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Original Research Article

Influential Movements on Sustainability Concept at Neighborhood Scale (An Analysis on Theories)*

Hamid Mohebbi¹, Mansoureh Tahbaz^{2**}

1. Ph.D. Candidate in Architecture, Faculty of Architecture and Urban Planning, Shahid Beheshti University, Tehran, Iran.

2. Associate Professor, Architecture Department, Faculty of Architecture and Urban Planning, Shahid Beheshti University, Tehran, Iran.

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Abstract

Problem statement: The concept of sustainability is being increasingly discussed as an important component contributing to building environments. This has grown in importance especially, in neighborhoods as the basic building block of cities and organizer of architectural components. Nevertheless, accurate understanding and knowledge of sustainability are necessary for its implementation and actualization in the real world.

Research objective: This study attempts to provide a better understanding of the contemporary conception of sustainability and lay the groundwork for its progress and evolution

Research method: in this study, the sustainability principles of the movements contributing to the formation of neighborhoods in the last 150 years were analytically investigated using the grounded theory method, and conclusively, common approaches were identified and those aspects, which contribute to the contemporary concept of sustainability were investigated. These movements were namely parks and playground, garden city, neighborhood unit, regional ecological planning, modernism, neo-traditionalism, landscape ecological urbanism, and eco-city; however, the contributory styles were not limited to these, and the authors of this study selected some of them according to their importance, impact range, and limitations of this study.

Conclusion: By investigating the guidelines and principles of influential architecture and urban planning movements on neighborhoods, a tail of interconnected views and thoughts, resulting from different professional fields, can be observed. Each of them is presented as a response to the urban life challenges of their time, and based on their effectiveness, they have consolidated into the concept of sustainability. The contemporary concept of sustainability could be recognized as a flexible and developed phenomenon resulting from the contribution of past movements and the outcome of their successful experiences. In the present study, sustainable management is also introduced as the prevailing movement of the last decade which contributes to the development and formation of neighborhoods while conforming to the movements with greater emphasis on the planning approach.

Keywords: *Neighborhood Sustainability, Neighborhood Sustainability Movements, Neighborhood Sustainability Criteria.*

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Dr. Niloufar Razavi and advisement of Dr. Sahar Nedaei Tousi at the Faculty of Architecture and Urban Planning, Shahid Beheshti University, Tehran, Iran.
 **Corresponding Author: M-tahbaz@sbu.ac.ir; +989123114023

Introduction

One of the solutions put forward to the world's contemporary challenges such as climate change, and loss of natural resources is the attempt for the creation of a sustainable environment since one of the main concerns of sustainability is how to save the humans on earth; that is, how should the relationship between humans and the environment be arranged so that the survivor of the human race would be guaranteed. Trying to implement sustainability, the greatest challenge is the shallow and depreciating understanding of this concept, which practically leads to inverse consequences in the way to create sustainable environments. Therefore, to achieve a sustainable environment, it is necessary above all to obtain an understanding of the concept of sustainability. The definitions of sustainable neighborhood proposed in recent years, generally, constitute a set of characteristics such as the area of green space, efficient public transportation, mixed land-use, preservation of natural resources, and public participation; and the spaces possessing these characteristics are considered to be sustainable. Such neighborhood sustainability assessment systems as LEED-ND and BREEAM apply this type of conception. On the other hand, with a regard to urban growth, the practice of sustainability concepts has risen in importance at the neighborhood scale more than before, since, many aspects of sustainability such as social and economic sustainability will be discarded at the small building scale. This study attempts to answer the question what is the relation between the main guidelines of past architecture-urban planning movements and the contemporary concept of sustainability; and what would be the perspective of its development. Therefore, adopting a qualitative approach and a grounded theory method, this research investigates sustainability in the theoretical movements contributing to neighborhood design to explain the concept of sustainability at the neighborhood scale. It should be noted that although there are

many movements, this study is not meant to be a comprehensive literature review of sustainability, and only the most influential movements are studied. The movements are also named based on past references such as Rohe (2009) and Wheeler (2013) except for sustainability management that is proposed by the authors.

Research questions

This research seeks to answer the following questions:

- What is the relationship between the main guidelines of the movements contributing to neighborhoods' formation and the contemporary concept of sustainability?
- What are the common points of neighborhood sustainability contributory movements?
- What were the results of these movements regarding their goals and values?
- Which movement does contribute to the sustainability of neighborhoods in our age?

Literature review

Neighborhood sustainability is relatively a new discipline, and most of the studies related to this area are conducted in the second decade of the 21st century after the popularization of holistic views in sustainability because the holistic and integrated sustainability could be implemented to a better extent at the neighborhood scale relative to the building scale due to the possibility of participation of social and economic components. However, many of the famous neighborhood sustainability theories could even be traced back to the time before the emergence of sustainability discourses. Lewis Mumford (1927, 1954) was among the first ones who investigated the main theories of neighborhood design. Miles (2007) and Fishman (1982) investigated the idealistic views on this subject in separate books titled utopias. Furthermore, some researchers such as Silver, Basiago, Gillette Jr, Rohe, and Sharifi (Basiago, 1996; Gillette Jr, 1983; Rohe, 2009; Sharifi, 2016;

Silver, 1985) have mentioned the neighborhood contributory movements chronologically in a classified form, however, a social approach is evident in their investigation of movements. On the other hand, Daniels (2009) and Wheeler (2013) have adopted a mostly environmental approach. In addition to the above-mentioned studies, many researchers including the main theoreticians of movements have tried to investigate a single movement or analyze its relationship with other subjects. For instance, Caprotti (2014, 2015) have studied the eco-city theory; Mumford (1954) and Perry (1929), the neighborhood unit; Wu (2008, 2013, 2014, 2019), Urban Ecology. The following table presents some of these resources (Table 1). It is noteworthy that investigating neighborhood sustainability, most of the past studies have applied a reductive and selective attitude; though, this study incorporates the contributory movements regarding architecture, landscape architecture, and urban planning, thus, articulating a more comprehensive view of the subject. Furthermore, since the anthropocentric views are more emphasized in past studies, this research attempts to incorporate some eco-centric movements to maintain a neutral position. this study also opens a new way by detecting and introducing the sustainability management movement.

