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A systemic view of the design process of apartment buildings

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Abstract

This paper takes a systemic perspective on the design process of apartment buildings. By including the participation of different and dealing with several variables constituting a set of parts in interaction, such processes could be approximate with the notion of complex systems. It is understood that changes in the forms of organization of these design processes may favor the introduction of innovations, both for the process itself and for its products and may result in projects with better architectural quality.

Keywords: apartment buildings, dwelling design, design process, complex systems innovation.

Presentation

This paper aims to approach the design process of apartment buildings to the concept of complex systems. As will be seen forward, the term design process seems to be more inclusive and

representative of the set of actions that results from the interaction between several actors from different disciplines.

The Nomads.usp - Center for Interactive Living Studies, University of Sao Paulo , has been conducting researches on the theme of Contemporary Dwelling for several years. Particularly on the topic Metropolitan Apartments, studies had been made about the origins of the modality apartment in medieval Europe and their recurrence in many parts of the western world, focusing the case of Brazil and in particular the city of Sao Paulo[1]. Always closely related to the evolution of their spaces design, the nucleus have also developed works concerning mechanisms of production and commercialization and the introduction of technical and spatial innovations throughout the twentieth century, covering both social and private production.[2]

The methodological procedures applied in the research are traditional and widely described in literature. Data collection was conducted through consultation with the secondary sources from several institutes (Instituto Brasileiro de Geografia e Estatstica IBGE, Fundação Sistema Estadual de Análise de Dados Seade, etc.), institutional libraries such as Escola de Engenharia de São Carlos (EESC-USP) and Faculdade de Arquitetura e Urbanismo (FAU-USP) ones, archives of the newspaper Folha de São Paulo, documents produced by Nomads.usp, monthly and annual reports of companies operating in the real estate market in So Paulo (Empresa Brasileira de Estudos de Patrimônio Embraesp, Secovi-SP, etc.) and consultation to journals and via the Internet. The analyses of graphic pieces of apartments were based on methods already studied and applied in studies of the Center (BRANDÃO, 2002; ORNSTEIN; BRUNA; ROMERO, 1995; PEDRO, 1999; TRAMONTANO, 2004).

Introduction

Despite the deep transformations in the ways of living of the users of this type of dwelling (TRAMONTANO, 1998), it is perceived great uniformity of design solutions among hundreds of drawings, produced over more ten decades, that compose the Nomads.usps database. Given this similarity, the architect Jorge Wilhelm said recently that "it seems there is a single protagonist to draw with his 'hidden hand' all the plans" (WILHEIM, 2008).

Considering the production of apartments in the 1940s and 1950s in the city of São Paulo, Rossela Rossetto notes that:

> "The solutions adopted proved to be innovative in relation to what had been built so far. Maybe precursors, intuiting needs related to living in the metropolis, not yet expressed in its totality in the '50s." (ROSSETTO, 2002)

But the researcher is surprised that those same solutions were still present in many of the current real estate projects, indicating that despite the changes in lifestyles and the growing "complexity of

everyday life," there wasnt a systematic review of dwelling program. Marcelo Tramontano (2004) corroborates this view by stating that the projects of the units have the same spatial structure found in plans of exemplars from the first decades.

> "Abandon ing the drawing boards and computers of the architects, the design of So Paulos apartments in the years 1990 and 2000 has been defined in the sales stands by professionals whose goal is the commercialization of the units, even if not always founded on credible representations of the its buyers aspirations. (TRAMONTANO, 2004)"

The maintenance of a compartmentalized and functionally tight internal design, despite the changes occurring in the behavioral patterns of its users, is closely linked to market mechanisms such as economic factors and financial aspects of construction and legal issues, among others. But it also reflects the prioritization, even in the planning stages of the product, of the demands of certain actors involved in the design process of these buildings. For the researcher Fábio Queiroz (2008):

> "The lack of innovations, with respect to the spatial structure of the units, might be due to factors such as the consequent necessity to promote changes also in the production process or because it represents risks with respect to commercialization, against possible rejections from sellers and buyers." (QUEIROZ, 2008)

Thus, the production of this type of dwelling seems to be today, tied to a market equation whose main protagonists would be, according to Rossetto (2002), the developer, the builder and the seller. The first one prefers to invest in a conventional pattern of apartment, which involves less risk in its commercialization because it is a widespread and assimilated model. João Lima Jr. argues that "under the viewpoint of the investor the product attributes are, ultimately, summarized to the factors: cost of production and sales profits" (LIMA JR., 1993.)

