

City-Organization: Elucidating the Paradigmatic Foundations Governing Urban Self-Organization *

Parichehr Rashidghalam^a- Hamidreza Saremi^{b**} - Ali Safavi^c

^a Ph.D. Candidate in Urban Planning, Faculty of Art and Architecture, Tarbiat Modares University, Tehran, Iran.

^b Associate Professor, Department of Urban Planning, Faculty of Art and Architecture, Tarbiat Modares University, Tehran, Iran (Corresponding Author).

^c Assistant Professor, Department of Urban Planning, Faculty of Art and Architecture, Tarbiat Modares University, Tehran, Iran.

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ABSTRACT

Today, unexpected events have reproduced urban complexities and driven urban areas toward an unpredictable future; only through continuous, dynamic management can progress be achieved in keeping pace with change. Therefore, a shift in approach toward “city-ordering” is essential to respond to current and future challenges. Self-organizing cities are considered a new paradigm in urban planning worldwide, representing a comprehensive, multidimensional, and complex phenomenon grounded in contemporary theoretical frameworks. On the other hand, the problems arising from the dispersion of opinions in the literature on the self-organizing city and the lack of consensus regarding its theoretical definition become even more pronounced with the introduction of the concept of city-ordering. Accordingly, this study aims to elucidate the paradigmatic foundations governing the self-organizing city. To achieve this objective, a meta-analysis following the PRISMA guidelines was conducted to identify and classify the theoretical and paradigmatic dimensions of the self-organizing city (in the initial search, articles published from 1944 to 2024 were considered, and after final screening, 27 articles were selected for analysis). The findings of the study indicate that self-organization derives from three distinct theories: the theory of dissipative structures, the synergetic theory, and the autopoietic theory, each emphasizing different principles, including the external and internal orientation of the system. Moreover, the philosophical dimensions of urban self-organization theory are framed within two ontologies: critical realism and post-structuralism. These two epistemological perspectives go beyond positivism and linear cause-and-effect relations. They are seen as a bridge connecting the non-human and human worlds, providing a space for planning dynamism that can adapt to unforeseen conditions. Therefore, it can be concluded that urban self-organization is a multilayered process emerging from the interaction of structural forces, local actions, and identity reproduction, and effective urban planning should focus on facilitating and strengthening these capacities.

Keywords: City-Organization, Urban Self-Organization, Self-Organizing City Paradigm, PRISMA Protocol.

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** E_mail: saremi@modares.ac.ir

1. INTRODUCTION

Human settlements, as the setting for the emergence of urban heritage, are living and dynamic systems characterized by the attributes of living organisms and require transformation and adaptation to a changing environment for their survival. Over recent decades, the rapid, uncontrolled pace of urban change has increasingly confronted human societies with challenges in managing cities (Nunbogu and Korah 2017). The concept of self-organization was introduced into human knowledge by systems scientists as a means of better understanding the world (Mousavinejad and Seyed Hamdollah 2013). Its manifestation in the urban context, under the concept of the self-organizing city, requires planning and managing urban spaces with a long-term perspective. Contemporary urban planning faces challenges such as an inadequate understanding of complexity, short-term perspectives, the absence of holistic viewpoints, and weaknesses in stakeholder participation. Despite the growing importance of urban self-organization over the past decade, comprehensive evaluations in this field remain limited, and existing studies have largely focused on developed countries. Therefore, a shift in the approach to city organization is essential to addressing both current and future challenges. One reason for the knowledge gap in this field is the limited research concerning the reciprocal relationship between self-organizing systems and the inherently unpredictable urban system. Although some policy frameworks contain examples and components consistent with the organization of cities, these have not yielded successful outcomes in practice, and urban management policies are implemented through approaches that have not been designed to respond to future needs. Accordingly, the principal issue addressed in this research arises from the diversity of viewpoints in the literature on the self-organizing city and the absence of consensus regarding its philosophical and theoretical dimensions, particularly in the domain of city organization.

1.1. Statement of the Problem

Contemporary cities, particularly metropolises and large urban centers, have increasingly become unsafe, unattractive, unhealthy, crowded, noisy, spiritless, harsh, and problematic places. In many instances, these conditions have reached a critical state. Consequently, every step taken in the city is influenced by the rapid rhythm and diversity of urban economic, professional, and social life, which affect the moral foundations of citizens' lives. The city exerts influence through its inhabitants' beliefs, thoughts, and behaviors. Therefore, living in such environments requires adopting specific measures and plans to improve the functional, physical, social, and other dimensions of urban quality. Large-scale construction and development (the city) can only be understood over extended periods of time. Some scholars believe

that the art of urbanism began simultaneously with the emergence of humankind (Shieh 2000). Urban planning is, in fact, a combination of architectural sciences and the planning of social life presented through the art of urban design (Mousavian 2001). In contrast, city organization can greatly assist planners in managing simulation, forecasting, and adaptation to various transformations, guiding planning processes toward greater flexibility. Researchers argue that the concept of self-organization can provide a way out of this dilemma and believe that urban self-organization can contribute to the spatial, economic, social, and political objectives of citizen participation (Boonstra and Boelens 2011). At every moment, the city offers opportunities, landscapes, and advantages that neither the eye nor the ear can see or hear, awaiting discovery. For millions of people from different classes and with highly diverse personalities, the city is not merely a perceptual object, nor even, in some cases, a pleasant one. Rather, the city is the product of the activities of numerous creators who continually transform it. While the general appearance of the city may remain stable during a specific period, its details are continuously changing. The ability to create an environment and endow it with identity is a shared human capacity. The necessity of recognizing our environment and possessing the ability to shape it is of utmost importance. A city is built not only for a single individual but for a multitude of users who belong to highly diverse environments, behaviors, occupations, and social classes. For this reason, planners must seek and create a city capable of responding to the desires, needs, and mental images of its citizens.