Methodology

This is a qualitative study conducted by applying the grounded theory method and content analysis of data collected from such databases as Google Scholar, ProQuest, and Science Direct. In the first step, the keywords of “neighborhood sustainability” and “neighborhood movements” were searched for in the Google Scholar database, and the title and abstract of the first 300 data were investigated, and regarding our research goals, 36 papers were chosen and studied, according to which a primary list of contributory movements was created (Fig. 1). Due to research limitations, the movements and styles were filtered and chosen based on criteria 1. Geographical impact range, 2. Impact on subsequent movements and 3. Encompassing smaller movements. For instance, the eco-city style encompasses or represents a range of similar movements.¹ Some of the movements introduced in this paper concern a greater scale but they considerably affect the formation of neighborhoods, for example, although the ecological Urbanism movement contributes at the urban scale, it affects the approach to neighborhood sustainability because of its problem-oriented approach and expansion of the urban ecosystem theory at different scales. Aiming at finding the papers related to our research goals, further, the keywords

Table 1. Most important neighborhood sustainability movements and their prominent theoreticians. Source: Authors.

Movement	Key Roles	Since	References
Parks and Playgrounds	Fredrick L. Olmsted	The 1890s	(Mc Arthur,1975)
Garden Cities	Ebenezer Howard	The 1900s	(Howard, 1902)
Neighborhood Unit	Clarence Perry	The 1920s	(Mumford 1954; Perry 1929)
Regional Ecological Planning	Lewis Mumford, Benetton Mckay, Ian McHarg	The 1920s The 1960s	(Daniels 2009; Wheeler, 2013)
Modernism	Frank Loyd Wright, Le Corbusier	The 1930s	(Fishman 1982)
Traditional Neighborhood Development	Andres Duany, Elizabeth Plater-Zyberg	The 1980s	(Rohe, 2009; Duany, 1992)
Transit-oriented Development	Peter Calthorpe	The 1990s	(Calthorpe,1993)
Landscape Ecological development	Charles Waldheim, James Corner, Mohsen Mostafavi	The 1990s	(Waldheim 2012; Mostafavi, 2010)
Ecocities	Richard Register	The 1990s	(Register, 2006; Sharifi 2016)

of theoretical movements found in the first search results were used to search the databases of ProQuest, Science Direct, and Google Scholar. There were 860 results found. By culling the common results and investigating the abstracts, the studies that were not in conformity with the research questions were removed, and some papers and books listed in the selected data sources were also added to the study. Finally, up to 260 papers and books fulfilling the conditions of this research were recognized; however, only some of the selected sources were referred to because of the research limitations. These papers were studied and scrutinized, and the key parts concerning this paper were applied after being extracted by the content analysis method.

A review of the movements contributing to the formation of neighborhoods

• Parks and playground movement

The formation of working-class neighborhoods was a consequence of the genesis of industrial cities. Low-income residents, grid structure, dense buildings, and lack of public and open spaces were the main characteristics of these neighborhoods. Therefore, urban reformers tried to promote the creation of parks and playgrounds in the second half of the 19th century so that the people of all classes and especially, children would be provided with recreation facilities (Fig. 2) in addition to the improvement of public health and social behavior (Daniels, 2009, 180, McArthur, 1975). Although there existed some open spaces in neighborhoods at that time, they were not considered public spaces (Benton-Short & Short, 2008, 58). The parks and playground movement was first, introduced as a collective need for social equality trying to create public spaces to increase social interactions, provide people with facilities, and protect the youths against social anomalies (McArthur, 1975, 377-388). Therefore, in addition to the creation of an interaction space, the density of the neighborhood environment would be reduced,

and neighborhood residents, especially children, and youths would have a place to escape to and spend their leisure time. Inspired by Romanticism, the theoreticians of this movement were trying to redefine the relationship between humans and nature. Therefore, trying to bring the sub-urban lives into the city and expressing the picturesque moments and the pristine nature, blurring grid networks, and following the landscape form in their designs (Benton-Short & Short, 2008, 60). The parks and playground movement also paved the way for the formation of the neighborhood center movement. Many playgrounds turned into neighborhood centers which organized many of the activities from sport to social gatherings, and also the space required for local organizations and libraries (McArthur, 1975, 383; Silver, 1985, 163). For example, the Saint Louis Union proposed an urban plan in 1907 and suggested the formation of several urban centers around small parks and playgrounds (Gillette Jr, 1983, 423). These neighborhood centers responded to many social requirements of its time and were popularized in many American cities. With this idea, the number of parks and playgrounds in the neighborhoods reached 3944 from 1890 to 1917, while the Playground Association of America played an important role in this success (McArthur, 1975, 377).

The parks and playground movement could be considered as one of the most influential movements in neighborhood design and planning with a wide geographical range in such a way that its legacy is turned into the inseparable component of contemporary neighborhoods all over the world. Furthermore, this movement led to the acknowledgment of the importance of open spaces and school playgrounds, and as a consequence, playing spaces became an essential part of schools (Frost, 2012). This movement also had a great impact on the growth of Non-Governmental Organizations (NGOs) concerning the formation of neighborhoods and land-use management

