon and its territory between 1938 and 1948, through the work conducted by architect-urbanist Étienne de Groër. Such attempt included green spaces as one of the most crucial elements to limit the city growth, which integrated a social-economic and urban vision which was never implemented, due to Portuguese political reasons of the time.

Disclosure Statement

No potential conflict of interest is to be reported by the author.

Notes on contributor

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Endnotes

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