2. LITERATURE REVIEW

The term self-organization has been used in various fields and with different meanings. For example, it has been applied in cybernetics [1] (Foerster 2024), thermodynamics (Prigogine et al. 2000), mathematics (Sneyd et al. 2001), biology (Ye et al. 2017), computer science (Mamei et al. 2006), and other disciplines. The general understanding of self-organization, which is discussed across nearly all the fields referenced in Table 1, is that self-organization is a phenomenon whereby a system organizes its internal structure independently of external forces. In recent years, concepts of self-organization have been widely employed in disciplines such as social studies, economics, and urban systems. The simplest form of self-organization can be achieved by arranging the components of a system so that their configuration is non-random. Considerable research has previously been conducted to study such systems. Self-organizing systems are frequently encountered in numerous scientific fields, including biology, chemistry, geology, sociology, and information technology (Brueckner et al. 2005). However, William Ross Ashby (1947) is generally regarded as one of the pioneers in the

study of complex systems and self-organization. He defines self-organization as a process by which the internal organization of a system (typically an open system) evolves toward greater complexity without being directed by external factors or subjected to managerial intervention (Mousavinejad and Seyed Hamdollah 2013). Likewise, Cilliers defines self-organization as a characteristic of complex systems that enables them to spontaneously develop or modify their internal structure and adapt to their

environment (Cilliers 2002). In systems science, self-organization is understood as a nonlinear process that emerges from incompatibility or breakdown among different parts of a system. In such a process, the occurrence of a disruption within a system prompts individual components to respond spontaneously and independently to resolve the crisis, without external intervention. Ultimately, this process leads to self-organization and the formation of a stable, ordered pattern (Roo 2016).

Table 1. Previous Studies Conducted in the Field of Self-Organization

Researcher(s)	Title	Description	Source
Ashby	Principles of the Self-Organizing Dynamic System	Cybernetics	(Ashby 1947)
Von Foerster	On Self-Organizing Systems and Their Environments, in: Yovits M.C., Cameron S. (eds.), Self-Organizing Systems	Cybernetics	(H. Von Foerster 2024)
Nicolis and Prigogine	Self-Organization in Nonequilibrium Systems	Thermodynamics	(Prigogine et al. 2000)
Allen	Cities as Self-Organizing Systems	The starting point of discussions on urban self-organization, although addressed intermittently, remains.	(Allen 1998)
Portugali	Self-Organization and the City. Springer, Berlin	Open and complex systems of urban self-organization	(Portugali 2000)
Camazine et al.	Self-Organization in Biological Systems. Princeton University Press, Princeton	Biology	(Sneyd et al. 2001)
Mamei and Zambonelli	Case Studies for Self-Organization in Computer Science	Computer Science	(Mamei et al. 2006)
Horelli et al.	When Self-Organization Intersects with Urban Planning: Two Cases from Helsinki	Marks the renewed attention to urban self-organization studies.	(Horelli et al. 2015)
Dayong et al.	A Survey of Self-Organization Mechanisms in Multiagent Systems	Mathematics	(Ye et al. 2017)
Rauws et al.	Framework Rules for Self-Organizing Cities: Introduction	Represents the peak of research efforts concerning the definition of urban self-organization in developed countries.	(Rauws et al. 2020)
Suhartini and Jones	Better Understanding Self-Organizing Cities	Urban Planning	(Suhartini and Jones 2020)
Boonstra and Rauws	Ontological Diversity in Urban Self-Organization: Complexity, Critical Realism and Post-Structuralism	Urban Planning	(Beitske Boonstra and Rauws 2021)
Suhartini and Jones	Inquiring into Self-Organization and the Self-Organized City	Urban Planning	(Suhartini and Jones 2023)

3. METHOD

This article uses a meta-analysis approach and the PRISMA protocol to review articles published on scientific websites. Meta-analysis is a tool for integrating the results of scattered research, systematically reviewing a set of studies, and achieving a new perspective to expand scientific boundaries. Google Scholar and Scopus were used to identify

and explain the theoretical and paradigmatic concept of urban self-organization. Phrases and keywords were searched between 1944 and 2024. Despite the significant use of the concept of self-organization across various sciences, it was used in only two articles in the field of cities and urban planning between 1944 and 2000, and in 202 articles between 2000 and 2024, indicating a growing literature on this

concept. Initially, abstracts of articles that focused on the theoretical dimensions of the research topic were selected (54 articles), and after reviewing and screening the studies, the results were reduced to 27

articles. Figure 1 shows the research process, which includes four main stages: identification, screening, eligibility review, and final entry of articles.

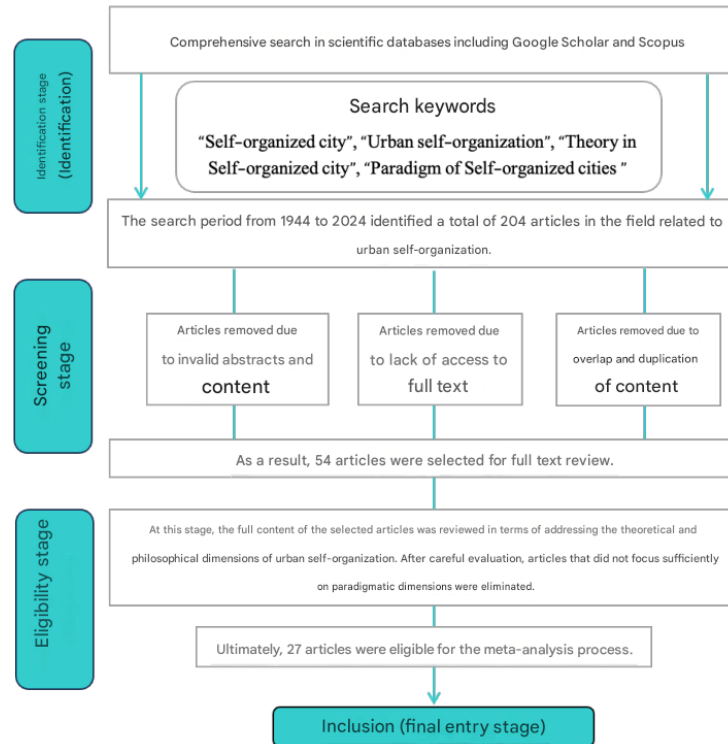


Fig. 1. Research Process Based on the PRISMA Protocol

Table 2 presents the 27 final selected articles, organized by the PRISMA protocol stages. For each source, the methodological approach, self-organization theory, extracted key concepts, governing philosophical paradigm, and its application in explaining city-organization have been identified. Based on the analysis of the 27 articles, three theories—Dissipative Structure Theory, Synergetics Theory, and Autopoietic

Theory—were identified as the principal theoretical foundations of self-organization. At the philosophical level, the two paradigms of Critical Realism and Post-Structuralism play a central role in explaining urban self-organization. This combination constitutes the basis for the final selection of the city-organization paradigm adopted in the present study.