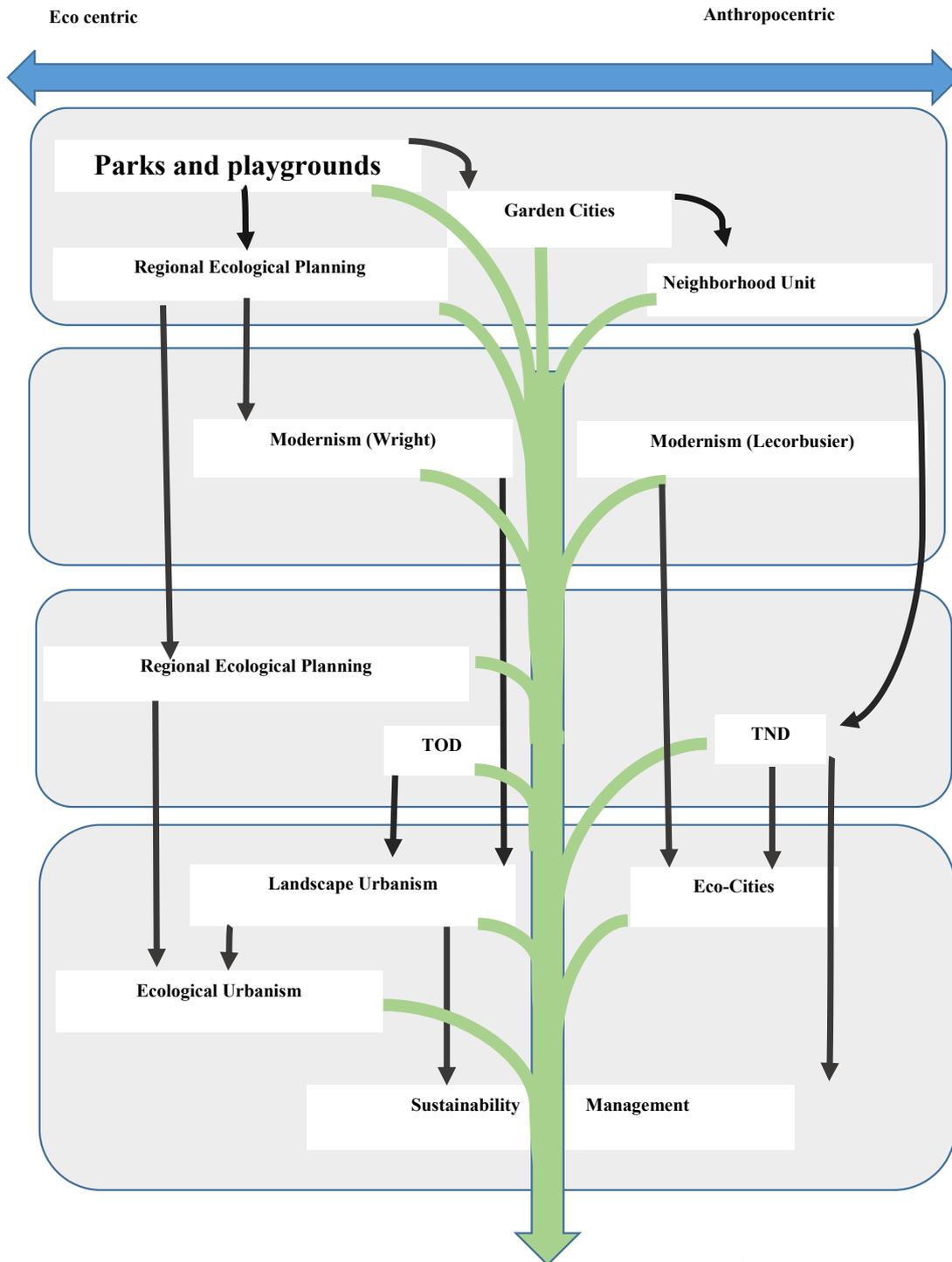


Fig. 1. Evolution process of sustainability over time and the impact of contributory movements on each other. Source: Authors.

(Daniels, 2009). During the development of the parks and playground movement, American cities established their specific park associations leading to many innovations in neighborhood formations. For example, as the primary model of social participation in the formation of neighborhoods,

the playground association of Chicago constituted a wide range of professions such as social activists, jurists, and landscape architects. The establishment of parks and playground associations led to the recognition of urban officials as responsible for the environment and public health in neighborhoods



Fig. 2. An example of a playground in the early 20th century. Source: Dallas Public Library, Texas, www.dallaslibrary2.org/dallashistory/photogallery/parks.php.

(*ibid.*, 182). Furthermore, the impact of Olmsted and his followers' views on such environmental planning theoreticians as Lewis Mumford and Benton Mackaye and also the naturalist modernism of Frank Lloyd Wright are evident.

• The Garden City movement

Garden cities became very popular among theoreticians and thinkers in the early decades of the 20th century because of the public acceptance of utopian ideas and thoughts (Miles, 2007; Sharifi, 2016, 4). Decentralization of central highly-populated areas and residence of industrial workers in suburban areas were among these theories aiming at improving the life quality and the sense of place (Silver, 1985, 162). As the key theoretician of garden cities, Ebenezer Howard tried to present an ultimate solution for the phenomenon of dense and polluted urban areas by combining town and country elements. This is presented in his famous three magnets diagram (Fig. 3) (Howard, 1902).

Howard's main idea constituted self-sufficient residential complexes surrounded by a green belt preventing the growth of urban slums. Further, being connected by railways, a network of radial paths was interconnected by this belt. These complexes could provide residence for 32000 people (Basiago, 1996, 137; Howard, 1902; Rohe, 2009). Therefore, the main outcome of Howard's theory was the transition from neighborhood design aiming at health improvement, to a new form introducing zoning, spatial and land-use planning (Choguill, 2008, 42; Daniels, 2009, 181). Henry Wright and Clarence Stein later applied the principles of garden cities in the Sunny yard garden and Radburn city being considered as models for similar developments.

The garden city concept was first introduced by Sir Ebenezer Howard in Letchworth and Welwyn (Fig. 4), England. It was also one of the few neighborhood design movements that expanded worldwide. Howard introduced some of the sustainability principles to



Fig. 4. Letchworth Garden City. Source: www.stridetreglown.com/re-imagining-the-garden-city/.

most significant impact of the neighborhood unit (Gillette Jr, 1983; Mumford, 1954, 260; Rohe, 2009), which was welcomed by the American community of planners, so much so that the neighborhood unit was the most popular concept among the city planners until the 40s. (Silver, 1985, 165) In fact, the idea of a neighborhood as the cities' basic units dates back to the middle ages (Mumford, 1954; Silver, 1985); however, Perry reintroduced this concept in the modern era. The neighborhood unit theory, along with the city garden movement, was primarily criticized for the physical determinism governing the urban plans. (Gillette Jr, 1983, 422) Therefore, development in neighborhoods based on the neighborhood unit concept faced numerous issues and would limit social interactions with the other neighborhood.

Tendency to social homogeneity in the neighborhoods is most evident in the neighborhood unit concept (Silver, 1985, 165), which leads to racial and social segregation in most cases (Isaacs,

1948, 22; Rohe, 2009) 1948, p. 22; Rohe, 2009. Nonetheless, Perry believed that social uniformity would facilitate living together and have numerous advantages (Perry, 1929a, 110). In practice, however, the constructors overdid some of the aspects of the neighborhood unit such as placing specific boundaries, while ignoring some others such as emphasis on the neighborhoods' centers. Perry acknowledged the possibility of his ideas inspiring the hierarchical society and predicted that many residents might leave their habitats. Accordingly, he suggested that neighborhoods could be planned and built for different income groups (Perry, 1929b; Silver, 1985, 166). On the one hand, the neighborhood unit did not prove beneficial to the old neighborhoods as the implementation required several changes in the structure of the neighborhood. As a result, Perry emphasizes that the neighborhood unit is more appropriate for neighborhoods with unused centers or recently-constructed parts (Rohe, 2009, 212).