The builder seeks to develop more efficient and responsive constructive methods to the reproduction of that spatial model, considering his own interests of efficiency and profitability, as well as those of investors. According to Silvio Melhado, a project keen to production should propose more appropriate solutions for the implementation of the product. In this regard:

> "The criticism of the traditional process of buildings design development is based on the finding that this design focuses on defining the 'product', i.e. the physical and geometrical characteristics of the building, leaving in the background the definition of how to produce it." (MELHADO, 1997)

The seller, being the only one of these three actors in direct contact with buyers, advocates knowing better their needs - supposedly revealed in the sales stand - and claims therefore the right to determine product standards (TRAMONTANO, 1998). Prioritizing strategies that lead to support sales speed, he decides or induce decisions on issues of design, the area of the units, the finishing

materials, common areas and eventually even the aspect of the facades. According to the architect Fernando Luiz Rocco, "brokers do not accept innovations with the argument that they do not sell and the developer accepts the views of the broker as if he was a god" (ROCCO, 2006).

The buyer finally closes the equation acquiring the apartment, convinced of its exchange value in the future, even if it is necessary to adapt their own way of living to the spaces that are offered. For Carlos Lemos, it would take place because:

> "In fact, the evolution of our apartment is based on handling of its varied needs programs by its sponsors or developers, who are ruled more by real estate market forces than by practices, manners and expectations of a certain cultural scheme." (LEMOS, 1989)

In this context it may be said that a deterministic posture prevails in relation to procedures for design and production of this type of dwelling. From this viewpoint, to the apartment building, as a well formulated and known problem, it should correspond a projective response consolidated and widely reproduced in models, not just by marketing strategies but also by postures taught in architecture schools and thus in professional practice.

Design process as a collective activity

The definition of features such as plans, finishing materials and facades obey, currently, a logic that architecture has moved away from. Whether for reasons related to teaching or practice in project offices, it seems that project activity started to prioritize, increasingly, the attention to the pragmatic demands of the market, leaving discussions possibly less objective - as the relevance of consolidated design solutions in contradiction with current users profile - in the background. Allow that architects return to have a prominent role in this process could be very positive, but it would still be necessary to ask whether Brazilian architects develop, during their education, instrumental and critical thinking able to help them both in proposing other solutions as in dialoguing with other players in this process.

For many authors, including Christopher Alexander (1977, 2002-2005), Jon Lang (1974, 1987), Doris Kowaltowski et al (2006), the term "project process" refers to the procedures involved in defining the characteristics of objects, be they furniture, buildings or urban fragments, for instance. However, looking at the universe that frames the development of apartment buildings projects, especially in So Paulo , we realize that the project process, according to this definition, is relatively unimportant in terms of the outcome of this development. For this reason, we are interested in considering a broader set of actions, called by some authors (CUFF, 2001; EMMITT, 2008), as design process.

Dana Cuff suggests a highly collaborative process, involving professionals from different areas:

> "Imagine that each individual with a voice in the design process as a kind of designer - the client, the engineer, the contractor, the inhabitants (...), the financer and so on. The design happens when any of these actors makes plans in relation to the future environment. "(CUFF, 2001)

For Stephen Emmitt, it is a field of action in which:

> "(...) the word design is broadly interpreted to include the contribution of all designers, i.e., architects, engineers, technologists, technicians, component manufacturers, contractors, craftsmen and specialist suppliers."(EMMITT, 2007)

Márcio Fabrício agrees with this view by stating that in the process of developing of building projects:

> "(...) several planners, consultants and agents of the enterprise are mobilized to contribute to the project. Each agent participates with their interests and knowledge in order to develop some of the projective decisions and formulations." (FABRICIO, 2002)