Table 2. Final Articles Selected Based on the PRISMA Protocol and the Paradigmatic Framework of Urban Self-Organization

Author / Year	Article Title	Scientific Field	Self-Organization Theory	Urban Planning Paradigm
Ashby (1947)	Principles of the Self-Organizing Dynamic System	Cybernetics	Dissipative Structure	Critical Realism
Von Foerster (1960)	On Self-Organizing Systems and Their Environments	Systems Theory	Dissipative Structure	Critical Realism
Prigogine & Nicolis (1977)	Self-Organization in Nonequilibrium Systems	Thermodynamics	Dissipative Structure	Critical Realism
Allen (1998)	Cities as Self-Organizing Systems	Urban Studies	Synergetics	Critical Realism
Portugali (2000)	Self-Organization and the City	Urban Studies	Synergetics	Critical Realism
Camazine et al. (2001)	Self-Organization in Biological Systems	Biology	Dissipative Structure	—

Author / Year	Article Title	Scientific Field	Self-Organization Theory	Urban Planning Paradigm
Haken (1980)	Synergetics: An Introduction	Theoretical Physics	Synergetics	—
Maturana & Varela (1973)	Autopoiesis and Cognition	Biology / Systems Theory	Autopoietic	Post-Structuralism
Luhmann (1986)	Social Systems	Sociology	Autopoietic	Post-Structuralism
Heylighen (1999)	The Science of Self-Organization	Systems Theory	Synergetics	Critical Realism
Batty (2005)	Cities and Complexity	Urban Studies	Synergetics	Critical Realism
Barros & Sobreira (2008)	Urban Informality and Self-Organization	Social Urban Studies	Autopoietic	Post-Structuralism
Cilliers (2002)	Complexity and Poststructuralism	Philosophy	Autopoietic	Post-Structuralism
Roo (2016)	Planning in the Face of Complexity	Urban Planning	Synergetics	Critical Realism
Boonstra & Boelens (2011)	Self-Organization in Urban Development	Participatory Urbanism	Autopoietic	Post-Structuralism
Bettencourt (2013)	The Science of Cities	Urban Theory	Synergetics	Critical Realism
Moroni & Cozzolino (2019)	Complexity and Spatial Planning	Spatial Planning	Dissipative Structure	Critical Realism
Boonstra & Rauws (2021)	Ontological Diversity in Urban Self-Organization	Planning Philosophy	Autopoietic	Post-Structuralism
Horelli et al. (2015)	When Self-Organization Intersects with Urban Planning	Participatory Urbanism	Autopoietic	Post-Structuralism
Ye et al. (2017)	Mechanisms in Multiagent Systems	Computer Science	Synergetics	—
Suhartini & Jones (2020)	Better Understanding Self-Organizing Cities	Urban Planning	Synergetics	Critical Realism
Suhartini & Jones (2023)	Inquiring into Self-Organization and the Self-Organized City	Adaptive Urbanism	Autopoietic	Post-Structuralism
Thrift (1999)	Spatial Formations and Complexity	Geography	Dissipative Structure	Critical Realism
Urry (2007)	Mobilities and Complex Systems	Sociology of Space	Synergetics	Post-Structuralism
DeLanda (2019)	Assemblage Theory and Cities	Contemporary Philosophy	Autopoietic	Post-Structuralism
Bruijn et al. (2018)	Complex Adaptive Systems in Planning	Complexity Planning	Synergetics	Critical Realism
Rauws, Cozzolino & Moroni (2020)	Framework Rules for Self-Organizing Cities	Adaptive Urbanism	Synergetics	Critical Realism

4. THEORETICAL FOUNDATIONS

In the theoretical foundations section of the study, based on the screened articles, the concepts of self-organization and city-organization are first introduced. Subsequently, the main focus of the research—the theories of urban self-organization and the principal paradigms associated with them—is discussed.

4.1. The Concept of Self-Organization

According to the Longman Dictionary, “organization” is defined as the arrangement or planning of components to form an effective whole. Similarly, the literal meaning of “self-organization” refers

to an arrangement created by the components of a system itself. However, when used specifically as a mechanism by which a complex adaptive system generates order from chaos, the meaning of self-organization extends beyond this literal interpretation. In this context, self-organization refers to a nonlinear process in which new structures, patterns, or forms of organization emerge spontaneously from interactions among elements, components, agents, or actors that are not externally controlled, coordinated, or regulated (Heylighen 1999; Prigogine and Nicolis 1977). Phenomena of self-organization in physics, such as the Bénard experiment, clearly demonstrate how

environmental changes (e.g., increasing temperature) can transform the chaotic movement of molecules into regular hexagonal patterns (Hidayanti 2013). Nevertheless, physical and chemical systems are relatively simpler than social systems because their elements are homogeneous. According to Portugali (2000), social systems are “dual complex systems” because they are composed of human agents with diverse interests, beliefs, and values, each of whom is, in itself, a complex system. This multiplicity makes the resulting structures in social systems considerably more complex and less predictable (Heylighen 2008, 1215-1224).

The process of self-organization is the system's response to environmental changes, enabling it to achieve a new level of stability. This phenomenon operates through two feedback mechanisms: “positive feedback”, which by amplifying disturbances is the main source of growth and structural change, and “negative feedback”, which by reducing the effects of disturbances maintains the stability of the system. The simultaneous interaction of these two feedbacks puts the system on a dynamic, nonlinear, and uncontrollable path (Cleveland 2009). Ultimately, self-organization means the spontaneous emergence of a global structure from local interactions (Heylighen 2016). The word “spontaneous” emphasizes that the created order is not the product of external forces; rather, external forces merely initiate an internal and autonomous process by which the system spontaneously organizes itself (Portugali 2000). Thus, in general, self-organization is defined as the spontaneous emergence of order from disorder (Cilliers 2002; Prigogine et al. 2000), which, due to the rich interactions between the elements within a system and the system environment, self-organization processes lead to the emergence of new systemic states from within the system itself. Thus, self-organization is a spontaneous, autonomous, and local process (Heylighen 2002).

4.2. Self-Organization and Urban Planning

Urban planning faces greater challenges due to the increasing complexity of the problems it seeks to solve. One of the challenges and at the same time the solution is self-organization, which takes place at the micro level and affects urban development at the macro level. Self-organization in urban areas is considered a challenge when it has a negative impact on urban development due to its separation from the formal urban planning system; for example, when it creates an unwanted image of the city (such as a slum area). However, even in a poor area, self-organization still contributes to addressing the housing shortage for citizens (Barros and Sobreira 2008). Understanding the concept of self-organization in a positive sense can serve as an alternative to solving urban problems. In the city, self-organization can be observed in the short term, such as in daily activities, as well as in the

long term, as the city grows and evolves. In everyday activities, self-organization occurs when a group of people try to cross a street without a traffic light or when they organize themselves to go to an event in the city center. In the long term, self-organization can be seen in the emergence of spontaneous settlements in most developing countries (Hidayanti 2013).