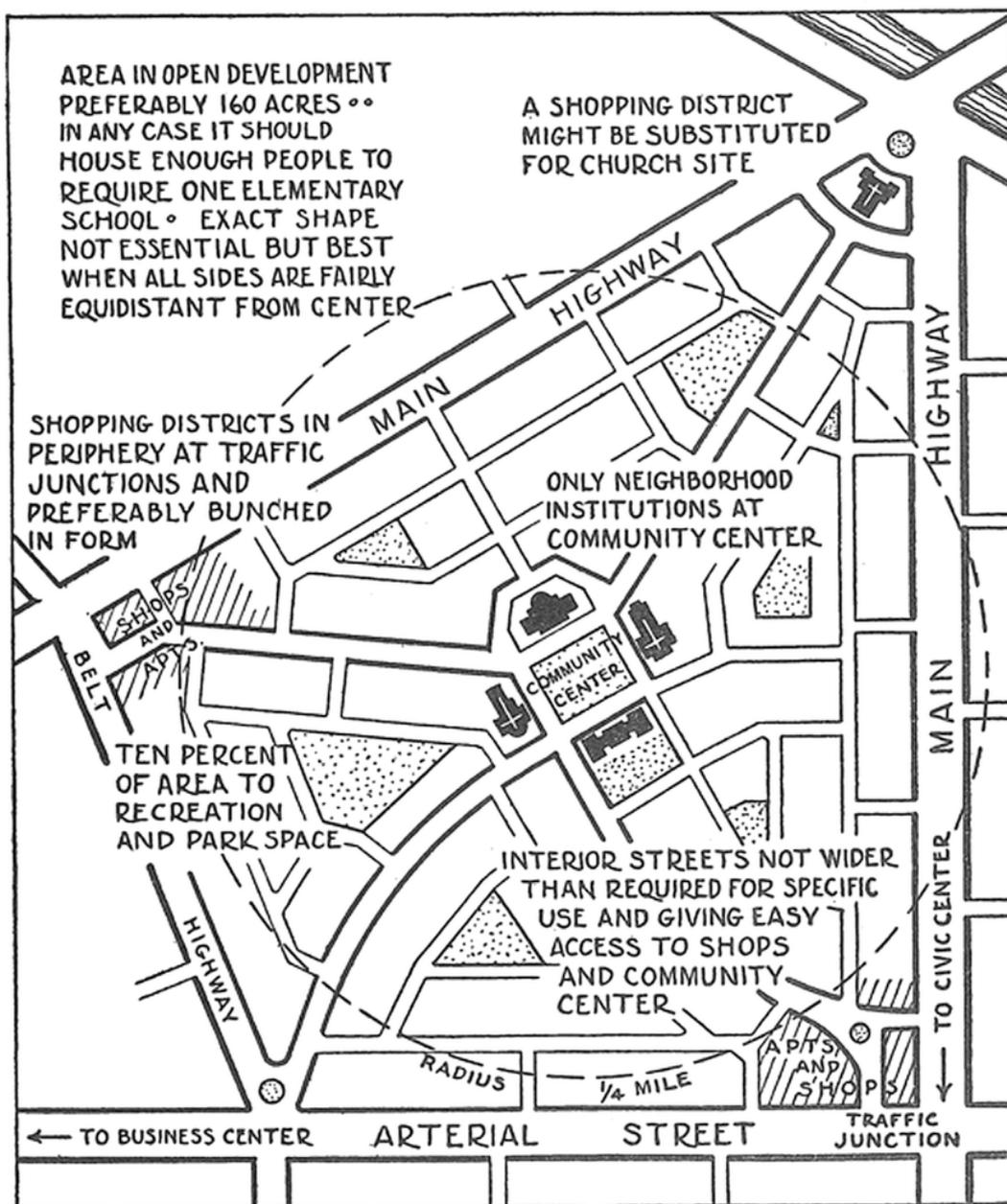


Fig. 5. The primary elements of the neighborhood unit plan. Source: Perry, 1929a.

• **Regional Ecological Planning**

In the 20s, the members of The Regional Planning Association of America tried to conform the environmental regional planning by mixing common concepts of the garden city and the wilderness (Daniels, 2009, 183). The association consisted of members like Lewis Mumford, Benton MacKaye, and Clarence Stein, who were evidently heavily influenced by the Scottish theorist, Patrick Geddes. Geddes considered a region as a

set of environmental interactions among natural elements such as morphology and climate that form human culture (Mumford, 1927). They were decentralization promoters across urban areas as illustrated in the concepts presented by Howard and Lloyd Wright (Basiago, 1996; Wheeler, 2013, 134) designed to achieve urban ‘sustainability’. The notion of sustainable urban form has its roots in the Garden City movement at the turn of the century. The ‘garden’ cities of the 1900s and the ‘ecological’

cities of the 1970s were proposed as alternatives to the pathology of modern urban form. Just as cities provide a place for humans to live, so they destroy ecosystems and become unfit habitats for the human spirit. The city must be made more vital, humane, efficient, beautiful, self-sufficient, and natural through a return to a more compact form, its impact on the environment must be decreased. These themes have re-emerged in the sustainable cities of the 1990s, advanced on behalf of future generations and planetary ecology. The sustainable city is a compact city. Calthorpe's 'Transit-Oriented Developments' 1989. Generally, environmental designers and planners in the 20s and 30s spread natural resources management to alleviate poverty and unemployment (Wheeler, 2013, 136). With the expansion of the modern worldview in the 50s and the 60s, there was a discernible collective agreement among the designers to use scientific and technological methods to draw the future of the cities, and consequently the neighborhoods. Moreover, regional planning leaned to ecology in the 1960s (ibid., 136).

Theorists of this branch try to collect relevant information from analyses and scientific methods to use as the basis of their plans. Among them, Ian L. McHarg and Richard Foreman conformed to the ecological design. In his book titled *Design with nature*, Ian L. McHarg suggested a new method based on ecological layers, which deeply impacted the designing and planning community. This method was later developed, based on which Geographic Information System (GIS) was later made. McHarg was in charge of a significant feature that made it possible to choose various uses simultaneously, and for the same land (Steiner, 2011, 335).

The biggest achievement of ecological planning was highlighting the scientific aspect of the planning and designing discourse (Daniels, 2009), as well as emphasizing the planning aspect as the basis of the design. Moreover, this movement paved the way for the emergence of ecology-oriented movements

in the future such as ecological urban planning and organic architecture. Theorists of this school consider the transgression of cities into natural environments to be one of the most crippling issues. As a result, they expanded the greenbelt concept across the cities, which allows us to see many cities with this characteristic from that period. Most ecological planning's success took place in suburban areas and national parks that had great potential for natural resources management, as well as protection programs and their integration with human settlements. Nonetheless, the ecological and planning view is prominent in the construction of neighborhoods and cities, particularly ecological layers that McHarg developed and The replacement of the grid plan of the neighborhoods with the ecological plan was one of its direct results.

