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ARTICLE / ARAŞTIRMA

Development of A Neighborhood Sustainability Assessment System for Turkey: SEEB-TR Neighbourhood

Türkiye için Mahalle Ölçeğinde bir Sürdürülebilirlik Değerlendirme Sistemi Önerisi: SEEB-TR Mahalle

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ABSTRACT

It is extremely important to improve energy efficiency in all sectors and to spread the use of renewable energy resources to protect natural resources, especially to prevent environmental pollution with renewable products, buildings, processes, technologies, and services. Indicators of the transformation of knowledge and technology into economic value in the building development process are that the operating costs will decrease since environmentally friendly buildings are energy efficient throughout their life cycle and spatial quality is audited by certification systems. In this context, directives and directions foresee a holistic approach in the fields of energy, planning, and housing at an upper scale. The establishment of transportation, energy, and technology infrastructures is the issues that need to be emphasized especially in the city, building, and product scale. The evaluation of technological solutions together with community-oriented solutions may help to improve the built environment. In this sense, sustainability assessment systems at urban scale provide solutions to some transformation matters and also set ground to obtain a shared vision by bringing together many actors. This kind of system, which is the reflection of planning policies in developed countries, is not yet available in Turkey. This paper introduces SEEB-TR Neighborhood assessment system which is developed specifically for Turkey as a new measurement and monitoring tool. It is considered that the developed system will be a quality assessment criterion for urban space in the construction sector.

Keywords: Green neighborhood; sustainability; sustainability assessment systems.

ÖZ

Tüm sektörlerde enerji verimliliğinin artırılması ve doğal kaynakların korunması, özellikle yenilenebilir ürünler, binalar, süreçler, teknolojiler ve hizmetler ile çevre kirliliğinin önlenmesi için yenilenebilir enerji kaynaklarının kullanımının yaygınlaştırılması son derece önemlidir. Bina geliştirme sürecinde bilgi ve teknolojinin ekonomik değere dönüşümünün göstergeleri, çevre dostu binaların yaşam döngüleri boyunca enerji verimli olmaları ve mekânsal kalitenin sertifika sistemleri ile denetlenmesi nedeniyle işletme maliyetlerinin düşeceğidir. Bu bağlamda direktifler ve yönergeler, enerji, planlama ve konut alanlarında üst ölçekte bütüncül bir yaklaşımı öngörmektedir. Ulaşım, enerji ve teknoloji altyapılarının oluşturulması özellikle şehir, bina ve ürün ölçeğinde üzerinde durulması gereken konulardır. Teknolojik çözümlerin toplum odaklı çözümlerle birlikte değerlendirilmesi yapılı çevrenin iyileştirilmesine yardımcı olabilir. Bu anlamda kentsel ölçekte sürdürülebilir değerlendirme sistemleri bazı dönüşüm konularına çözüm getirmekte ve birçok aktörü bir araya getirerek ortak bir vizyon elde edilmesine zemin hazırlamaktadır. Gelişmiş ülkelerdeki planlama politikalarının yansıması olan böyle bir sistem Türkiye'de henüz mevcut değildir. Bu çalışma, Türkiye'ye özgü bir ölçme ve izleme aracı geliştirilmesinin ilk adımı olarak SEEB-TR Mahalle değerlendirme sistemini tanıtmaktadır. Geliştirilen sistemin inşaat sektöründe kentsel mekân için bir kalite değerlendirme kriteri olacağı düşünülmektedir.

Anahtar sözcükler: Yeşil mahalle; sürdürülebilirlik; sürdürülebilir değerlendirme sistemleri.

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1. Introduction

According to the United Nations Development Program (UNDP, 2019), two-thirds of the world's population (6.5 billion people) will start living in cities by 2050. The increase in the population of the city as a consequence of the orientation to the cities brings environmental problems and the increasing danger of natural resources. Attention is drawn to the speed and manner in which developed countries consume natural resources.

The Sustainable Development Goals adopted by all United Nations Member States in 2015 is an action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. There are integrated 17 goals to social, economic and environmental sustainability. The goal 11 refers to "Make cities inclusive, safe, resilient and sustainable". Making cities sustainable means creating career and business opportunities, safe and affordable housing and building resilient societies and economies. It involves investment in public transport, creating green public spaces, and improving urban planning and management in participatory and inclusive ways. The steps which are taken to protect nature highlighted sustainability based on buildings and cities. The sustainability of a city refers to be livable for centuries. Then, it must be sustainable not only environmentally but also economically and socially, and it must be protected against various dangers and threats that the city is exposed to. In this sense, the sustainability and safety issues of cities are frequently discussed and studies are carried out in this context.

While the sustainability of cities is gaining importance, we also encounter technology-oriented smart cities to ensure sustainability by making use of developing technology. Recent studies show that producing smart solutions in energy, environment, transportation, economy, management, and security issues in smart city formation will positively affect the comfort of life in cities. However, urban responsibility will be gained in improving the built environment with the evaluation of technological solutions together with community-oriented solutions (UNDP, 2019).

The titles of "Climate Change, Natural Resources, Ecological Balance, Energy Efficiency and Urbanization" should be taken into consideration in sustainable architecture, urbanization, planning, and energy issues. In recent years, issues such as "climate change", "urban transformation" and "sustainable urban form and energy efficiency" have been discussed within the scope of new phenomena in urbanization. It is extremely important to improve energy efficiency in all sectors and to expand the use of renewable energy resources to protect natural resources, especially to prevent environmental pollution with renewable products, buildings, processes, technologies, and services. In the assessment of the 2010–2023 goals, strategies, and actions of the "Integrated Urban Development Strategy and Action Plan" (KENTGES, 2010) which is prepared by the Turkish Ministry of Environment and Urbanization in 2010, it is seen that responsibilities have been defined for relevant partners including universities, to create an environmentally sensitive living space in cities. Accordingly, it is emphasized that collaborations should be established between institutions for a sustainable spatial arrangement with a high quality of life. For example, under the heading "Action 14.1.4 Energy Efficient and Climate Sensitive Settlement Strategies will be prepared", it is requested to develop adaptation and mitigation strategies for climate change in settlements, and to determine the procedures and principles for planning and construction. In this sense, the evaluation of the procedures and principles for the establishment of Sustainable Energy Efficient Buildings according to the geographical conditions and characteristics of urbanization in Turkey is gaining importance. As can be seen from these statements, sustainability is increasingly important to take steps towards shaping the cities of the future, vision, and building a good society. In this sense, a multi-disciplinary approach is required to create a holistic solution. In Turkey, the transition to a sustainable settlement has begun to be developed within the scope of corporate responsibility and reliability targets of multinational companies. Recently, it has also come to the fore in the public sector with 'sustainable' mass housing projects. In this context, the first initiative started with the 'energy performance regulation in buildings' that entered into force in 2008.

Even if the environmental analysis 'barriers' stipulated by the regulations are easily overcome by entrepreneurs today, the issue of minimizing the environmental impacts in the use of incentives and loans to realize the project is on the agenda again. Minimizing the negative effects of the buildings on the environment and society may be important in many ways. The energy consumption of buildings is of great importance for a country's economy. In Turkey, the share of domestic resources in energy supply is about 30 percent, and almost 70 percent of consumption is based on imports (URL-1, 2021). The burdens that the difference between the production and consumption of energy resources put on the economic structure of the country are obvious. A small reduction in the energy costs of buildings can bring significant economic benefits to the country. In addition to the economic benefit, the public sector, which is the most important employer, sets a model for the Turkish construction market. Environmentally and socially sensitive laws, regulations, and practices will be a driving force for the entire construction industry. Anyway, the first task of the public sector is to increase the welfare of the people living in that country, and as long as sustainable structuring is planned correctly, it exactly matches the public goals. Investing in environmental protection technologies, materials, equipment, and new production methods is an important opportunity for a country.