The beginning of the 21st century is considered a turning point in human civilization, as for the first time, more than 50% of the world's population lives in urban areas (UN 2010). This massive urbanization has made urban planning a vital tool to meet the needs of billions of inhabitants. However, the nature of urban issues is constantly changing, and current approaches are the result of an evolutionary process that can only be analyzed by understanding its historical development. In this context, the concept of “self-organization” as the spontaneous emergence of macrostructures, independent of external forces, gains special importance. This means that complex urban systems, in the context of dynamic relationships with the environment and internal interactions among elements, can create new structures without centralized guidance. Such systems exhibit features such as nonlinearity, instability, and fractal structures that are linked to the lived experience and public sense of urbanization at the end of the twentieth century (Bates and Maack 2016). Furthermore, self-organization in planning is tied to processes of learning and innovation, and requires the use of communicative approaches to encourage collective learning. Boonstra and Bolens (2012) make a clear distinction between “participatory planning” and “self-organization”; participatory planning is a state-driven process with predetermined goals and frameworks, while self-organization involves initiatives for spatial interventions that take shape within civil society and through autonomous social networks of citizens, outside the direct control of the state. In many urban areas, local participation already exists and helps to shape the face of the city (Boonstra and Boelens 2011). In developing countries, self-organization is more prevalent due to limited government budgets and the need to plan and develop every corner of the city. But in fact, self-organization can also take on a positive sense. In this sense, self-organization may be seen as a solution to complex urban problems, alongside formal planning.

4.3. City-Organization

The rapid growth of urbanization in recent decades and the increasing complexity of social, economic, and environmental relations have led cities to be recognized as complex adaptive systems. Due to their dynamic nature and dependence on interactions among multiple elements, these systems cannot be easily managed and, if they lack organization, can fall into chaos and crisis (Batty 2012). In such circumstances, moving towards an “organized city” is considered a

fundamental necessity to balance today's needs and future capacities. One of the fundamental reasons for moving towards an organized city is to create spatial justice and equal access to urban facilities and services. In unorganized cities, spatial and social gaps lead to the spread of marginalization, poverty, and inequality. In contrast, an organized city seeks to provide an orderly, fair structure for the distribution of urban resources so that all citizens have equal opportunities to benefit from public services. On the other hand, today's cities are vulnerable to new threats such as climate change, energy crisis, and natural hazards. By organizing in the fields of land use and resource management, and by designing sustainable transportation systems, the urban city can increase urban resilience and sustainability. Such an approach not only provides the opportunity to deal with short-term crises but also strengthens the capacity to adapt to long-term developments. In addition to the physical and environmental dimensions, the social aspect of the urban city is also important. Cities that lack organization often suffer from weak social cohesion and a crisis of urban identity. Meanwhile, the urban city, by leveraging a suitable spatial pattern and urban design, strengthens citizens' sense of belonging, promotes social security, and reproduces cultural identity. At the governance level, the urban city also acts as a platform for participatory and transparent management. Lack of institutional organization in cities often leads to conflicts of interest and reduced public trust.

Urban planning is mainly about the government or official institutions determining the path of urban development by formulating comprehensive, detailed plans and strategic documents. This approach is based on a rational-instrumental logic and assumes that the future of the city is largely predictable and controllable (UN-Habitat 2022). In contrast, "urban planning" is based on the understanding of the city as a complex adaptive system whose order and dynamics are created by spontaneous interactions between multiple actors, including citizens, social groups, the market, and even the environment (Batty 2005). Therefore, instead of emphasizing control and discipline, attention is paid to learning mechanisms, flexibility, and resilience to social, economic, and environmental changes (Bettencourt 2013). Accordingly, one of the most important criticisms of traditional urban planning is its inability to adapt to dynamic urban conditions. Alexander (1965), in his study entitled "The City is Not a Tree," showed that rigid plans do not reflect a reductionist understanding of the multilayered, overlapping reality of the city. On the contrary, self-organizing models view the city as a "living network" composed of overlapping layers and continuous interactions. Global experiences have also shifted from purely centralized approaches to hybrid, networked models. This development is, in fact, an attempt to bridge the logic of "urban planning"

and the reality of "self-organization," so that urban policymaking serves as a platform for its constructive empowerment and guidance. Accordingly, urban planning represents the "logic of control and prediction", while urban planning is based on the "logic of adaptation, learning and projection". Many contemporary theorists believe that the future of urban management lies in the convergence of the two; this means that public policies provide the necessary frameworks and infrastructures, but the real life of the city continues in the actions and self-organizing networks of residents and local institutions (Batty 2005; Portugali 2000).

4.4. Schools of Thought in Urban Self-Organization

Urban studies scholars and planning researchers regard self-organization as a useful concept for understanding the fundamental mechanisms underlying urban dynamics and spatial transformations (Batty 2012; Allen 1998; Portugali 2000). It has been applied to phenomena such as informal settlements and unplanned urban development (Barros and Sobreira, 2008), the spontaneous emergence of traffic patterns (Kerner 1998), pedestrian movement (Helbing et al. 2001), and the emergence of civic initiatives in spatial development (Boonstra and Rauws 2016).

The understanding and application of self-organization are far from uniform. At least two schools of thought can be distinguished, broadly corresponding to the hard/natural sciences and the soft/social sciences. Originally, self-organization was more clearly defined within the hard and natural sciences (Zhang et al. 2015).

Several theories of self-organization have influenced planners' views of the urban area: Ilya Prigogine's Dissipative Structures, Hermann Haken's Synergetics, and Humberto Maturana's Autopoietic (later translated into the social sciences by Nicolaus Luhmann). These three theories share the same philosophical concept of self-organization with different emphases, which we will define below.

Dissipative Structure Theory

The modern understanding of self-organization is rooted in the concept of dissipative structures, introduced by Ilya Prigogine in 1977. This concept essentially refers to the outcome or product of the self-organizing process within a system (Meerkerk et al. 2012). Through his study of thermodynamic phenomena such as Bénard cells, Prigogine demonstrated that certain systems continuously generate entropy while simultaneously increasing their internal order by actively exporting entropy to their external environment (Heylighen 1999). In an open system operating under constant fluctuations, responses to external disturbances may take the form of either negative or positive feedback. Through negative feedback, the system neutralizes

disturbances and preserves its existing structure. Through positive feedback, however, disturbances become powerful enough to force changes within the system. At the critical moment known as a bifurcation point, the future trajectory of the system becomes unpredictable. The system may either collapse into disorder or undergo an evolutionary leap to a higher level of organization, resulting in the formation of a dissipative structure (Prigogine et al. 2000).