• **Modernism Movement**

Le Corbusier and Frank Lloyd Wright are some of the most influential people in the formation of neighborhoods during the modernism movement. In their designs, they simultaneously dealt with the fears of the urban atmosphere of the 19th century, as well as people's beliefs in the survival of the human race by modern science (Fishman, 1982, 10). In "The City of To-Morrow", Le Corbusier illustrated a futuristic image encompassing residential towers with low-rise industrial buildings surrounding them, located in a green vast area (Miles, 2007, 68). Given the scale of these towers, each could be seen as a neighborhood.

On the other hand, Howard's aspirations to free people from the center of the cities once again appear in Wright's Broadacre City designs (Fig. 6), (Basiago, 1996, 141). Wright, however, was stricter in decentralizing the garden city movement due to the popularity of personal vehicles at the time (Fishman, 1982, 13). Wright prepared his designs for a sociological society in which each household owns a one-acre land and a personal car. Wright emphasizes that "as the main principle, Broadacre City leans on general decentralization." There are no commercial and industrial zones in this

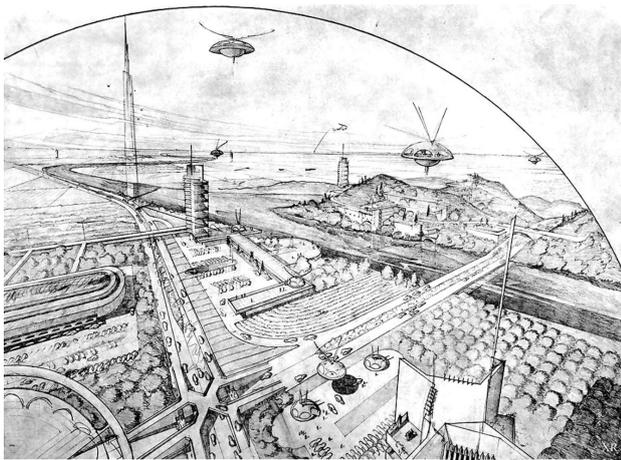


Fig. 6. Lloyd Wright's Broadacre City design. Source: Wright, 1935.

design, instead, there are small farms, factories, and workshops spread based on people's needs and interests (Wright, 1935, 347). Moreover, Lloyd Wright stresses the role of trees and urban agriculture in residential fabrics, which we now know as a feature of Ecosystem services.

many of the designs and ideas of the modernism movement are discernible in the formation of today's neighborhoods including the organic pattern and ecosystem services that Wright promoted, as well as the residential towers in green spaces that Le Corbusier advocated. Wright and Le Corbusier depicted vehicle-dependent neighborhoods that were somewhat the symbol of the modern era; nonetheless, Le Corbusier sought to elevate and popularize residential towers that incorporated various uses and resembles the mixed-used idea of sustainable environments, while Wright went after decentralization in his neighborhood design.

The modernism movement has always been criticized for its lack of attention to environmental issues. Although numerous modernists claimed to have designs compatible with nature, they would not take the issue seriously in practice (Barnett, 2016, 8). Wright's Broadacre City was also more of a utopian diagram than a practical design and was far from sustainable. We can also add extreme dependence on fossil fuels to the issues mentioned above. In Wright's design, particularly, the residents

had to drive long distances to meet their basic needs, which required a great deal of fuel. Many of the neighborhood activists criticize some of the experiences of the modernism movement such as urban renewal in the old neighborhoods that meant to construct modern and harmonious ones (Wheeler, 2013, 12). These experiences also taught us the significance of social interactions among the neighborhoods.

• Neo-Traditionalism

"The tyranny of the auto reaches every corner of American life" is a quote by Andrés Duany in reaction to the troubling conditions of American modern cities (Duany & Plater-Zyberk, 1992), of which intellectuals such as Lewis Mumford and Jane Jacobs, in *The Death and Life of Great American Cities*, have also warned. Neo-traditionalism is a term consisting of two schools of the development of traditional neighborhoods and transit-oriented development. The terms neo-traditionalism and modern urban planning, which gained attention after the Congress for New Urbanism (NTU) in 1993, are used interchangeably at times. Some of the theorists of this movement are Andrés Duany, Elizabeth Plater-Zyberk, Peter Calthorpe, Elizabeth Moule, and Daniel Solomon whose source of values lies in small American cities before the emergence of vehicles (Wheeler, 2013, 15). In general, traditional development can be seen as a mixture of the past movements' principles in the design of neighborhoods.

Traditional Neighborhood Development in the 80s was suggested as a way to form American cities based on the patterns of small American cities. This mentality is mostly known for features such as mixed-use, walkable neighborhoods, lively neighborhood centers, and seeks to find a balance between economy-oriented uses and residential buildings. Streets follow a grid plan in this theory, which is surrounded by a common architectural style (Duany & Plater-Zyberk, 1992). Neo-traditionalism was introduced to the world through Andrés Duany's Seaside design, which became this movement's

symbol later (Rohe, 2009, 224). Peter Calthorpe advocated transit-oriented development. It is similar to the traditional neighborhood movement in many aspects and also emphasizes features such as mixed-use, more density, and pedestrian-orientation. Their primary difference is the centrality of public transport (Rohe, 2009, 226). The transit-oriented development appears to be more sensitive to environmental issues (Sharifi, 2016, 8). In this theory, neighborhoods are defined with neighborhood centers in which transport terminals are situated and straight streets with rows of trees. Accordingly, the residents of each part of the neighborhood would have a ten-minute walk to the public transportation center at most (Basiago, 1996, 149; Calthorpe, 1993, 17). Claiming that the high-rise buildings around the public transportation centers would reduce car use, and consequently energy consumption, Calthorpe promoted the sustainability of this movement. According to studies, although the number of travels in Neo-traditional neighborhoods is equivalent to those of other neighborhoods, the car travel rates are significantly lower (Khattak & Rodriguez, 2005). However, there has not been strong proof indicating an increase in the neighborhoods' sustainability with increased density and walkability (Sharifi, 2016, 8). Moreover, according to the studies, people are willing to pay more money to live in such neighborhoods (Rohe, 2009, 226; Tu & Eppli, 2001, 6). As a result, neighborhood developers and constructors have warmly welcomed traditional development, and it has caused neo-traditional neighborhoods to be criticized because they failed to provide homes for people with low income. Although this movement has once again drawn the neighborhood designers' attention to the significance of social interactions, its focus on social liveliness and disregard for environmental issues is criticized. In traditional development, green spaces are marginal spaces and unused spaces are often allocated to this (Daniels, 2009,

188). In general, adequate studies have not been conducted to confirm the claims of traditional development theorists. Nonetheless, according to one of the findings, there is not much difference between traditional and ordinary neighborhoods in terms of the sense of space (Nasar, 2003).