We understand, so, that design process refers thus to the set of actions that results from the interaction between actors, such as those mentioned by Cuff, Emmitt and Fabrício, colaboring (or working together) for the production of architectural objects. In this regard:

> "At some level, architecture should be understood as a collective artistic activity, rather like film making or theater production than writing novels, painting or sculpture." (CUFF, 1991)

In fact, the production of apartment buildings is clearly a major problem and cannot be resolved only with the tools of architecture, nor with any of the other disciplines involved, separately. This is a problem that requires concerted solutions, involving different expectations for the product. There is also a set of variables such as laws and current funding rules, construction techniques, among other, which make up a network of relationships and that we can approach to the notion of systems and complexity.

Thus, launching an expanded analysis on the design process of buildings would mean, somehow, understanding it as a set of actors and variables, a set of interacting elements, configuring a system.

A notion of system>

In the first half of the twentieth century, the Austrian biologist Ludwig von Bertalanffy formulated the idea of system as a metaphor that can be used to understand from living organisms up to machines, as well as design processes and communication processes. For him, "the statement of Aristotle that 'the whole is more than the sum of its parts' is a definition of the basic idea of system"

(BERTALANFFY, 1975). From this viewpoint, it is understood that a system is greater than the simple sum of its parts because it is composed not only by the parties, but also by the ways they relate to each other and even more by the qualities that emerge from these relations.

These concepts were subsequently enriched by theories developed by others authors, (HEISENBERG, 1996; JOHNSON, 2003) in particular by the French philosopher Edgar Morin, formulator of the so called complex thought. Morin introduces the idea of complexity as a conceptual tool capable of assisting studies on the organization of systems. Starting from their formulations, complex systems can be understood as systems out of balance, both open and closed in relation to their environment and where the noise acts as an organizer element.

To form the basis of complex thought, Morin uses a set of theories related to the idea of self-organization, such as John von Neumanns, Heinz von Foersters, Henri Atlans and Ilya Prigogines ones. However, he indicates three theories as foundational: Norbert Wiener's cybernetics, Claude Shannon's Mathematical Theory of Information and Communication, and Ludwig Von Bertalanffy's General Systems Theory.

> "The study of complex phenomenon (...) can be seen as a several floors building. The ground floor consists of three theories (information, cybernetics and systems) and contains the tools needed to develop a theory of organization." (MORIN, 1996)

Bertalanffy's ideas are therefore presented by Edgar Morin as fundamental to the notion of complexity. Morin discusses the need to rethink the relations between subject and object of scientific knowledge, indicanting that classical thought is reductive with respect to the need of considering the organization of these relations. He said:

> "The fact that every object can be set from laws to which it is subjected and from elementary units for which it is constituted deletes all references to the observer and the environment, and the reference to the organization of the object can only be incidental." (MORIN, 2003)

Complex thinking, then, emerged not as an alternative to classical scientific thinking, but as a way that seeks to expand the epistemological framework of thought, allowing the construction of different views, less limiting and able to promote dialogues (FIEDLERFERRARA, 2003). Thus, take a look at a set of factors through the complexity means to understand it as a complex system, a network of relations that are constructed from interactions between the constituent parts and also variables outside the system, but considering the notion of unpredictability as intrinsic to the system (ALMEIDA, 2006; PINILLA CASTRO, 2006). In this case, it is necessary to considerate the idea of probabilistic thinking, unlike the deterministic and specialized approach used in classical scientific thinking.

Understanding a design process in a probabilistic way imply that, despite of having some delineations over the intended product, there would not be a definition of what precisely the final product would be. For instance, imagine a design process that should lead to the design of a new apartment building. It would certainly be necessary to determine some of its features - such as number of floors, units, the income range of its public, among others. However, solutions for the drawnings of the units and facades, for the relations between the building and its surroundings could be achieved during the design development, and the team involved would be willing to accept - or to allow - a greater variety of possibilities for the final result. In contrast, the practice commonly adopted in the market today is to adapt a single solution to different situations (QUEIROZ, 2008).