In short, the creation of order in this theory requires two vital principles: first, the “openness of the system,” which allows for the continuous exchange of energy and matter with the environment; and second, being in a “far-from-equilibrium state.” In this state, the system becomes sensitive to the smallest changes. It exhibits nonlinear behavior, so that a small change in the components can lead to a large-scale transformation of the entire structure.

Synergetics Theory

Hermann Haken’s experiment on laser light provides one of the most precise scientific explanations of self-organizing phenomena. In this experiment, atoms in a gas-discharge lamp initially move erratically when an electric current is applied, but as the current intensity exceeds a threshold, they suddenly oscillate coherently and emit laser light. Haken explains this development through the “slavery principle”: after competition between different waves, the wave with the greatest stability wins and dominates the process. This dominant wave becomes the “order parameter” and coordinates the behavior of all atoms. The theory of “synergy” refers to the joint action of multiple subsystems to create structure and function on a macroscale (Haken 1980; 1983; 1978).

In this framework, the internal interactions of elements lead to the emergence of an order that, in turn, “enslaves” the elements to a coherent function. Haken calls this reciprocal and cyclical relationship between the order parameter and the subordinate elements “circular causality” (Hidayanti 2013). From this theory, the fundamental characteristics of self-organizing systems can be extracted. First, self-organization is a direct product of the interactions and linkages among the system’s elements. Second, these interactions are guided by the order parameter, thereby minimizing internal conflicts and maximizing synergies. Finally, the system must be “open” to its environment so that, through energy exchange, the necessary control parameters for the transition to a new order are provided. This approach shows how the cooperation of the elements leads to intelligent order in the entire system without direct external guidance.

Autopoiesis Theory

The concept of “autopoiesis”, introduced by Maturana and Varela in 1973, offers a different approach to self-organization that emphasizes processes of “self-generation” and identity maintenance rather than structural change. Accordingly, an autopoietic system is any system that recursively reproduces its

components and regulates the renewal process so that its overall structure is maintained. In fact, the interactions among the system’s elements lead to the production of new elements, without the need for direct external influences (Varela 1981; Cleveland 2009).

One of the key features of these systems is “operational dependence”. This term does not mean that the system is isolated, but rather that its internal operations are produced solely by the system itself and that no external agent can directly enter this process (Seidl 2004). In a social context, this concept is interpreted as a chain of decisions and connections, in which each decision is related to the previous one and provides the basis for subsequent decisions, indicating an internal “learning” process. Ultimately, the whole society is maintained through the continuous reproduction of these connections and organizations. In the field of urban planning, autopoiesis is understood as an internal tendency to establish the identity and self-preservation of social systems (Boonstra and Rauws 2016; Meerkerk, Boonstra, and Edelen-Bos 2012). In short, autopoietic systems emphasize the reproduction of components to maintain the stability of the structure, and they accomplish this process through the internal activities of their elements. In human societies, this phenomenon is most closely linked to the reproduction of communication and learning-based decision-making, which allows the system to redefine and maintain its autonomous identity over time dynamically.

4.5. Theoretical Framework of Urban Self-Organization

Urban self-organization refers to transformations that emerge from decentralized, coordinated, local, and place-based interactions among large numbers of agents or elements. It is a spontaneous process, as agents—while acting intentionally upon their environment—are largely unaware of the broader effects of their actions and interactions. However, the understanding of self-organization in urban studies and planning theory is far from unified, often fragmented, divergent, and even contradictory (Bruijn et al. 2018; Moroni and Cozzolino 2019).

The philosophical dimensions of complexity theories are highly diverse and include postpositivism, relativism, incrementalism, pragmatism, hermeneutics and hermeneuticism, critical realism, and poststructuralism (Boonstra and Rauws 2021). This article focuses on poststructuralist and critical realist ontologies for two reasons: first, because poststructuralism and critical realism welcome complexity thinking. Both explicitly acknowledge globalization and its role in shaping evolutionary trajectories as crucial elements of complexity thinking. Furthermore, both critical realism and poststructuralism not only problematize the object-subject distinction, but also consider how normativity

and subjectivity are inherent to making sense of a complex world. Second, both critical realism and

poststructuralism are prominent in contemporary planning research on cities (Table 3).

Table 3. Key Concepts in Urban Self-Organization in Relation to Critical Realism and Post-Structuralism

Ontology	Critical Realism	Post-Structuralism
Definition	An independent reality exists, but it can only be studied indirectly. Explanations of reality are multiple, probabilistic, and partial.	Reality is non-independent; explanations focus on constructed and transformed representations and assemblages.
Research aim	To develop a probabilistic understanding of how generative mechanisms and enabling/constraining conditions produce empirical manifestations.	To deconstruct processes of becoming to understand constructed representations.
Theoretical view	Complex adaptive systems theory	Assemblage theory; Actor–network theory

Thus, different interpretations are grounded in two distinct epistemological positions: one is a critical realist interpretation (Byrne 2003) that leads to model-focused, directive planning (Portugali 2011). The other involves a poststructuralist interpretation of ongoing sets (Cilliers 2002; DeLanda 2019), leading to the emergence of person- and behavior-focused planning (Boonstra and Rauws 2016).

Critical-Realist Epistemic Tradition

The first ontology behind the specific understanding and application of self-organization is critical realism. Critical realism accepts the idea that reality has an objective existence outside of human construction and cognition. However, critical realists also assume that knowledge of reality is not directly available to us but is produced by identifiable actors in the social world (Urry 2007). Theories of complex adaptive systems provide a critical realist perspective on self-organization. Complex adaptive systems (CAS) theories have developed in the hard sciences such as physics, chemistry, and mathematics, which traditionally embrace a positivist perspective. Hence, the “self” of self-organization refers to the emergence of “unplanned” organization “by itself” or “by itself” (Boonstra and Rauws 2016; Heylighen 2009).

Complex adaptive systems are understood as open systems that are sensitive to environmental changes and evolve through feedback between subsystems and suprasystems. Consequently, these systems are dynamic due to continuous adaptation, resulting in nonlinear developmental trajectories (Heylighen 2002).

A critical-realist perspective on self-organization in cities and planning

According to Portugali (2000), the city is the product of the interaction of individual motivations of actors and spatial developments resulting from collective actions. These self-organizing processes manifest themselves in morphological patterns, physical growth, and the emergence of socio-spatial groups. In complex adaptive systems, physical (infrastructure) and social (networks of actors) aspects are viewed as integral parts of the real world (Portugali 2012). Using this theory and a critical realist perspective,

researchers analyze the development of neighborhoods and the emergence of urban forms (Thrift 1999). In the meantime, feedback loops are formed by citizens and professional planners. Planners try to bring reality and design closer together by recognizing emerging patterns and intervening when processes are going in an undesirable direction. In fact, planning means guiding self-organizing processes towards desirable social outcomes through changing environmental conditions and understanding underlying structures (Boonstra and Rauws 2016). This approach moves urban management from direct control towards “management of emergent conditions”.