Non-holistic decisions taken for planning and applications, which are considered as a spatial arrangement tool, negatively affect the efficient and appropriate use of resources and the qualification of cities as sustainable living spaces. The lack of mechanisms that direct the protection and use of the environment and energy reduces the welfare and comfort level of the region. Creating perceptible differences at the local level in terms of sustainability is only possible with urbanization based on smart growth. Two basic approaches can be mentioned; the first is to increase and improve environmental quality and activities in the city to create environmental efficiency; the second is to reduce the environmental burden (Ergönül et al., 2019). This situation, which requires taking into account the local conditions in terms of climate, environment, energy, cultural, social, and economic aspects, requires scientific approaches/mechanisms in urban space intervention.

In widely used certification systems in the world such as DGNB, BREEAM, LEED, CASBEE, GREEN STAR and GREEN MARK, the certification processes developed for green urban space project design and implementation have started to come to the fore among the mentioned mechanisms. It is seen that local characteristics are prioritized in urban certification, as well as green building certification systems, which are in line with the decisions taken by governments at regional scale. In Turkey, the impact assessment of urban development is limited to the Environmental Impact Assessment (EIA) report. The lack of necessary control mechanisms can be overcome with the development of Neighborhood Green Certificate System. The certification system created as a reflection of planning policies and a representative brand value in developed countries is not yet available in Turkey. However, when the impact area of the construction industry is considered, it is seen that the necessity of such an urban certificate associating with the Green Building, which will increase energy efficiency is increasing day by day.

Lin and Shih (2018) state that many countries have adopted commonly used green building assessment tools for the assessment of neighborhood sustainability. In applying sustainability concepts to cities there is no definite rule as each city has its own characteristics. In Turkey, LEED and BREEAM certification systems are commonly used at building and neigbourhood level. It is clear that there is a need for a neighbourhood sustainable assessment tool that is particularly developed under the Turkish context. By doing this, Turkey will have a more holistic, compact and original neighbourhood assessment system which is suitable its own economical, social and environmental values.

This study targets to develop a sustainable assessment system at neighborhood scale for Turkey. It is thought that the developed system can be a solution to some of the urban transformation problems and will bring together many actors related to the city. The system has been created by integrating the earnings and experiences gained through the previously developed "Sustainable Energy Efficient Buildings (SEEB-TR)" Green Building Certification System for the transformation of buildings, at Building Practice and Research Center in Mimar Sinan Fine Arts University (SEEB-TR, 2014). The usage areas of such a certification system are likely to expand with the inclusion of the construction sector.

1.1. Aim of the Study

Since Turkey does not have a unique neighbourhood assessment system, LEED and BREEAM are widely used. However, since these systems are developed according to the legislation of their own countries, they do not fully comply with the legislation and practices in Turkey in some respects. Issues related to energy, water, materials and the environment are handled within the framework of current legislation in Turkey. Therefore, there is a need for an assessment system that will highlight the sustainability issues that are important for Turkey, comply with the current legislation and allow the protection of its resources. In this context, the main purpose of this study is to take the first steps towards the development of a neighborhood sustainability assessment (NSA) system for Turkey. The criteria addressed in the developed system will form a basis for the national certification system in the future. The economic, social and environmental values in Turkey have played an important role in determining the criteria for the neighborhood assessment system. However, in developing neighborhood certification system, commonly known certification systems were analyzed regarding their features and criteria. The results of the analysis contributed to the formation of the certification system.

1.2. Research Method

This study is the first attempt for the development of a neighborhood assessment system for Turkey. To achieve the purpose of the study, first of all, current researches on urban sustainability and assessment tools were reviewed based on the examination of relevant documents, books, journal articles, and websites. Thus, the topics covered within the scope of sustainable assessment systems and country-specific assessment systems were analyzed. Eight NSA tools, which are widely used among the existing certification systems and represent different regions, have been analyzed in detail. Certification systems evaluated within this scope are; LEED ND (2011), BREEAM Communities (2017), GREEN MARK for Districts (2017), GREEN STAR Communities (2016), CASBEE UD (2014), QSAS NH (2017), DGNB UD (2016) and PCRS for Estidama Pearl Community (2010). In choosing these assessment systems for further search, the key considerations are; LEED, BREEAM and DGNB are currently used systems in Turkey; CASBEE, since Turkey is lo-

cated in an earthquake zone like Japan; QSAS and PCRS as they reflect the same geography; GreenMark, Singapore is a developed country in terms of sustainability and GreenStar because Australia represents a pioneering role in sustainable urbanization and community issues and it is a different continent. Thus, the representation of all continents was obtained except Africa and Antarctica, which have different climatic characteristics.

In analyzing these certification systems, their criteria were taken into consideration and evaluated in terms of their purpose, family structure, evaluation scale, scoring, and weighting. Data obtained from the evaluation of current systems contributed to the formation of the developed system. The main criteria of the developed system were defined considering the conditions such as legislations, regulations, climatic features and natural resources in Turkey.

After the main criteria were determined, each criterion was analyzed by working groups of experts in the field. Thus, important points under each criterion were not overlooked and evaluated in detail. Working groups were formed for each criterion and the aim, scope, basic principles and sub-criteria were determined. The neighborhood assessment system developed has been evaluated in terms of environmental, economic, social, cultural, and technological aspects in a holistic approach.

2. Sustainable Assessment Systems for Neighborhoods

Neighbourhoods are known as a building block of a city, which has their own architectural, cultural and economic systems (Reith and Orova, 2015) and a good starting point to create a sustainable community (Tam et al., 2018). A sustainable neighbourhood is a part of a sustainable urban development and requires the consideration of buildings, public spaces, transportation and infrastructure. A sustainable neighbourhood should provide a good living comfort to the residents. As the practices for the sustainability of cities and the importance of the issue increase, concerns about social, economic, and environmental sustainability are also reflected in urbanization plans. In this context, countries develop various policies and systems. While the current assessment systems that have been developed initially only consider individual buildings, it has been understood that building evaluation systems are not sufficient alone in solving the sustainability problems of urban societies since the beginning of this century, and they have started to be considered on a higher scale. Therefore, sustainable assessment systems can enable evaluations in three scales as individual buildings, neighborhood, and city.

According to Berardi (2011), the scale dependency of sustainability in the built environment is inevitable. The interaction of the building with the environment relates to the context of sustainability, which means that sustainability assessment should be contextualized. The scale dependence has shown the importance of expanding spatial boundaries in assessing sustainability to take into account the connections between a building and its surroundings. When sustainability is viewed from the community level, the social dimension remains minimal. This dimension is not taken into account in building scale assessments. However, whether it is a single building or a city, to ensure the social sustainability of the built environment; Providing mixed types of housing, preserving local heritage and culture, ensuring access to local infrastructure and services, involving interested parties in an integrated approach, providing social and cultural value over time and for all people are required (Berardi, 2011). Small-sized residential neighbourhoods face with difficulties in achieving sustainability concerns because of limited technical, human and financial resources, and specific environmental and socioeconomic conditions. In sustainability assessment small sized neighbourhoods can be primarily analyzed at three main components; buildings and land use, civil infrastructure systems, and socioeconomic well-being and subsequently sustainability objectives are considered (Haider et al., 2018).

Sustainability assessment systems have been used for many years. In particular, existing systems on energy, water, waste and infrastructure at both building and city/neighborhood scale have been studied by different researchers. Many researchers (Ameen et al., 2014; Bakar and Cheen, 2013; Castanheira and Bragança, 2014) emphasized that addressing building sustainability alone is not sufficient, although it has an important role in environmental assessment, and accelerated studies in this direction. According to Ameen et al. (2014) urban sustainability assessment methods have the potential to assist in striking a balance between human and environmental needs, thus enhancing the quality of life and economic competitiveness of the urban area. NSA tools become important for urban regeneration projects. The sustainability assessment tools can play a substantial role to improve the integration of the main aspects of urban regeneration such as local context, social wellbeing and economic prosperity, environmental quality, and stakeholder engagement at the neighbourhood level (Adewumi, 2020). Neighbourhood certifications systems can be helpful in getting communication between stakeholders and introducing sustainability aspects early in the planning processes (Wangel et al., 2016).