For the physical Nelson Fiedler-Ferrara (2003), the design process of apartment buildings would constitute, actually, a complex system whose organization would be better understood through a systemic approach. This view, however, should not be taken as a method of analysis of design processes. It is, according to the researcher, a mean that can be used to understand the organization of these processes.

> "The complex does not state that 'everything is complex', a synonym of 'it cannot be understood'. It is not a thought of imprecision, uncertainty - despite including imprecision and uncertainty. Its purpose is to serve as a basis for structure concepts and methodologies - tools of thought, reflection and action in the world - to coordinate specialized knowledge." (FIEDLERFERRARA, 2003)

Fiedler-Ferrara further explains that "complexity is not a holistic thinking that focuses on comprehensive analysis of the parts, the components. He articulates the whole with the parties, the global and the particular in incessant comings and goings "(FERRARA , 2005). Architects Clarissa Almeida and Anja Pratschke note that in design processes "the adoption of these principles invites mainly to a reassessment of the relations between designer, user, object and environment" (ALMEIDA; PRATSCHKE, 2003)

Parties in interaction

From a systemic perspective, an apartment building would be not only the product of specific interests of the actors involved in its planning. It would also result in the interactions established between the parties concerned, considering the contribution of external variables - such as laws or funding rules - and also of developments emerging from these relations. Projecting from a systemic perspective would thus make room for the actors - not just the three appointed by Rossetto in a way they could express themselves, allowing the development of products with greater diversity. It would admit a plurality of solutions for final results, but respecting certain limits.

Cuff reinforces this opinion to emphasize that understanding the context in which architecture is done is vital for architects to develop proposals with best architectural qualities and meeting, at the same time, the interests of future users and also their promoters. The author affirms that:

> "Sometimes architects deny the significance of the role of other actors in the design or suggest that paying attention to these relations is an inherently non-architectural behavior - such work should be left to businesspersons and managers. This study would reveal that ignore the social context in which buildings are designed is counter-productive for all parties involved, mainly for architects. By devaluing the conditions that frame creative process a range of constraints and opportunities are ignored and removed from the potential control of the architect." (CUFF, 1991)

The need to broaden the understanding of aspects related to the production of buildings is also underscored by Silvio Melhado, for whom "the project cannot be understood only as it is viewed by architecture (...) but as a multidisciplinary activity, involving from marketing analysis and cost analysis to decisions about the technology and manufacturing process" (MELHADO, 1997). Dana Cuff adds that design excellence comes not only from a talented architect or an exceptional client or even from a well-executed construction, but from an interaction between several parties, involving their expectations on the resulting object, respect for co-participants, flexibility in decision making and concern to meet the final users of the building. The result of processes with these characteristics would be projects directed more to final product quality and less oriented to business. Buildings gifted with good architectural qualities would not be understood solely as the result of good architects or good clients, but as a result of a good process (CUFF, 1991).

On the users of these buildings, even though normally understood in a typified way as a profile of buyers - and despite their demands been often defined by deficient methods and frequently biased by the demands of other parties (PASCALE, 2005; TOMANARI, 2003) they actualize their participation as actors in the process purchasing units during the so called launch phase, helping to make the enterprise financially possible. On the one hand, investors and their criteria seem to prevail over other agents only as it is the part that pays for the process - so the one who pays the others. But in this case, it would be necessary to understand the buyers, the users-consumers of the apartments, as the real sponsor of this production.

To ensure that the demands of users are observed and treated consistently, as well as those of other parties, Sérgio Amorim argues that "we must establish a strategy for quality development, which transcends the level of building quality, including aspects of the definition of demand, ie, the needs that the product must meet" (AMORIM, 1998).

Thus, a design process organized as a complex system must include among its central concerns the daily lives of residents in the building after the conclusion of the construction. It should consider the notion of indeterminacy also is relation to the use of its spaces, both in the building as in its

units, allowing residents to have different uses possibilities. This understanding involves, as advocated by Dana Cuff, that a building results from negotiation between the demands of their customers and users, the clients' interests, those of the production participants - including investors and builders - and the values of architects, authors of architectural designs. For the researcher, the quality of architecture performed as well as the quality of the final product is a result of these relations, of the dialogue established between these actors (CUFF, 1991).