Post-Structuralist Epistemic Tradition

Poststructuralism, as the second influential ontology, sees self-organization as a process of emergence of the “relational self.” In this view, contrary to the traditional notion, identities are not static entities but are formed over time and within a network of relationships and meanings. According to Deleuze and Lyotard, the “self” is never independent and changes unpredictably in response to interactions. The “network-actor” theory, with a poststructuralist approach, explains this continuous evolution well because it sees the system not as a static entity but as a constantly running, mutually influencing process (Cilliers 2002; Urry 2007).

Post-Structuralist Perspective on Self-Organization in Cities and Planning

From a post-structuralist perspective, spatial planning and governance are considered representational practices. Self-organizing actors are actively involved in producing representations and transforming them into new forms. Since actor–network theory includes both human and non-human elements, it considers not only individuals but also material and institutional components involved in planning processes, such as sites, architecture, planning documents, procedures, legal frameworks, and other contextual settings. Spatial planning itself can therefore be understood as a networking process in which heterogeneous entities interact to enable specific functions (Boonstra and Boelens 2011).

The perspective of self-organization as emergent networks of actors for spatial initiatives opens up the understanding of different networks being planned simultaneously. This poststructuralist perspective on self-organization can be used to explain the ongoing challenges to meaning-making, identity, and the reading of space, and to prioritize the aspects that should be prioritized. In fact, the focus is on the transformations and identification of actor networks and the pathways through which different actors shape relational space and relational selves (Innes and Booher 1999).

5. FINDINGS

Emphasizing only the ontological differences of these two approaches ignores their complementary aspects in urban transformations. Despite their fundamental differences, combining the strengths of these two perspectives in spatial planning and governance provides a comprehensive understanding of complex urban processes. Rather than opposing them, they should be seen as “mirrors” of each other and complementary; this convergence allows planners to constructively confront fluid realities and networks of actors while recognizing macrostructures. It is redundant to claim incompatibility between the critical-realist and poststructuralist understandings of complexity. Although there are mutual accusations between the two ontologies—including the accusation of poststructuralism of absolute instability and the accusation of realism of “ostentatious arrogance” and neglect of the role of the observer in the scientific event—a deeper examination reveals strategic overlaps. These two positions are not necessarily opposed, but can bridge the “natural-nonhuman” and “social-human” worlds beyond positivist logic. In fact, this convergence provides a space for reconciling “stability and dynamism” and “planning and emergent conditions.” Rather than hiding reality behind rigid or abstract explanations, the combination of these two perspectives enables planners to recognize the unforeseen potential and momentary changes in urban networks while embracing sustainable infrastructure. This integrated approach opens a window to a more comprehensive understanding of the complex life of the city, in which order and chaos interact constructively.

5.1. Converting Divergent Pathways into Integration

The critical realist perspective on self-organization provides a powerful tool for understanding the evolutionary trajectory of urban systems and their configurational changes. In this approach, planners focus on the spontaneous emergence of macro-level patterns that arise from local, disjointed interactions, as well as the conditions that enable or constrain

these processes. In effect, this perspective focuses on the “bigger picture” or system level. However, focusing solely on spatial patterns and forms creates a blind spot regarding actors’ intrinsic motivations and actual behaviors. In this view, although the importance of local interactions is acknowledged, the “actual act” of development is often overlooked, creating a gap between planners and current realities that fosters a dichotomy between “planned” and “unplanned.” This is where poststructuralism comes in as a vital complement. This perspective focuses on the perceptions, connections, and relationships of individual actors, how “networks of actors” are formed, and how interactions between actors lead to the creation of dominant readings of reality. Unlike realism, which focuses on spatial consequences, poststructuralism emphasizes how processes are performed and acted upon.

The combination of these two ontologies enables researchers to understand the complexities of urban self-organization better. This link not only bridges the gap between individual motivations and structural consequences but also provides planners with a broader set of practical perspectives to more effectively engage with emergent and unpredictable urban processes. This integration paves the way for intelligent planning that is simultaneously faithful to the “system structure” and the “actor dynamics.” The combination of critical realism and poststructuralism provides planners with a comprehensive and multi-stage framework for managing urban transformations. In the first step, critical realism, relying on “pattern recognition,” enables planners to identify early signals and reinforce global trends. This systemic perspective helps to understand emerging socio-spatial patterns and their potential impacts on the area of interest.

In a second step, combining this paradigm with a poststructuralist approach enables planners to identify emerging coalitions of actors forming along these patterns. This leads to a precise mapping of the adaptations or incompatibilities in the representations that actors produce in the development process. In this way, planners can respond to developments by “planning the conditions” and establishing regulations that enhance positive effects and moderate negative consequences. At this level, the planner is no longer an external observer but an active agent within the region, influencing processes. Ultimately, this integration shows how an emerging paradigm itself becomes an “actor” with a collective identity and plays a role in actor networks. This dual perspective reinforces the process of “continuous adaptation” and shows that self-organization and planning regulations are twin and intertwined phenomena. In such a context, the development of monitoring activities, continuous evaluation, and organizational learning to address the dynamic complexities of urban life becomes a fundamental necessity.

6. SUMMARY AND CONCLUSION

A comparison of the two dominant paradigms for explaining urban self-organization, namely critical realism and post-structuralism, shows that each approach focuses on a distinct aspect of the urban order-finding process. The critical realist approach considers self-organization as a phenomenon dependent on structural mechanisms and known contexts and emphasizes the relative identification and guidance of patterns. In contrast, the post-structuralist approach focuses on fluidity, emergence, and the formation of meaning in everyday actions. It considers self-organization to be the result of dynamic interactions between actors and local networks. As a result, a comprehensive understanding of urban self-organization processes requires a link between the two levels of “structural conditions” and “emergent action.” Consequently, the role of urban planning shifts away from prescriptive, hierarchical approaches toward facilitative, learner-oriented, and participatory planning. In this new paradigm, the planner acts not as an external observer or rigid controller, but as a companion and enhancer of the self-organizing capacities of the local community. This synergy, by simultaneously recognizing the systemic patterns and micro-motivations of the actors, provides a flexible platform for neighborhoods to adapt and be resilient in the face of rapid urban change.