In global sustainability, neighborhoods play a major role and Neighbourhood Sustainability Tools are the latest generation of impact assessment tools (Sharifi and Murayama, 2014). Sharifi and Murayama (2013) defines NSA tool as a tool that evaluates and rates the performance of a given neighborhood against a set of criteria and themes, to assess the neighborhoods' position on the way towards sustainability and specify the extent of neighborhoods' success in approaching sustain-

ability goals. They mention about two categories of currently used NSA tools. While the first category consists of third-party assessment tools which assess the sustainability beyond a single building, the second one includes tools which are embedded into neighborhood-scale plans and sustainability initiatives to assess their sustainability performance.

Sustainability Assessment tools provides important contribution for the planning and design of better urban environments. There are several assessment tools developed to evaluate the sustainability of neighborhood. In literature the most encountered NSA tools are LEED ND, BREEAM Communities, DGNB UD and CASBEE UD. The existing NSA tools are evaluated from different perspective and their efficiency are discussed. Reith and Orova (2015) compares five NSA tools (LEED, CASBEE, BRE'09, BRE'12 and DGNB) considering their topics, indexes and indicators. The comparison of systems shows that although the tools are designed for particular goals to cover sustainability issues, certain areas of sustainable development are not covered or do not get enough attention. Further, it is found that the DGNB UD provides the best results in terms of covering the pillars of sustainability and also detailed indicators. While the CASBEE UD is different in the most aspects because of its different background, the LEED ND and BREEAM Communities is average at most issues (Reithe and Orova, 2015). Wangel et al. (2016) analysed BREEAM Communities and LEED ND. They pointed out that both of the systems have some limitations on that environmental and socio-economic impacts outside the development project's geographical boundary are included to a limited extent. Another limitation is that a number of sustainability aspects, such as toxic substances and emissions embodied in buildings and infrastructure, are not taken into account. Yiğitcanlar et al. (2015) focus on the geographic situations of developing countries that existing well-known NSA tools neglected. They develop a NSA tool for use in developing countries.

Tam et al. (2018) evaluates twenty major international green neighbourhood assessment systems regarding their sustainability coverage and features. Sustainability aspects are considered as transportation, infrastructure, ecology, resources, energy, community, location, economy and building. The evaluation shows that in most of the assessment systems, community, resources and ecology are the three major sustainability aspects. Here while the community refers to society, resources refers to economy and ecology points out the environment. However, in terms of weighting, ecology, energy, transportation, resources and economy get the highest rate but community has the lower rate of importance. The environment as one of the pillars of sustainable development can easily be highlighted in any assessment system (Tam et al., 2018). Beyond the building assessment tools, NSA tools include community as a new aspect. This is the fact that neighbourhoods play an essential role in forming community and social networks. Community participation is essential in the development of sustainable neighbourhoods (Deakin, 2011). Haapio (2012) indicates that the assessment tools are strongly related with the region they developed for. The characteristics of the region; national standards, regulations, building codes, cultural heritage, way of living and building culture directly affect the NSA tools. Even if the similar criteria are considered in terms of sustainability, the importance of each criteria may differ regionally. It is important for each country/region to develop its own NSA tools. Lin and Shih (2018) indicate that while some countries focus on resource and energy categories some disregard economic issues in the development of neighbourhood assessment tool. Pedro et al. (2019) reviews the widely used NSA tools and discuss the shortcomings of these tools. They reveals that there is a need for local actionable measures such as involvement of regulatory bodies to ensure the successful application of such systems. As Lützkendorf and Balouktsi (2016) mention sustainable urban development is usually part of national sustainability strategies. Cheshmehzangi et al. (2020) analyse eight Asian NSA tools (BERDE, BCA, GBI, IGBC,QSAS/GSAS, PCRS, BEAM and CASBEE). The analysis show that there are some common social, cultural, economic, and political conditions in these countries which differ from developed countries.

In 2015 the first version of Citylab Action's "Guide for Sustainable Urban Development" was released (Lind et al., 2017). The Guide differs from other certification systems by concentrating on the sustainability issues that are important for sustainable urban development rather than concentrating on only a certification system. It's focus is to facilitate a sharing of knowledge, experiences and ideas within the Swedish built environment sector. Thus, the Citylab certification system supports public and private stakeholders to have their project developed regarding specific sustainability issues. There is no certain framework that can be used in developing this kind of systems. However, Lind et al. (2019) suggest that a framework should involve three principles as Scientifically credible, Practical and Driving change. Mohsin et al. (2020) propose a sustainability framework to enhance the quality of life and mitigate the current problems, such as high energy consumption and demand, and traffic congestion, environmental pollution, and lack of effective planning. The framework is for urban development projects in hot and dry developing regions focusing on Iraq and based on three main dimensions as Future vision, Domestic features and Urban sustainability indicator. Sustainability indicators are considered as environmental and ecology, water, energy and solar energy, transportation, public services, and infrastructure factors, cultural, social, innovation, safety and security, economic and management. The framework can be adopted by other developing countries facing with population inflation and traffic problems.

The green neighborhood certification system is believed to be a meaningful way to get a low-carbon city realistically and effectively (Kim and Park, 2014). A green certificaton which is applicable to the Korean neighbourhood unit was developed for the five sectors as industry, transportation, households, green, and planning. The certification system was applied to Magok which is a new town in Seoul, Korea to demonstrate its applicability and usefulness. Results show that many parts needs to be developed. For instance, the involvement of cost-benefit analysis would be meaningful to improve public welfare.

Communities around the world are striving to be more equitable, environmentally sensitive and economically resilient. In this context, they use sustainability criteria to make evidence-based decisions, to understand the progress of their initiatives and their contribution to sustainability goals. In practice, it is not clear whether these criteria are sufficient for local sustainability and how they contribute to the sustainability (Lynch and Mosbah, 2017). Presence of healthy, safe and livable communities has become important and it has been inevitable to develop building, neighborhood and city-scale sustainability assessment systems and to formulate a number of policies in this direction. Komeily and Srinivasan (2015) mentions about four dimensions of sustainability as environmental, social, economic and intitutional. They state that these four dimensions must be in a balanced and equitable manner. The fourth one refers to intitutional dimension which relates to the policies, governing principles and structures, and regulations. Neighbourhoods sustainability assessment can be used to identify weaknesses in planning policies, strategies and instruments (Moroke et al., 2020).

Researchers highlight the social aspects in urban sustainability. Merino-Saum et al. (2020) demontrates that the most frequent indicators in urban sustainability are social aspects such as quality of life, access to services, consumer behaviour and employment. The lesser attention is given to environmental stakes. Maintaining cultural and natural heritage is considered as a vital part of sustainability in urban development. Borges et al. (2020) emphasize that neighborhoods should be dealt with as spaces of community building informed by different social, cultural, and political interactions rather than only physical, aesthetic, and historical contexts. Doussard (2017) points out the cultural profiles in developing NSA tools. The research examines how national NSA tools can be adapted or not to other countries' cultures. As the future of NSA tools one of the possibilities is that western NSA tools will probably be exported toward developing markets. This will result in restraining the diversification of assessment systems and cultures. The other possibility can be that developing countries will develop their own NSA system to expand their number and evaluation cultures.

In evaluation of existing sustainable neighborhood systems, it is seen that the systems are handled in a different way due to the conditions of each country. These tools suffer from "one-size-fit-all" vision (Komeily and Srinivasan, 2016); they are not adequate to influence urban development and this makes them inappropriate for application in both planned and the existing communities (Boyle, 2018). Chaguetmi and Derradji (2020) point out the main problems in the urban environment as energy, water, landscape and visual quality, and mobility. However, considering the sustainable development goals, energy, water, material, environment, transportation, socio-cultural conditions, economy, land use, community security and community health are among the topics to be highlighted to improve the quality of life for everybody. Each certification system covers most of these issues in accordance with the conditions of the country where they were developed. According to Dawodu et al. (2017) NSA tools are needed to evaluate the effects of climate change issues and rapid urbanization on countries. However, this can be achieved through a detailed understanding of the impact, dynamics and context of sustainability initiatives on the selected country.