Innovative exemplars?

It has been observed in São Paulo an offer, although initial, of apartment buildings with innovative features both in the spatiality of its units and in the building's architecture, regarding the functions of the common areas and its relations with the neighborhood. It is considered, here, as innovative, projects that present ruptures in relation to recurrences found in apartments widely offered in the real estate market in the city of São Paulo as discussed by Queiroz (2008). These exemplars present alternatives to its internal design and spatial organization, distancing themselves from the bourgeois model of dwelling, as defined by Tramontano (1998)[3], with qualitative increments in terms of the use of units and buildings.

Apparently, the design of some of these exemplars recently offered in São Paulo adopts different organizations in shaping and planning of projects. While assuming the participation of usual actors and the same set of variables considered in the planning of other buildings, their design processes appears to establish more balanced relations between the involved actors. Seemingly, this factor would help to promote quality increases, both for the process itself, as advocated by Amorim (1998), and for the product, as formulated by Cuff (1991).

Innovation, according to economist Christopher Freeman (1988), is a process that includes technical activities such as design, development and management, and the result is the commercialization of new or improved products, or the implementation of new or improved processes. Also according to the author, innovation depends on a complex set of relationships between actors configuring a system, which may include companies, universities and research institutes. Stephen Emmitt corroborates this systemic understanding by stating that:

> "Design innovation is directly related to the characteristics of actors contributing to the design and the characteristics of the project and the client. (...) Innovation is also influenced by the interaction between office and project environment." (EMMITT, 2007)

Fact is that the offering of buildings and units with innovative spatial characteristics in a market characterized by uniformity and conventionality suggests possibilities of proposing design solutions to provide better architectural quality attending premises of real estate production, whether related to efficiency in the construction or the return on invested capital. They are built among other

buildings offered in the same neighborhoods and intended to clients that represent consumers also for conventional apartments, with equivalent prices. In short, the fact that they are developed in design processes within different organizations and presenting different results does not invalidate them as products on the market.

Final considerations

Understanding the design process of apartment buildings as a complex system means valuing the relations between the elements involved in this process and how their contributions can help, interfere or even determine aspects of this process.

It may be taken as an assumption that the design processes of apartment buildings resemble complex systems for dealing with contributions and goals of different actors as well as external factors, as laws of use and occupation of land or funding rules. Thus, in the cases of buildings that present innovative architectural and spatial features, one may consider that their design processes differ from the procedures commonly adopted in the market. Both in terms of interactions established and levels of hierarchy among the agents involved, but also the weights assigned to different interests and variables.

While addressing the same problematic to be solved by design processes that result in conventional buildings, the design process of these innovative exemplars present differences in their organization, establishing more favorable conditions to dialogue and cooperation between the parties and encouraging the emergence of innovations in process and in its products. Therefore, changes in the organization of these systems, in the quality of relations between the parties involved, would affect the architecture produced and hence the configuration of buildings. In other words, when implementing changes in process design, changes would also happen in the characteristics of their products.

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Notes

[1] The concerns expressed in this text derive in part from the dissertation Apartamento Modelo: Arquitetura, modos de morar e produção imobiliária na cidade de São Paulo (QUEIROZ, 2008), funded by CAPES - Coordenação de Aperfeiçoamento de Pessoal de Nível Superior, and are based on the doctoral research "The process of design of apartment buildings as a complex system", funded by FAPESP - Fundação de Amparo à Pesquisa do Estado de São Paulo.

[2] A wide database on the production of apartments in the city, since the 1910s up to the latest releases, was built. This database consists of three parts: a set of graphic pieces and information for projects identification, a set of tables in spreadsheet format, which contains information about buildings and its units, and a document explaining the fill-in fields of tables and the identification of projects and graphic pieces. Gathering took the following criteria: buildings made by private initiative in São Paulo that have been publicized in any way, either through advertisements in newspapers, in publicity material, on the enterprises websites, or in magazines and journals of architecture.

[3] In addition to the space issues, this model is also defined by recurrences of characteristics that reflect the prioritization of the demands of some actors. Legitimated by the real estate market over several decades along twentieth century, these recurrences