This study aims to deeply explore the concept of self-organization in the urban context, first explaining the three main theoretical pillars of this field. First, the theory of “dissipative structures” is proposed, which focuses on the system’s external orientation; it explains how the neighborhood achieves new dynamic states through interaction with the outside world and under the influence of environmental flows. In the next step, the “synergistic theory,” with its emphasis on internal orientation, analyzes the mutual relations and interactions among members of the local community, which lead to the system’s overall behavior. Finally, the concept of “autopoiesis” is introduced to explain the internal reproduction of actors, ideas, and decisions that establish identity and maintain the system’s structure. In the second part, the article deals with the confrontation and evolution of two key ontologies: critical realism and poststructuralism. Critical realism, with a systemic and “bigger picture” perspective, studies urban transformations through the formation of

patterns and multi-layered causal mechanisms. This approach aims to identify conditions that can be regulated to influence self-organization. In contrast, poststructuralism focuses on individual actions, descriptions of ongoing processes, and the agency of actors. Rather than regulating structural conditions, this perspective seeks to encourage and inspire actors to influence the network of urban relations. A close examination of these two approaches shows that, despite fundamental differences in the analysis and proposed interventions, their combination is essential to understanding contemporary urban complexities. Critical realism helps the planner recognize macro-patterns, while poststructuralism provides a tool for understanding actors’ perceptions and relations. This ontological diversity is not only a challenge, but also an opportunity for urban planning to move away from centralized control and towards “facilitation and capacity building.” Ultimately, the research concludes that spatial order and sustainability of social life are the products of the simultaneous interaction of three levels: interaction with the environment (expendability), internal coordination (synergy), and identity reproduction (autopoiesis). Urban planning will be effective when it accepts this complexity and combines theoretical perspectives to adapt to emerging processes within the local community. This integrative approach opens a path in which sustainable structures and unforeseen dynamics contribute to the flourishing of the urban environment.

7. DISCUSSION AND FUTURE DIRECTIONS

Combining the two positions of critical realism and poststructuralism enables planners to adapt their ontological preferences according to the situations and challenges they face. This requires that planners and scholars be aware of the differences and complementarities (which the present study provides a framework for enhancing this awareness). However, the combination of poststructuralism and critical realism in planning practice has many implications and is easier said than done. Therefore, it is suggested that future research examine how to combine these two ontologies in practice. By incorporating pragmatism into the combination and diversity of styles and deepening the issue of representation and recognition of patterns,

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REFERENCES

- Allen, Peter M. 1998. Cities as Self-Organising Complex Systems. *The City and Its Sciences*: 95-144. https://doi.org/10.1007/978-3-642-95929-5_2
- Ashby, W. R. 1947. Principles of the self-organizing dynamic system. *Journal of General Psychology* 37(2): 125-128. <https://doi.org/10.1080/00221309.1947.9918144>
- Barros, Joana, and Fabiano Sobreira. 2008. City of Slums: self-organisation across scales. *Unifying Themes in Complex Systems IV*: 265-273. https://doi.org/10.1007/978-3-540-73849-7_30
- Batty, Micrael. 2012. Building a science of cities. *Cities* 29(SUPPL. 1): S9–S16. <https://doi.org/10.1016/J.CIT-IES.2011.11.008>
- Bates, Marcia J., and Maack Mary Niles. 2016. *Encyclopedia of Library and Information Sciences*. Taylor & Francis. Third Edition, 1215–1224. <https://doi.org/10.1081/E-ELIS3-120043869>
- Batty, Micrael. 2005. *Cities and Complexity: Understanding Cities with Cellular Automata, Agent-Based Models, and Fractals*. MIT Press, Cambridge.
- Bettencourt, Luis. 2013. “The kind of problem a city”. Santa fe institute.
- Boonstra, Beitske, and Rauws Ward. 2016. Conceptualizing self-organization in urban planning: turning diverging paths into consistency.
- Boonstra, Beitske, and L. Boelens. 2011. Self-organization in urban development: towards a new perspective on spatial planning. *Urban Research & Practice* 4(2): 99-122. <https://doi.org/10.1080/17535069.2011.579767>
- Boonstra, Beitske, and Rauws Ward. 2021. Ontological diversity in urban self-organization: Complexity, critical realism and post-structuralism. *Planning Theory* 20(4): 303-324. <https://doi.org/10.1177/1473095221992392>
- Brueckner, Seven A., Di Marzo Serugendo, Anthony Giovanna Karageorgos, and Radhika Nagpal. (Eds.). 2005. *Engineering Self-Organising Systems*. 3464. <https://doi.org/10.1007/B136984>
- Bruijn, Ewald De, and Gerrits Lasse. 2018. Epistemic communities in urban self-organization: a systematic review and assessment. *Journals.Sagepub.ComE de Bruijn, L. GerritsJournal of Planning Literature*. <https://doi.org/10.1177/0885412218794083>
- Byrne, David. 2003. Complexity theory and planning theory: A necessary encounter. *Planning Theory* 2(3): 171-178. <https://doi.org/10.1177/147309520323002>
- Cilliers, Paul. 2002. Complexity and Postmodernism. *Complexity and Postmodernism*. <https://doi.org/10.4324/9780203012253>
- Cleveland, John. 2009. Complexity theory: Basic concepts and application to system thinking. *Innovation networks for communities*.
- DeLanda, Manuel. 2019. *A New Philosophy of Society*. Bloomsbury Academic. <https://doi.org/10.5040/9781350096769>
- H. Von Foerster. 2024. On Self-Organizing Systems and Their Environmen. Retrieved February 1. doi:[10.1007/0-387-21722-3_1](https://doi.org/10.1007/0-387-21722-3_1)
- Haken, Hermann. 1983. *Synergetics – An Introduction*. Springer.
- Haken, Hermann. 1978. *Synergetics*. <https://doi.org/10.1007/978-3-642-96469-5>
- Haken, Hermann (Ed.). 1980. *Dynamics of Synergetic Systems*. <https://doi.org/10.1007/978-3-642-67592-8>
- Helbing, Dirk, Peter Molnár, Iiles J. Farkas, and Kai Bolay. 2001. *Self-Organizing Pedestrian Movement*. SAGE PublicationsSage UK: London, England. <https://doi.org/10.1068/B2697>
- Heylighen, Francis. 2008. Complexity and Self-organization, in: M. J. Bates & M. N. Maack (Eds) *Encyclopedia of Library and Information Sciences*, Taylor and Francis: London, pp. 1215-1224.
- Heylighen, Francis. 1999. *The Science of Self-Organization and Adaptivity*. Physics, Computer Science, Mathematics.
- Heylighen, Francis, and Paul Cilliers. 2006. *Complexity and philosophy*. Arxiv.OrgF Heylighen, P Cilliers, C GershensonarXiv Preprint Cs. <https://arxiv.org/abs/cs/0604072>
- Heylighen, Francis. 2002. *The Science of Self-organization and Adaptivity*. EOLSS Publishers Co Ltd. <https://researchportal.vub.be/en/publications/the-science-of-self-organization-and-adaptivity>
- Heylighen, Francis. 2009. *Complexity and Self-organization*. Taylor and Francis. <https://researchportal.vub.be/en/publications/complexity-and-self-organization>
- Hidayanti, M. M. 2013. Self-organization at the neighborhood level: comparison of three case studies in Jakarta, Indonesia.
- Horelli, Lissa, Joanna Saad-Sulonen, Sirkku Wallin, and Andrea Botero. 2015. When Self-Organization Intersects with Urban Planning: Two Cases from Helsinki. *Planning Practice & Research* 30(3): 286-302. <https://doi.org/10.1080/02697459.2015.1052941>