2.1. Applications in Turkey

In the development process of the Sustainable Neighborhood Evaluation System for Turkey, the evaluation of similar examples available in Turkey would be valuable to be able to analyze comparatively and to provide information feedback. For this reason, technical studies and meetings were held with the relevant local institutions managing the process, to obtain detailed information about the three projects that differ in terms of geographical location and scale. The field studies were carried out by taking into account the defined sustainability criteria that guide these three projects in which existing evaluation systems are considered.

The first example is the Gaziantep Eco-City Project carried out by the Gaziantep Metropolitan Municipality. This project is aimed at protecting the ecological balance, maintaining the natural resources and natural balance in a sustainable way, protecting the flora and fauna, developing organic agriculture, ensuring energy efficiency and productivity, green space continuity and making the region a center of attraction with various cultural structures. In the scope of the project, an ecological city application design guide was prepared. This guide stands out as the first application tool that is handled together with the legal process in the relevant theme. The second example is the Seferihisar settlement in İzmir and received the title of 'Slow City' in 2009. Principle decisions such as lighting for renewable energy sources in public spaces, treatment plants, supporting local production and promoting sustainable transportation, especially within the scope of environmental policies, create a livable healthy environment by increasing the quality of life of the city. The third example

is 35th Street, located at Karşıyaka, İzmir. The 35th Street is a sustainable concept settlement, which has received many awards and has been shaped by design approaches that comply with many of the general principles of green certification systems at the neighborhood scale. The fact that the design and implementation of the project was carried out taking into account the BREEAM certification principles was decisive in its selection as an example (Olgun et al., 2020).

In Turkey, regarding sustainable assessment systems, there are studies carried out by Turkish Standardization Institute (TSE), Turkish Green Building Council (ÇEDBİK) and the Ministry of Environment and Urbanization. TSE has developed a local standard under the name of Safe Green Building Certificate (TSE, 2022). This standard is based on a buildings; security, fire and earthquake issues specific to our country were also taken into consideration. ÇEDBİK has created a National Green Building Certification system based on international certification systems. The purpose of this certificate is to create healthy societies, a livable environment and a developed economy. However, it is a certificate system at the building scale like TSE and has no legal acceptance (ÇEDBİK, 2022). The Ministry of Environment and Urbanization has developed a software (YES-TR). The aim is to create a sustainable green building certification system, which is a brand value unique to Turkey, by disseminating energy efficient and environmentally friendly building practices at national and local level, encouraging renewable energy technologies, and reducing carbon dioxide emissions. YES-TR will enable to provide valid certificate systems to be issued in a systematic way and an inventory of buildings with green building characteristics will be kept (CBS, 2020).

3. SEEB-TR Neighborhood –Neighborhood Sustainability Assessment for Turkey

Population growth and thus uncontrolled growth in cities, increase in human activities, change in the morphological structure of the urban texture, etc. bring along economic, social and environmental problems. Intense urbanization and destruction of the natural environment negatively affect the micro-climate and trigger global warming. At this point, the phenomenon of sustainable urbanization gains importance. Systems have been developed to reduce the negative effects of architectural and urban designs on the environment during application and use, and even to provide positive effects. These systems target environmentally, economically, culturally and socially sustainable buildings and cities. In this direction, it can be possible to evaluate settlements designed with a holistic approach that is compatible with nature, suitable for the region and climate data, energy efficient, envisaging the use of renewable materials and waste management, and sensitive to ecosystems and ecological structure (Seçkin and Baççıoğlu, 2020). There is no mechanism for local adaptability and participation (Sabour, 2015). No great neighbourhood sustainability tool is available to assess neighbourhood development in developing countries. This reveals the shortcomings of the assess¬ment tools and confirms that developing countries should develop their own tool (Shwe et al., 2018). NSA tools provide major contribution in the transition towards sustainable urban development. These tools make significant contribution to environmental sustainability issues while they fail in socio-economic contributions (Sharifi et al., 2021).

Evaluation systems such as LEED and BREEAM, which are widely used in Turkey, take into account the issues related to sustainability, but since they are developed in accordance with the laws and regulations of their own countries, there is a need for a regulation that will comply with the laws and regulations of our country, and how this regulation will be made cannot be clearly defined. For this reason, it is obvious that a system that will be developed specifically for our country will be more beneficial in terms of protecting our natural resources. It would be appropriate to develop an evaluation system in accordance with the conditions and laws of our country by examining not only widely used evaluation systems, but also some other existing systems.

In this context, regarding their regional characteristics and general uses, eight of the existing NSA tools are evaluated in this study; BREEAM Communities, England (2017); LEED ND, America (2011); DGNB UD, Germany (2016); CASBEE UD, Japon (2014); QSAS NH, Quatar (2017); GREEN MARK for Districts, Singapore (2017); GREEN STAR Communities, Avustralia (2016); PCRS for Estidama, Abu Dhabi (2010). These tools have been analyzed in detail, taking into account their reason, purpose, scope, prominent features, criteria, and scoring systems (Baççıoğlu and Turgut, 2020). Table 1 gives information about these systems. The results of the evaluation contributed to the development of SEEB-TR Neighborhood.

Sustainable neighborhood systems, which protect the natural environment and save energy by increasing urban quality and sustainability, are important in terms of economic contribution, increasing the quality of life of urban space stakeholders, contributing to national energy and environmental policies related to the city.

When issues such as sustainability, Sustainable Development Goals, and climate change are considered, criteria similar to existing certification systems have been handled in accordance with our own laws and regulations and have been included in the SEEB-TR Neighborhood evaluation system. The quality of life, comfort and safety of users, which are utilized differently in the existing certificate systems, is a very important and neglected issue in Turkey. For this reason, as a result of the workshops held, it has emerged that it would be appropriate to have a separate criterion under the title of community.

Table 1. Eight neighborhood assessment systems

	LEED ND	BREEAM COMMUNITIES	BCA GREEN MARF FOR DISTRICTS	GREEN STAR COMMUNITIES	CASBEE UD	GSAS/QSAS NH	DGNB UD	PCRS FOR ESTIDAMA
FULL NAME	Leadership in Energy and Environmental Design for Neighborhood Development	Building Research Establishment Environmental Assessment Method-Communities	Building and Construction Authority Greenmark for Districts	Green Star Communities	Comprahensive Assessment System for Built Environment Efficiency for Urban Development	Global Sustainability Assessment System / Qatar Sustainability Assessment System Neighborhood	Deutsche Gesellschaft für Nachhaltiges Bauen (German Sustainable Building Council-Urban District).	Pearl Community Rating System for Estidama
COUNTRY	USA	United Kingdom	Singapore	Australia	Japan	Qatar and Gulf Arab Countries Cooperation	Germany	Abu Dhabi (UAE)
DEVELOPER	USGBC	BRE	BCA	GBCA	IBEC	GORD	DGNB	DPM
PUBLICATION YEAR	2007	2008	2009	2012	2006	2009	2011	2010
FAMILY	• LEED ND • LEED BD+C • LEED ID+C • LEED O+M • LEED Homes • LEED Cities and Communities	• BREEAM Infrastructure • BREEAM New Construction • BREEAM in-use • BREEAM Refurbishment and Fill-out	• Green mark for districts	• Green Star Design &As Built • Green Star Interiors • Green Star Performance	• Housing • Building • Urban • City	• GSAS Districts and infrastructure • GSAS Neighborhood	• Existing buildings • New construction • Interiors • Districts	• Pearl building rating system • Pearl villa rating system • Pearl operational rating system
SPATIAL SCALE	Regions that contain at least two habitable buildings and not larger than about 6 km2.	There is no area size. Qualitative data such as education and transport infrastructure are taken into account.	Districts with mixed uses and land area of at least 20 hectares. Districts include residential, commercial, industrial and business areas.	Communities assesses the planning, design and construction of large scale development projects at a precinct, neighbourhood and/or community scale.	Used to assess both small and big areas covering various numbers of buildings. Areas are divided into two; the high-use city center with a base-area ratio of greater than 500% and low-use city center where it is less than 500%.	There is no area size. Neighborhood refers to an area within a district.	The neighborhood should be at least 2 hectares and should have a few buildings and at least 2 building areas, public spaces and related infrastructures. It is stipulated that the ratio of residential use to the entire neighborhood should not be less than 10% and higher than 90%.	Urban development projects that will support a residential population of at least 1000 people.
MAIN CRITERIA AND WEIGHTS	• Smart location and linkage, 25 % • Neighborhood pattern and design, 40% • Green infrastructure and Buildings, 26 % • Innovation and design process, 5% • Regional priority credit, 4%	• 9% Governance • 15% Local Economy • 17% Social Well-being • 21% Resources and Energy • 13% Land use and Ecology • 14% Transport and Movement • 11% Environmental Conditions	• 17%, Energy efficiency • 11%, Water management • 16%, Material and waste management • 23%, Environmental planning • 19%, Green buildings and gren transport • 14%, Community and innovation	• 26%, Governance • 20%, Liveability • 19%, Economic prosperity • 26%, Environment • 9%, Innovation	• QUD1 Environment • QUD2 Society • QUD3 Economy • LUD1Traffic-based CO2 release • LUD2 Buildingbased CO2 release • LUD3 CO2 absorption of green sector	• 7%, Urban connectivity • 13%, Site • 24%, Energy • 16%, Water • 10%, Materials • 16%, Indoor / Outdoor Environment • 7%, Cultural and economic value • 7%, Management and operations	• 22.5% Environmental quality • 22.5% Economic quality • 22.5% Socio-cultural and functional quality • 22.5% Technical quality • 10% Process quality	• 6%, Integrated development process • 10%, Naturel systems • 22%,Livable communities • 23%, Precious water • 26%, Resourceful energy • 11%, Stewarding materials • 2%, Innovative practice