• Landscape Ecological Urbanism

Frederick Steiner first suggested the term "landscape ecological urbanism" (Steiner, 2011, 333), which indicates a movement incorporating landscape urbanism and ecological urbanism together and for each other's evolution. Given the fact that the two views have many things in common in terms of intellectual origins and main principles, this paper explores the two neighborhoods in one frame and uses the term landscape ecological urbanism due to its comprehensiveness. We will first explore the two movements individually:

Several architects and landscape architects such as James Corner, Mohsen Mostafavi, and Charles Waldheim first devised the idea of landscape urbanism (Steiner, 2011; Thompson, 2012), in which landscape is considered to be the basic building block of the city (Waldheim, 2012, 11). Charles Waldheim first suggested the term "landscape urbanism." Waldheim was strongly influenced by James Corner and Ian L. McHarg, two authors/landscape architects (Steiner, 2011; Waldheim, 2012). Waldheim promoted landscape urbanism as an answer to the weaknesses of traditional development (Waldheim, 2016, 4). It also seems to have many mutual features with the utopia Wright introduced. Regarding Broadacre City, Wright writes: "In an organic architecture, the land automatically pre-determines all the elements" or "form and function are the same in Broadacre City", which is extremely close to the principles landscape theorists have proposed (Wright, 1935, 348). This movement also presents new time reading. Landscape urbanism theorists seek to implement long-term changes through "seeding" (Steiner, 2011; Waldheim,

2012, 2016), which allows for the development of the environment based on unpredictable needs throughout time.

Ecological urbanism was proposed as an answer to the criticism on landscape urbanism including lack of ecological efficiency in many projects and the insignificance of people's role in the formation of a landscape urban environment and its development (Mostafavi, 2015; Steiner, 2011; Thompson, 2012, 24) even though ecological planning has a rich history in the design of neighborhoods and cities (Mostafavi & Doherty, 2010, 21). Mohsen Mostafavi et al. introduced the term "ecological urbanism" at Harvard University (Steiner, 2014, 336; Turner, 2014, 19). that Richard Forman's concept of urban ecology had a critical role in it. According to that, cities are conceptualized as ecosystems encompassing people with woven biophysical connections (Benton-Short & Short, 2008, 142; Forman, 2014). In other words, it is seen a more prominent role for ecology in ecological urbanism compared to landscape urbanism. Given the history, ecological urbanism is based on a completely scientific ground while seeking to employ ecological methods in a build environment and beyond it (Steiner, 2011). Additionally, it aims to provide environmental facilities and reduce environmental impacts (Forman, 2014; Steiner, 2014). It can be said that ecological urbanism was proposed as complementary to landscape urbanism. As landscape ecological urbanism stresses the significance of ecological function to solely aesthetics, displaying natural elements in the city such as green infrastructure and urban agriculture are some of its mottos (Waldheim, 2012, 39). This approach is a reminder of the position of modernism regarding aesthetics (Thompson, 2012, 12). In other words, these movement's theorists believe the elements with ecological function to be beautiful on their own (Waldheim, 2012, 79, 75). In this case, it makes one wonder whether the landscape

ecological movement aesthetics is new or modern aestheticism in disguise. Nonetheless, many of the elements mentioned seem to lack the expected ecological function in many projects assigned to this movement (Duany & Talen, 2013, 106, 33–35), and picturesque aesthetics are discernible in them.

Like many other movements, landscape urbanism was criticized due to causing a situation (gentrification) that would lead to the locals leaving the area (Duany & Talen, 2013, 20; Steiner, 2014, 308). The reason is that landscape projects often take place on urban brownfields with low economic value, and following the changes and increased environmental quality, housing prices, as well as services' rates rise in that area, causing the previous residents who are mostly from the lower class to leave that area, such as the Highline Project of New York (Fig. 7). This could lead to the sudden disappearance of that area's social identity and damage the existing social interactions. Landscape ecological urbanism does not propose a general framework nor does it conform to the physical determinism of designing plans. It often tackles challenges with a problem-oriented approach. Hence, it would not be surprising if a significant number of landscape projects are dedicated to renewing and rehabilitating urban brownfields (Waldheim, 2016, 3). The enhancement of society's sanitation and health, the neighborhood's safety, and the prevention of slum expansion are some of the most crucial advantages of this movement (Benton-Short & Short, 2008, 86).

Moreover, one of the most significant challenges of the landscape/ecological mentality is freeing land for ecological development, which is extremely costly and, in some cases, impossible. There is also ambiguity about how ecological knowledge is used in neighborhood design, and there is no agreement on which part of ecological knowledge should be utilized. Despite the ecological urbanism theorists' emphasis



Fig. 7. Linear project assigned to the landscape/ ecological move. Source: nt <https://www.laidbacktrip.com>.

on the homogeneity of social communities, the primary focus is still on the environmental ecological aspect. In some cases, resources and great expenditure on rehabilitating and creating ecological processes lead to the loss of the social and economic function of that area (Duany & Talen, 2013, 12).

• Eco-city Movement

Since climate change and energy safety are some of the most significant issues of future cities, (Caprotti, 2014, 10) theorists warmly welcome ideas with green and environmental aspects. Eco-city can be considered the product of this movement. On the other hand, the global welcoming of technological solutions led to the growth of eco-cities and many have been created within a global scope such as Masdar in The United Arab Emirates and Tianjin in China. This mentality has appeared in many forms ranging from building completely new cities to renewal and rehabilitation projects within the urban fabrics (Caprotti, 2014; Joss & Molella, 2013).

Looking for a future ideal city and leaning to scientific approaches can root back to the garden city movement, as well as modernism. With this regard, eco-cities are expected to be managed scientifically and systematically (Cugurullo, 2018, 73). Richard Register first presented the idea of eco-cities seeking to realize sustainable city models (Cugurullo, 2018; Sharifi, 2016). By looking at eco-cities, we understand that the technology-oriented ideology has manifested in most aspects of a city such as the use of renewable energies and the urban sewage management systems. The difference between eco-cities and smart cities mostly lies in the dependence of smart cities on information sciences and urban management through information technology (Joss, Cook & Dayot, 2017). Although eco-cities and smart cities are different terms, they have mutual capitalism roots (Caprotti, 2015; Cugurullo, 2018) and promote development based on a general plan with complete details (Cugurullo, 2018, 74).