- Innes, Judith. E., and David. E. Booher. 1999. Metropolitan development as a complex system: A new approach to sustainability. *Economic Development Quarterly* 13(2): 141-156. <https://doi.org/10.1177/089124249901300204>
- Kerner, B. S. 1998. *Experimental Features of Self-Organization in Traffic Flow*. Phys Rev Lett, 81.
- Mamei, Marco, Ronaldo Menezes, Robert Tolksdorf, and Franco Zambonelli. 2006. Case studies for self-organization in computer science. *Journal of Systems Architecture* 52(8-9): 443-460. <https://doi.org/10.1016/J.SYS-ARC.2006.02.002>
- Meerkerk, Ingmar v., Beisike Boonstra, and Jurian Edelenbos. 2012. *Self-organization in urban regeneration: A two case comparative research*. European Planning Studies.
- Moroni, Stefano, and Stefano Cozzolino. 2019. Action and the city. Emergence, complexity, planning. *Cities* 90: 42-51. <https://doi.org/10.1016/j.cities.2019.01.039>
- Mousavian, Mohammad Reza. 2001. Principles and Foundations in Architecture and Urban Planning, Azarakhsh. <http://opac.nlai.ir/opac-prod/bibliographic/632614>. [in Persian]
- Mousavinejad, Seyed Vali, and Seyed Hamdollah Akvani. 2013. A New Perspective on Development Theory: Self-Organization of Development (Transition from the Theories of Modernization and Dependence to the Theory of Chaos and Self-Organization). *Conference on the Iranian Islamic Model of Progress*. <https://sid.ir/paper/846183/fa>. [in Persian]
- Nunbogu, Abraham Marshall, and Prospel Issahaku Korah. 2017. Self-organisation in urban spatial planning: evidence from the Greater Accra Metropolitan Area, Ghana. *Urban Research and Practice* 10(4): 423-441. <https://doi.org/10.1080/17535069.2016.1238502>
- Portugali, Juval. 2000. Self-Organization and the City. Springer. <https://doi.org/10.1007/978-3-662-04099-7>
- Portugali, Juval. 2006. Complexity theory as a link between space and place. *Environment and Planning A*. 38(4): 647-664. <https://doi.org/10.1068/A37260>
- Portugali, Juval. 2011. Cognition, Complexity and the City. 113-138. https://doi.org/10.1007/978-3-642-19451-1_6
- Portugali, Juval. 2012. Complexity Theories of Cities: Achievements, Criticism and Potentials (pp. 47-62). Springer. <https://research.tudelft.nl/en/publications/complexity-theories-of-cities-achievements-criticism-and-potential>
- Prigogine, Ilya, and Isabelle Stengers. 2000. Chaos, Complexity, Self-organization and US. 349.
- Prigogine, Ilya, and G. Nicolis. 1977. Self-Organisation in Nonequilibrium Systems: Towards A Dynamics of Complexity. *Bifurcation Analysis*: 3-12. https://doi.org/10.1007/978-94-009-6239-2_1
- Rauws, Ward, Stefano Cozzolino, and Stefano Moroni. 2020. Framework rules for self-organizing cities: Introduction. *Environment and Planning B: Urban Analytics and City Science* 47(2): 195-202. <https://doi.org/10.1177/2399808320905377>
- Roo, Gert De. 2016. Self-organization and Spatial Planning: Foundations, Challenges, Constraints and consequences. 54-97. <https://doi.org/10.17418/B.2016.9789491937279>
- Seidl, David. 2004. *Luhmann's theory of autopoietic social systems*. s.l.:Ludwig-Maximilians-Universitat Munchen.
- Shieh, Esmaeil. 2000. *Introduction to urban planning*. University of Science and Technology Publications. [in Persian]
- Shieh, Esmaeil. 1999. *City and region in Iran*. University of Science and Technology Publications. [in Persian]
- Sneyd, James, Guy Theraula, Eric Bonabeau, and Jean Deneubourg. 2001. Self-organization in biological systems. <https://www.degruyter.com/document/doi/10.1515/9780691212920/html>
- Suhartini, Ninik, and Paul Jones. 2020. Better understanding self-organizing cities: A typology of order and rules in informal settlements. *Journal of Regional and City Planning* 31(3): 237-263. <https://doi.org/10.5614/JPWK.2020.31.3.2>
- Suhartini, Ninik, and Paul Jones. 2023. Inquiring into Self-organization and the Self-organized City. *Urban Book Series*: 1-16. https://doi.org/10.1007/978-3-031-22239-9_1
- Thrift, Nigel. 1999. The Place of Complexity. *Theory, Culture & Society* 16(3): 31-69. <https://doi.org/10.1177/02632769922050610>
- Urry, John. 2007. Global complexities. *Frontiers of Globalization Research: Theoretical and Methodological Approaches*: 151-162. https://doi.org/10.1007/978-0-387-33596-4_6
- UN-Habitat. 2022. "Action Framework for the Implementation of the New Urban Agenda." Nairobi: United Nations.
- Varela, Francisco, 1981. *Autonomy and autopoiesis*. Frankfurt/New York: Campus Verlag.
- Ye, Dayong, Minijie Zhang, and Athanasios Vasilakos. 2017. A survey of self-organization mechanisms in multiagent systems. *IEEE Transactions on Systems, Man, and Cybernetics: Systems* 47(3): 441-461. <https://doi.org/10.1109/TSMC.2015.2504350>

- Zhang, Shuhai, Gert De Roo, and Terry Van Dijk. 2015. Urban Land Changes as the Interaction Between Self-Organization and Institutions. *Planning Practice and Research* 30(2): 160-178. <https://doi.org/10.1080/02697459.2015.1014226>

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