Sustainable Energy Efficient Buildings (SEEB-TR) green building certification system (SEEB-TR, 2014) developed in Mimar Sinan Fine Arts University, in 2014 has been taken as a base for the development of the sustainable neighborhood assessment system. SEEB-TR Building has been designed for existing, renovated, and new buildings. It consists of 13 main criteria (Energy, Water Efficiency, Material Use, Comfort and Health, Land Use, Waste Management, Project and Construction Management, Operation and Maintenance, Pollution, Adaptability, Fire, and Disaster Safety, Design and Innovation) and their sub-criteria. It allows users to test their buildings online.

Table 1 (cont.). Eight neighborhood assessment systems

	LEED ND	BREEAM COMMUNITIES	BCA GREEN MARF FOR DISTRICTS	GREEN STAR COMMUNITIES	CASBEE UD	GSAS/QSAS NH	DGNB UD	PCRS FOR ESTIDAMA
SCORES	• Certified, 40–49 points • Silver, 50–59 points • Gold, 60–79 points • Platinum, 80 points and above	• Outstanding≥ 85 • Excellent≥ 70 • Very good≥ 55 • Good≥ 45 • Pass≥ 30 • Unclassified< 30	• Platinum 100 and above • Green • Gold Plus 90 to < 100 • Gold 75 to < 90 • Certified 60 to < 75	• One Star Minimum Practice 10-19 • Two Star Average Practice 20-29 • Three Star Good Practice 30-44 • Four Star Best Practice 45-59 • Five Star Australian Excellence 60-74 • Six Star World Leadership 75+	• Q (environmental quality inside urban development area) and L (environmental load on the outside of the area). Built Environment Efficiency (BEE) = Q/L • Superior (S) (BEE≥3.0 and Q≥50) • Very Good (A) (BEE 1.5-3.0; BEE≥3.0 and Q<50) • Good (B+) (BEE 1.0-1.5), • Slightly Poor (B-) (BEE 0.5-1.0), • Poor (C) (BEE<0.5)	• X < 0 Certification Denied • 0.00 ≤ X ≤ 0.50 1 star • 0.50 < X ≤ 1.00 2 stars • 1.00 < X ≤ 1.50 3 stars • 1.50 < X ≤ 2.00 4 stars • 2.00 < X ≤ 2.50 5 stars • 2.50 < X ≤ 3.00 6 stars	• Platinum ≥80 • Gold ≥65 • Silver ≥50 • Bronze ≥35	• All mandatory credits 1 Pearl • All mandatory credits + 55 credit points 2 Pearl • All mandatory credits + 75 credit points 3 Pearl • All mandatory credits + 100 credit points 4 Pearl • All mandatory credits + 125 credit points 5 Pearl

The evaluation of eight neighborhood sustainable systems shows that each system has a family. In this context, the system developed at neighborhood scale is named as SEEB-TR Neighborhood and created a family with the building certification system. When the SEEB-TR Building system was developed it was presented to the experts in the field of construction for verification. The experts suggested to make it more compact as it covered too many parameters that would not be practical for use. Therefore, the SEEB-TR Neighborhood was designed to cover main concerns of sustainability. Then the sub-criteria of each main criterion address the issues important for Turkey. The main criteria of Energy, Water and Material Use in the SEEB-TR Building have been maintained at the neighborhood scale. "Land Use" and "Waste Management" in SEEB-TR Building are discussed under the main criteria of "Environment" in SEEB-TR Neighborhood. Nowadays, where the safety of the city dwellers and the protection of the culture and heritage of the city come to the fore, these issues have taken place under the main criterion of "Community". Similar criteria are included in existing certification systems evaluated in this study and their importance for the future of cities is emphasized. Briefly, the system developed specifically for Turkey consists of 5 main criteria; Energy, Water, Materials Use, Community and Environment and 20 sub-criteria as shown in Table 2 (Ergönül et al., 2020). In this paper, the purpose, scope and basic principle of each main criterion are presented to share the general considerations of the SEEB-TR Neighborhood.

When the existing assessment systems and literature are evaluated, it is seen that every country needs some regulations, laws and systems to protect its natural resource, and steps have been taken in this direction. Sustainable assessment systems also contribute positively to the formation of space in this context. Establishing an assessment system specific to Turkey is also important in terms of compliance with its own legislation. In the workshops held with the participation of experts in their fields, the idea of considering the evaluation system within the scope of the current legislation in Turkey and focusing on the criteria in that direction comes to the fore.

3.1. Energy

One of the important goals of Sustainable Development is "affordable and clean energy" (UNDP, 2021). The pollution caused by exhaustible energy resources and the thought that these resources could be depleted one day made it necessary to construct buildings and settlements consisting of these types of buildings that are self-sufficient, using sustainable energy resources, giving the least harm to nature and not polluting them. Environment, energy and comfort concepts, which are increasingly important today, have brought a new dimension to the design phase of the project process. This dimension necessitates the re-evaluation of buildings and its environment that have an important share in world energy consumption in these aspects, and the designers to consider criteria such as climatic data, protection of the environment and resources, and utilization of renewable energies as part of the design concepts (Özgünler, 2020). Turkey provides the vast majority of energy consumed from other countries. This puts a big burden on the economy. The report prepared by Çakan (2019) about national energy efficiency points out that Turkey has an average annual saving of 30 percent, in other words, an energy efficiency potential of approximately 1.3 billion dollars.

Table 2. SEEB-TR neighborhood sustainability assessment for Turkey

MAIN CRITERIA	SUB-CRITERIA
ENERGY	Energy Efficiency
	Energy Demand
	Energy Distribution
	Energy Monitoring and Management
	Outdoor Lighting
	Renewable Energy
	Heat Island Effect
WATER	Water Consumption
	Rain Water Consumption
	Waste Water Usage
USE OF MATERIAL	Use of Local Materials
	Certified Material Use
	Economic Material Usage
	Sustainable Use of Materials
COMMUNITY	Safety / Security
	Community Participation
	Developing Cultural and Heritage, Identity
ENVIRONMENT	Land Use and Ecology
	Transportation
	Waste Management

In this context, it is important to increase the efficiency of use of energy and energy resources. The first and most important step taken in Turkey in this regard is the "Energy Efficiency Law" numbered 5627, which was published in the Legal Gazette dated 02 May 2007. The purpose of the law is to increase efficiency in the use of energy resources and energy in order to use energy effectively, to prevent waste, to alleviate the burden of energy costs on the economy and to protect the environment (Energy Efficiency Law, 2007). The energy efficiency law, including the "Regulation on Thermal Insulation in Buildings", which was forced in 2000, and the "Renewable Energy Law" in 2004, allowed a holistic evaluation of many issues mentioned in the current legislation regarding measures to reduce heat losses in buildings.