Trying to deal with the global epidemic challenges can be considered the reason behind the rapid spread of these movements across the globe; however, eco-cities and smart cities have not been successful in achieving their goals and ideals (Cugurullo, 2018; Sharifi, 2016). In other words, they have not been able to stay committed to their promises. The role and position of people in the city are missing in eco-cities (Joss & Molella, 2013, 127), especially when science and technology-based management becomes the center of attention in eco-cities and smart cities (Joss, Cook & Dayot, 2017; Joss & Molella, 2013). Although the designers of eco-cities claim that a social environment with necessary facilities and amenities will be provided for people, their viewpoint is limited to the residents of that specific project (Caprotti, 2014) and people with low income often have no access to the facilities and amenities. Despite the general name of eco-city given to these cities, these projects are mostly a heterogeneous set as they are sub-projects made with various strategies (Cugurullo, 2018, 75). As a result, its function as a system raises serious questions (Cugurullo, 2013, 34).

• Sustainability Management

Following the spread of the concept of sustainability in the 1970s and 1980s, and its introduction to official authorities and political discourse, the need to implement this concept, in reality, has grown more and more. The first generation of assessment systems was made for this purpose, which was mostly partial and leaned on a limited number of criteria. The environmental impact assessment could be considered one of the most crucial among them. With the emergence of the BREEAM assessment system for assessing building sustainability in 1990, integrated assessment systems were introduced (Retzlaff, 2009; Sharifi & Murayama, 2013, 73). Afterward, neighborhood assessment systems were introduced in the late 1990s, and in the first two decades of the 21st century, they

gained momentum around the world (Table 2). Some countries developed their local assessment systems, while others localized internationally recognized systems. Changing the assessment scale from buildings to the neighborhood scale is one of the great achievements of sustainability sciences, which allows attention to aspects that are normally neglected (Berardi, 2013, 1573). The neighborhood assessment tools can be considered the last generation of environmental impact assessment. The most essential function of these instruments is to help the decision-making process. Accordingly, through a systematic view, they determine the position of the assessed issues in sustainability based on various criteria that are the sub-set of themes or the more major categories. Furthermore, they lay the groundwork to explore the most significant challenges of the neighborhoods. Therefore, they adopt a problem-oriented approach. It is noteworthy that these criteria are often taken from the goals of previous movements and organized by official international institutions. The type and aggregation method of indicators in different assessment systems depend on various contextual conditions. Another essential feature of these tools is their flexibility that enables the implementation of changes in the construction of neighborhoods throughout their lifecycle and based on the existing condition of that period.

Although there have not been many studies on the efficiency of these systems, the significant increase in the number of neighborhood assessment tools, as well as related keywords such as “sustainability assessment” and “sustainability management” in the literature in the recent decade can be considered as reasons for their relative success (Figs. 8 & 9). Given the systematic and holistic view of these tools, they seem to be more associated with the concept of sustainability compared to many other movements and make the incorporation of ideas such as economic sustainability and the

Table 2. Some of the most prominent sustainability assessment systems at a neighborhood scale. Source: Authors.

Name	Trustee and developer	Country	1 st version	Last version
LEED-ND	US Green Building Council	The US	2007	2018
CASBEE-UD	Japan Sustainable Building Consortium (JSBC), and Japan Green Building Council	Japan	2006	2014
BREEAM Communities	Building Research Establishment (BRE)	England	2009	2012
QSAS Neighborhoods	Gulf Organization for Research and Development	Qatar	2011	2011
Green Star Communities	Green Building Council of Australia	Australia	2010	2016
HQE2R	CSTB	The EU	2001-2004	–
Ecocity	EU research project	The EU	2002-2005	–
DGNB-UD	German Sustainable Building Council	Germany	2011	2020
Green Townships	Indian Green Building Council	India	2010	2010
EarthCraft Communities	EarthCraft, Greater Atlanta Home Builders Association,	The US	2005	2014
Pearls	Abu Dhabi UPC	Abu Dhabi	2010	2010

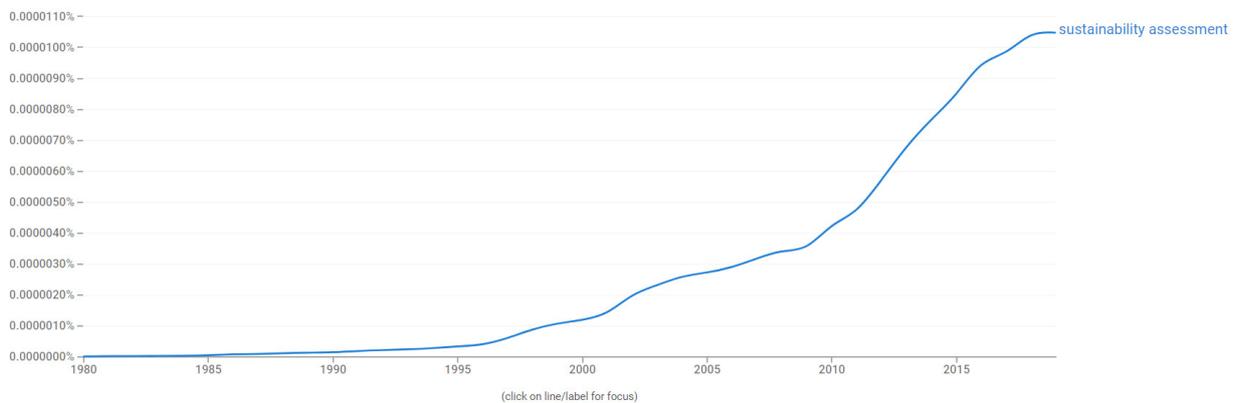


Fig. 8. The growth trend of the term “sustainability assessment” in google sources, 1980-2019. Source: www.books.google.com/ngrams.