Energy is therefore one of the main criteria for SEEB-TR Neighborhood Assessment System. Table 3 summarizes the Energy criteria in terms of aim, scope and basic principles. It is thought that it would be appropriate to deal with the energy issue under 6 sub-headings in the system as shown in Table 2. *Energy efficiency* refers to ensure that plans are made to keep the energy/benefit ratio at a minimum while meeting the needs for health, comfort and security in public spaces and buildings; to control the total amount of energy usage;

Table 3. Energy

Aim	Scope	Basic Principles
In living areas; while meeting health, comfort and safety/security needs, to prioritize the use of renewable energy sources to minimize energy consumption, to ensure the planning of energy use in the most efficient way by developing energy awareness throughout the society, and to ensure the control and monitoring of energy use during operation.	Ensuring that all kinds of efforts are made to reduce energy consumption by encouraging the use of national natural energy resources, and developing incentives and technologies for this purpose.	• Awareness-raising activities to ensure energy efficiency, • Encouraging the use of renewable energy sources, • Establishing a holistic energy approach for public spaces and buildings, • Ensuring the control of processes to provide energy efficiency.

to increase the energy efficiency for all needs. *Energy Demand* is conducting spatial and architectural studies aimed at minimizing energy consumption without causing a decrease in production quality and quantity; reducing energy demand through the smart city and building applications; reducing energy loss with the building envelope designed under the current geography and climate. *Energy Distribution* refers to the control of energy distribution systems in public open areas, to prevent unnecessary use and to direct energy use in time zones where industrial consumption is reduced. *Energy Monitoring* and *Management* provides improvements as a result of the feedback studies to be carried out for the control and follow-up processes; provides the reduction of interruptions and losses, and the development of distribution mechanisms for this purpose. *Outdoor Lighting* is to ensure efficiency in public open spaces with the selection of smart automation systems and lighting elements. *Renewable Energy* is encouraging the studies and planning that will prioritize the use of renewable energy sources while meeting health and comfort needs in public spaces and buildings; encouraging and expanding the use of renewable energy sources by reducing the consumption of non-renewable energy resources in buildings across the country; increasing energy efficiency by integrating units using renewable energy into the system. *Heat Island Effect* is the reduction of the heat island effect, which has an impact on global warming and disrupts the ecological balance.

3.2. Water

Water, which is an important title among the consumed resources, is ahead of energy resources today and therefore requires a more permanent and holistic management approach. Green certification systems, which have become widespread on a global scale, have become an important part of this management approach. Criteria, which bring detailed expansions especially regarding the supply, use and conservation of water, also meet the basic criteria of smart urbanism, which aims sustainable growth and urban development with high quality of life. With an approach that considers the increasing water needs of rapidly growing cities together with the protection and de-

velopment of existing resources, strategic actions are aimed to reduce water consumption. In this sense, the design and engineering approaches towards obtaining green certificates and their contribution to the production of innovative solutions for water management are not far from smart city applications. Water is also directly related to how neighborhoods are designed and developed. Beyond preventing water pollution, it is necessary to ensure the protection of water quality, to diversify the water resources and classify the types of use for water quality (rainwater, groundwater, surface water, mains water, gray and black water, etc.) to be managed efficiently and allocated to the most appropriate use (Olgun and Tekin, 2020).

While the main policy documents are considered as the reflection of the goals that emerged in line with the social expectations and issues of interest to the international public, on the country's policy, it also carries important frameworks related to water as a rapidly depleted resource value (Aybuğa, 2015). The EU Integrated Environmental Adaptation Strategy, Information Society Strategy, Eleventh Development Plan and National Climate Change Strategy Document clearly show us why we need to strengthen the planning and design tools that will enable effective resource management and therefore effective water management.

The implementation of the principles underlined by the strategy documents, by many relevant units, especially local governments, based on legislation, requires coordination on projects to be developed on the basis of integrated policies in water management, inter-scale and unit-based. The implementation of the principles underlined by the strategy documents, based on legislation, by many relevant units, especially local governments, requires coordination on projects to be developed on the basis of integrated policies in water management, inter-scale and unit-based. In the legislation, the Municipality Law, within the scope of the duties and authorities of the municipal organization, to carry out services such as water supply, sewerage, wastewater services, removal of rain water and in this context, the evaluation of the establishment of geographical and city information systems makes the local administration the leading actor in water management.

In the scope of law, "establishing an infrastructure coordination center to be determined by regulation in order to carry out infrastructure services in coordination" and that this established legal authority has the feature of being an inter-stakeholder board at a local scale is extremely important. The fact that it is mandatory to provide all kinds of information and documents "including geographic information systems" that the infrastructure coordination center will demand from public institutions and organizations and private organizations makes the operability of the system more effective. When looking at Istanbul in particular, the Law on the Establishment and Duties of the General Directorate of Istanbul Water and Sewerage Administration defines broad powers and duties to the General Directorates of Water and Sewerage Administration among the water-related service organizations at the local level (İSKİ, 1981).

Especially three items defined within the scope of these powers and duties make the SEEB-TR Neighborhood assessment system an important application tool for local governments (Aybuğa, 2015);

- Carrying out studies and projects of all kinds of facilities in order to provide drinking, utility and industrial water needs and to have them operated,
- Planning, project and operation of all kinds of facilities for the collection of used water and precipitation water and removal from settlements,
- Preventing the pollution of water resources in the region and taking all kinds of technical, administrative and legal measures in this regard.

Table 4 gives information about the water criteria in system proposed. The criterion is taken into account at three matters as shown in Table 2 to use water efficiently. *Water Consumption* aims to avoid unnecessary water use and unwanted losses to reduce water consumption by considering the necessary needs and comfort conditions; to create alternative water resources within the scope of the integrated water cycle. *Rain Water Consumption* encourages the use of rainwater to be returned to nature in its pure form without additives, to protect natural resources by reducing the use of water obtained from the city network in water consumption. *Waste Water Usage* is meeting the water needs through different sources to reduce the use of water obtained from the city network. For this reason, it is to ensure the recycling of wastewater (grey water, sewage water, black water, etc.) by purifying them with a suitable and central purification system, and to protect water resources by encouraging the use of the obtained purified water within the scope of the need.

3.3. Use of Material

In various sustainable assessment systems, the use of materials is one of the common issues discussed. The reasons to include the use of materials in sustainable assessment systems are; the decrease of natural resources day by day, damage to the ecosystem while obtaining the raw material, the use of energy is very high while producing the material and the release of harmful gases to the environment, increasing the use of fossil fuels and environmental pollution by the transportation of the material over long distances, the material has a negative effect on indoor air quality during use. As a result, the material has negative environmental effects throughout its life cycle from cradle to grave, and it has few reusable and recyclable possibilities. Energy reductions have gained great

Table 4. Water

Aim	Scope	Basic Principles
It is to ensure efficient use of water integrated with alternative sources by reducing the water consumption for the needs without making any difference in spatial scale and without sacrificing the necessary comfort and hygiene conditions. It is the transformation of the infrastructure system equipment and defined infrastructure system to be water-saving to take water-saving measures depending on the project subject and the user needs from urban to building scale.	It is the reduction of the amount of water spent for hygienic and other uses, by making the decisions of building systems in protecting the environment and resources (in proportion to the high cost of replacement) and by encouraging the use of all kinds of systems, technologies and different resources other than city water to reduce water consumption.	• Creating integrated water resources, • Creating alternative water resources, • Establishing holistic project and application approaches for buildings and urban open spaces, • Protection of water resources.

importance with the use of less energy-consuming and more efficient equipment, process optimization studies and energy recovery investments in the production of building materials (Tekin and Hanyalı, 2020). In this direction, it is important in terms of sustainability that the material is Local, Certified, Economic and Sustainable in material selection.

When looking at the policies related to construction materials in Turkey, standards started to be defined in the 1960s and gained a more dynamic structure with neoliberal policies in the 1980s. However, with the adoption of the Construction Materials Regulation in 200, we can see that it does not have a developed structure with its own internal dynamics, but has developed more with the effect of foreign markets.

The manufacturer in Turkey is developing with the aim of meeting the requirements of the foreign market with the aim of taking part in the foreign market. The 2007 Construction Materials Regulation and the application principles of this regulation brought the production, producer and consumer to the international level and also created awareness. It also created an inquiring internal consumer. More external consumers and producers, who are questioning and whose awareness has started to develop, have started to take on their more dynamic/innovative/environmental identities. Thus, the manufacturer voluntarily takes part in the process of producing according to international (ISO) standards and being a brand / being different in the changing global production environment.

In this picture, the majority of the population continues the traditional building production approaches, even though it is possible to control the building material processes and develop through the requirements of the foreign market. The change should be structured in accordance with the characteristics of the segment in which the population is predominant. For this reason, the material criteria in the SEEB-TR Neighborhood System are a prelude to change.

The building culture, material selection and usage habits, and the policies developed and implemented within this culture are important for the assessment system to be successful. In the determination of the sub-headings under the material title of proposed assessment sytem, it has been tried to ensure that the consumer, as a national designer/user/contractor, can go through the stages that can be changed and easily adapted at the first stage, based on international approaches. Considering the sanctions that support these aims in today's conditions; Existing legislations such as Construction Material Regulation, Environmental Label Regulation, Environmental Inspection Regulation, Regulations for the Control of Air and Water Pollution, ISO 14040/44 standards; have the ability to control the producer. Although there is no legislation/sanction/incentive that directs the consumer's material selection, there is information that directs material selection and use within the insulation (heat, sound, fire and water) regulations.

The assessment systems define the material and are based on the scoring principles in case the consumer chooses these materials. There is not yet a widely used system in Turkish conditions. For this purpose, first of all, this awareness should be created in the national consumer center starting from a small scale. Therefore, the first version of the SEEB-TR Neighborhood aims to raise awareness and change behavior. This purpose has a content that is fed with the local characteristics of the consumer and that can define this change mainly through visible features. It has also a content where results can be obtained in a short time, such as revitalizing the local economy, using economical and safe materials, and using durable materials in multi-user spaces, and the results can be felt quickly. These goals are supported by the use of low-dose labeled, certified materials.

In SEEB-TR Neighborhood, Material section which, is explained in Table 5 was considered at four sub-headings (Table 2). *Use of Local Materials* is encouraging the use of local materials produced in close or distant borders to the project area, stimulating the local economy, reducing consumption and environmental impacts that may occur with *transportation*. *Certified Material Use* is ensuring the production-selection and use of materials with reduced environmental effects by increasing the awareness of producer-designer-user in the building material sector. *Economic Material Usage* is to reduce the use of new materials in the project area; it is to improve the reuse and recycling possibilities of existing materials, components, building elements or construction-excavation wastes, and to enable them to be used as a resource in the production of new materials. In the selection of materials, *Sustainable Use of Materials* refers to ensure that the service life is long and economical materials are selected for maintenance and repair, and the production technologies of the material manufacturers are changed in a way that they have durable, economical and reusable features with the increase of the user's demands on this issue.

Table 5. Material use

Aim	Scope	Basic Principles
Providing construction material production technologies that have durable, environmentally friendly, reusable, economical production technology; the development of user awareness with the increase of local products in the market, the widespread of the environmentalist approach in material selection and use, thus, to ensure the production, selection and use of reusable materials with low environmental effects following the project requirements. To ensure the production and use of domestic materials that can provide the necessary physical comfort conditions within the scope of the project, in the production, use and reuse stages, with economic, durable, human and environmental health effects eliminated or minimized.	Strengthening the domestic economy, improving reuse and recycling technologies, ensuring the reusability of materials or components for different purposes, minimizing human and environmental impacts by increasing the production and use of certified materials, developing local R&D activities in material production, and developing durable economic material production technologies.	• Encouraging local material production and expanding its use, • Reducing the use of natural resources in material production, • Reducing the use of new materials, developing recycling and reuse technologies, • Extending the production and use of materials with low environmental impact, • Encouraging the production of durable materials with long service life.

3.4. Community

SDG Goal 11, sustainable cities and communities, in sustainable development goals refers to make cities inclusive, safe, resilient and sustainable (UNDP, 2021). A city can be defined as sustainable for centuries when it is both economically and socially sustainable and is also protected against various dangers and threats to which the city is exposed. Safe cities/communities are known as a city/community where the people living in that city/community can lead their daily lives in an environment that does not include various risks such as fear, violence and injury. Unfortunately, with the increasing population of cities all over the world, the increasing needs and unfavorable economic conditions have made cities no longer safe living spaces. Urban dwellers need safe roaming areas and therefore security to ensure their daily lives, meet their needs and communicate with each other. Community safety is not only about reducing and preventing injury and violence, but also about achieving economic well-being and social balance, and it is about building participatory communities. The safety of the houses, circulation areas, public spaces and the working places are important in the creation of livable communities (Ergönül and Turgut, 2020).

The issues of safety/security, community participation/accessibility and Developing Cultural and Heritage Identity come to the fore in the studies to increase the quality of life of the society.

In creating safe living environment for the society, the laws and regulations valid in Turkey are applied and the health and safety of employees is handled within the framework of the Occupational Health and Safety Law (OHS, 2017). In order to prevent disasters, legislations related to earthquake and fire regulations are taken into consideration. Establishing an effective disaster management plan, arranging the necessary measures and incentives to ensure the safe living conditions of the society, taking the necessary measures for the safe development of the region, ensuring compliance with the laws and encouraging stakeholder participation in all processes are handled according to the Legislation on Disaster and Emergency Situations (Disaster and Emergency Regulation, 2015).

Regulations and guidelines are created to produce solutions that include everyone in order to increase the quality of the livable environment. The City Council Regulation (City Council Regulation, 2016) came into force in 2006 sets principles for the development of the city vision and citizenship awareness, the protection of the rights and laws of the city, sustainable development, environmental awareness, social assistance and solidarity, transparency, accountability participation and governance.

In Turkey, there are legislative regulations for designing for everyone and building accessible living spaces. Therefore, Zoning Legislation; especially the Zoning Law No. 3194, Planned Areas Zoning Regulation, Parking Lot Regulation and Building Inspection Implementation Regulation; on the other hand, according to the provisions in the disability legislation including the UN Convention on the Rights of Persons with Disabilities and the Law on the Disabled No. 5378 are taken into account. In addition, the Accessibility Monitoring and Auditing Regulation have been published in 2013 (Accessibility Monitoring and Auditing Regulation, 2013). One of the most important components of accessibility legislation is standards.

The accessibility standards are determined by the legislation as the standards published by the Turkish Standards Institution regarding accessibility. T.R. The Ministry of Family and Social Services, from individuals' residences to educational buildings to workplaces; An Accessibility Guideline has been created to ensure that all areas and all services are accessible from open and green spaces, public transportation vehicles to information and communication technologies. The historical and cultural values of the region are evaluated and protected by the cultural heritage preservation boards. In the SEEB-TR Neighborhood system, the community criterion was handled to cover all these legislations, issues and regulations and, aimed to contribute to the creation of more livable spaces for the community. Table 6 defines the aim, scope and basic principles of community issue in the system.

Table 6. Community

Aim	Scope	Basic Principles
To improve the livable environmental quality, to make arrangements that can ensure the harmony of the society; to create disaster and crime prevention environments where community security can be ensured; to increase the historical and cultural value of the region, if any, it is to be able to protect and use historical and cultural assets in urban development decisions according to their original characteristics.	To create an effective disaster management plan by the relevant laws and regulations, to arrange the necessary measures and incentives to ensure safe living conditions for the society; To take the necessary measures for the safe development of the region, to ensure compliance with the law; to encourage stakeholder participation in all processes.	• Creating a disaster management plan, • Ensuring community security, • Increasing the value of the region by improving its cultural and heritage identity, • Ensuring stakeholder engagement.