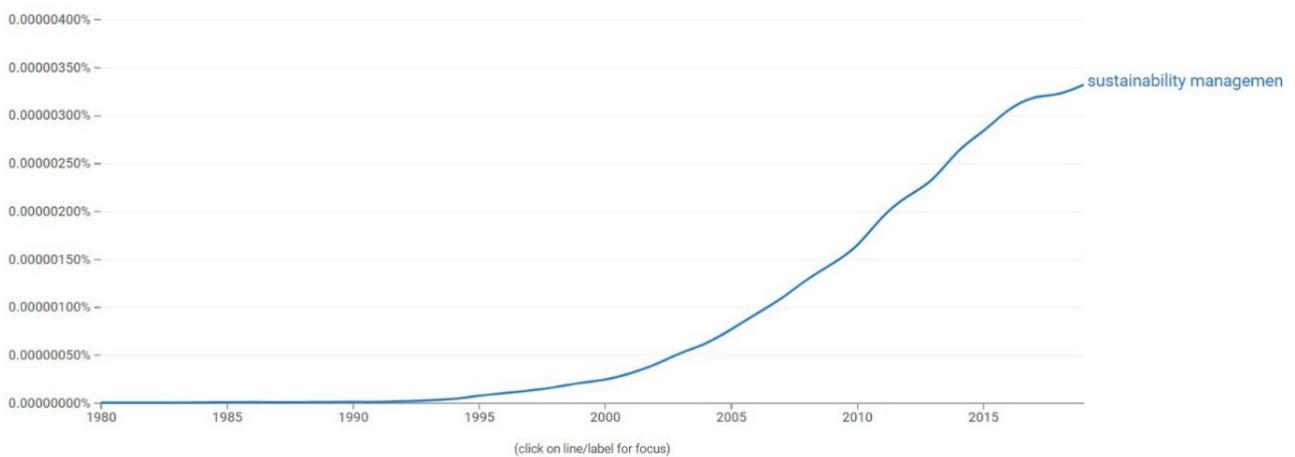


Fig. 9. The growth trend of the term “sustainability management” in google sources, 1980-2019. Source: www.books.google.com/ngrams.

support of governing institutions more tangible. Nonetheless, there is criticism regarding how they are formed and function including ambiguities in the scientific bases of their formation methods. Moreover, there is a risk that developers seeking approval for these systems will focus their efforts on meeting the easier criteria associated with a higher score while neglecting other aspects.

Conclusion

In the past 150 years, there have been numerous movements on a neighborhood scale aiming to improve living conditions and preserve natural resources. Each solution has sought to solve the particular issues of their time and place, and most of the solutions suggested have been used up to this day indicating their strength. The definitions

of sustainability given today often consist of an array of features such as providing public open space, providing an urban green space, creating urban agriculture, preserving natural resources, mixed land use, the sense of the place, public participation, managing waste, and reducing energy consumption. It is possible to retrieve these features that form the contemporary concept of sustainability strategies and main lines of previous movements in architectural-urban planning (Table 3), and somehow claim that the concept of sustainability comes from the previous experiences in facing the issues of a human’s living environment. In other words, sustainability is inherently an experience-oriented concept and the product of integrating successful ideas throughout time; this matter is especially evident

Table 3. Neighborhoods’ sustainability movements and their role in today’s concept of sustainability. Source: Authors.

Movement	Emerge	scholars	Contributing to the sustainability concept	Unsuccessful experiences
Parks and playgrounds	The 1890s	Fredrich Law Olmsted, Joseph Lee.	Social Interactions, Public Health, Public Open Spaces	
Garden Cities	The 1900s	Ebenezer Howard,	Green Belt, Zoning, New Technology, Self-sufficiency, food Production, Urban Agriculture	Utopian and Idealistic Plans, Physical Determinism
Neighborhood Unit	The 1910s	Clarence Perry	Services within walkable distance, Limitation of car traffic inside the neighborhood, Self-sufficiency	Social Segregation, Physical determinism
Regional Ecological Planning	The 1920s The 1960s	Lewis Mumford, Clarence Stein, Ian McHarg	Application of scientific methods, Natural resource protection, and preservation planning based design	Practical Feasibility, Disregarding social issues
Modernism	The 1930s	Frank Loyd Wright, (Broadacre City)	Organic pattern and design, Ecosystem services, Social justice, Landscape as the base	Car dependency, Lack of environmental concerns
Modernism	The 1930s	Le Corbusier (City of tomorrow)	Mixed land use, Compact design	Car dependency, Lack of environmental concerns
Neo-Traditional Development	The 1980s	Peter Calthorpe, Andres Duany, Elizabeth Plater-Zyberk	Mixed land use, Compact design, Walkable streets, Sense of place, Public participation, Open space	Physical determinism, Lack of environmental concerns
Eco-Cities	The 1980s	Richard Register	Green technology, Waste management, Zero carbon, energy efficiency, Science-based management	Disregard to social interactions, Gentrification, Economic disparity
Landscape Ecological Urbanism	The 1990s	Charles Waldheim, James Corner, Mohsen Mostafavi, Fredrick Steiner, Richard Forman, Garet Doherty	Public participation, Organic development, Green infrastructure, pluralism, Landscape as the basic unit, Gradual development, Natural preservation, Ecosystem services, Urban ecology	Gentrification, problems associated with the application of ecological flows like neglecting the economic and social factors
Sustainability Management	The 2000s	Sustainability Corporations	Holistic approach, Gradual development, and improvement	Downgrading the sustainability tenets to numbers, the possibility of neglecting some criteria by developers

in the structure of sustainability assessment systems so that their indicators and criteria can be considered the representatives of previous successful experiences.

The fact that some of these movements have common grounds and often overlap in their strategies is noteworthy. For instance, parks and playgrounds, garden cities, modernism (Wright), and landscape ecological urbanism all pay great attention to urban green space in common. Neo-traditional movement and neighborhood unit also overlap in having services at a walkable distance. Neo-traditionalism and modernism mutually pay attention to mixed land use. Environmental regional planning and landscape ecological movement both emphasize the preservation of natural resources it should be said that the common features are not limited to these. The above table illustrates some of the mutual features (Table 3).

By examining the approaches of the movements of the first half of the 20th century, it can be seen that movements dominating utopian and idealist thinking were superior. With this regard, the garden city movement and neighborhood unit can be mentioned, which had a significant impact on the movements after them. Given the rapid growth of science and the dominance of science-centered thinking in the second half of the 20th century, on the one hand, we can witness the science and technology-centered approach strengthening such as transit-oriented development and eco-cities in the design and planning of neighborhoods. On the other hand, we can see the growth of environmental and ecological movements such as regional ecological planning, as well as landscape ecological urbanism that stresses the utilization of scientific methods of planning in the design and construction of the built environment. The movements above can also be categorized in terms of the social or environmental approach, meaning some such as neighborhood units and

traditional development mostly deal with social issues, while some others such as ecological planning and urbanism focus on environmental issues. Nonetheless, what all the movements have in common is the distance between theory and practice, meaning none of the movements were successful in achieving all of their goals.

The prescriptive approach and the proposition of a solution in the form of a general plan that comes with physical determinism are other common critiques of the past movements. This may be one of the reasons behind the increasing growth of sustainability assessment systems at the neighborhood scale, which in the authors' opinion, can be categorized as sustainability management. This movement promotes a holistic and systematic approach in accordance with sustainability and gradually and based on contextual conditions, follows changes in neighborhoods' environments. therefore, it can be considered an effective and strong approach to forming neighborhoods, which opens a new horizon for the evolution and development of sustainability.

Endnote

1. Eco-town, Eco-districts, Green cities, Eco city, Eco-garden City

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