Community is considered at three sub-headings (Table 2); *Safety/Security* refers to the measures to be taken against disasters that may occur depending on the characteristics of the project area; it is the provision of safe living conditions to increase the life safety and quality of life of individuals. *Community Participation* is ensuring the participation of all stakeholders at every stage of the city's development process, raising awareness for sustainable living. *Developing Cultural and Heritage Identity* is secures the development and preservation of historical and cultural heritage; increases the users' sense of place and identity. To ensure a safe city; it is essential to increase the work and life quality and economic prosperity of the inhabitants of the city, to improve transportation and communication networks, to improve the social and cultural environment and to protect the cultural heritage.

3.5. Environment

As cities continue to grow, with the increase in demand for housing and infrastructure facilities, the consumption of natural resources, the potential for air, water and soil pollution, the damage to biodiversity, and the acceleration of climate change will increase the threats; precautions for taking sustainable planning and design decisions will play a critical role. The ability of cities to respond to the impacts of climate change will be of critical importance with the right decisions to be taken on issues such as infrastructure, ecology strategy, and land use. For this reason, environmental criteria in the neighborhood certification system are of great importance. When the current certification systems are analyzed, it is seen that highlighted issues affecting the natural environment are; land use and/or selection, reuse of contaminated land, design of mixed-use settlements, conservation of water resources and soil of wetlands, efficient water use, ecology strategy, conservation of biodiversity and habitats, green surface and increasing the areas, reducing the heat island effect and waste management (Seçkin and Başçıoğlu, 2020). For this reason, Land Use and Ecology, Transportation and Waste Management stand out as issues to be considered within the scope of environmental criteria.

In Turkey, the 'Soil Conservation and Land Use Law' No. 5403 is valid for land use (Soil Conservation and Land Use Law, 2005). This law defines the procedures and principles that will ensure the protection, development and planned land use of the soil by preventing the loss of natural or artificial means and loss of its qualities. It covers the definitions and methods related to the identification and classification of land and soil resources, preparation of land use plans, prevention of misuse and creation of methods to provide protection. As stated in this Law, the protection of the soil in all kinds of initiatives and investment processes that require land use, the prevention of soil loss as a result of natural and artificial events, is ensured by the implementation of land use plans, agricultural land use plans and projects and soil protection projects. These issues are detailed in the Regulation on the Protection, Use and Planning of Agricultural Lands (2017). In addition, the Zoning Law (1985), the Forestry Law (1956), the Protection Against Flood and Floods Law (1943), the Wetlands Protection Regulation (2014) constitute other relevant legislation. The identification, registration, approval and amendments of national parks, nature parks, nature monuments, nature protection areas and wetlands are carried out in accordance with the "Regulation on Procedures and Principles Regarding the Identification, Registration and Approval of Protected Areas" (2012).

The creation of ecological corridors, ecological rehabilitation/restoration and reclaiming of lands through rehabilitation methods are important especially for the areas that have important biodiversity values in terms of species, genetics, habitat and ecosystem diversity; that is ecologically important in terms of hydrological-hydrogeological; that have social, cultural and recreational value that provide resource and landscape integrity. Mainly, the Law on the Protection of Cultural and Natural Assets (1983) and the Law on National Parks (1983), which are based on the protection of nature and wildlife, contain details on the subject. The Convention on Biological Diversity (1996) was ratified by our country with the law dated 29.08.1996 and numbered 4177 and entered into force in 1997. Accordingly, the protection of biological diversity, sustainable use of biological resources, and fair and equitable sharing of the benefits arising from the use of genetic resources are essential.

Another important issue regarding the environment is the design of the urban transportation system in a way that will reduce environmental pollution and increase quality of life. In this context, solutions that reduce automobile dependency and support public transportation systems, bicycle and pedestrian transportation come to the fore. These matters are carried out within the framework of the legislation established by the Municipalities and the Ministry of Transport and Infrastructure of the Republic of Turkey.

Considering that the construction industry is one of the industries that consumes the most energy and natural resourc-

es and produces the most waste; for a sustainable future, it is important to carry out the construction process in a way that does not harm the environment and human health. It is one of the main requirements to minimize the wastes that will arise during the construction and usage stages and to ensure their effective management in a way that will not harm the environment. The management of wastes, from their generation to their disposal, without harming the environment and human health, is carried out within the scope of the "Regulation on the General Principles of Waste Management" (2008). Medical, solid, earthwork, dangerous, etc. wastes are also evaluated with the regulations issued under their own headings.

In the development of SEEB-TR Neighbourhood, all these regulations, laws and legislations were taken into accout and designed to improve environmental conditions in terms of sustainability. Table 2 and Table 7 describes the Environmental issues. In this context, *Land Use and Ecology* is preventing the project from taking place in lands that will adversely affect the ecological structure and natural resources, preventing pollution while using the land, preserving the ecological value of the land, improving biodiversity, and protecting the landscape character. *Transportation* is the evaluation of transportation connections in terms of alternative transportation preferences and public transportation within the framework of land use and transportation relationship. *Waste Management* is the minimization of waste that will occur during the construction and usage phases and effective management that will not harm the environment.

Table 7. Environment

Aim	Scope	Basic Principles
Ensuring that the land is used following the environment and that its negative impact on the environment is minimized while being used; ensuring effective management without damaging the existing natural resources and protecting the natural structure of the land, minimizing the wastes that will occur during the construction and usage phases and not harming the environment; planning by considering land use, social equality, housing and functional diversity; This planning includes the alternative energy use of transportation connections and public transportation.	Ensuring awareness of natural resources and land characteristics, determining strategies for the protection and development of natural habitats in the field, and determining appropriate methods for reducing, storing, recycling and/or disposing of wastes that will occur during the construction and use phase; The transportation connections between the buildings and the transportation relations they establish with the close environment are considered with a sustainable transportation planning.	• Protecting the ecological value of the land and natural resources, improving biological diversity, • Adopting mixed-use as a principle, handling pedestrian and bicycle paths together, arranging pedestrian areas to be continuous, • Handling pedestrian and bicycle paths integrated with public transportation together, arranging pedestrian areas to be continuous, • Prioritizing electric vehicle discharge stations in determining the parking lot capacity. • Minimizing the wastes during the construction and usage phase, encouraging the use of waste resources. • Establishing an effective waste management plan, promoting an environmentally friendly waste treatment system.

4. Discussion and Conclusion

Cities that have solved problems such as employment, education, health, safety and accessibility within the scope of cultural, environmental, economic and social resilience will provide their citizens with sustainable and safe cities with a high level of welfare. Such a city formation can take place with a multi-participatory approach. Sustainable assessment systems are important issues in terms of the quality of life in cities, community welfare and security. Systems developed by bringing all actors together will make positive contributions to urban life in a holistic framework.

The eco-city, ecological urban design and planning projects that have been recently witnessed in Turkey are limited in number; examples cannot be reproduced quickly; for the same reason, examples included in the green certification system cannot be found. Although an increasing number is observed over the years in projects that have received green building certificate as a single building or building complex, there is no example that has obtained a green neighborhood or settlement certificate. However, a few examples developed with different content in the ecological city model and neighborhood scale have been evaluated in this context.

In Turkey, where LEED and BREEAM certification systems preferred at building and urban scale, although individuals and institutions are working on the local certification system to date, there is no officially defined certification system yet. SEEB-TR Neighborhood has been developed to take into consideration the conditions in Turkey. As a result of detailed analysis of existing certification systems, it was thought that it is important for the certification systems to be connected to a family in terms of continuity, and in this direction, the SEEB-TR neighborhood certification system was considered as an extension of the previously developed SEEB-TR building certification system. In Turkey, beyond architectural building scale, there are not enough examples of ecological design in the desired quality at urban space scale. The limited number of examples, on the other hand, cannot fully meet the criteria suitable for any existing neighborhood certificate content, considering the scale, function and domains of influence. For this reason, difficulties have been experienced in comparing the developed assessment system with existing places. Therefore, the evaluation was made on the design criteria, within their conditions of existing project implementations. On the other hand, the sample projects discussed do not have equivalent features. Besides, it is thought that the data to be obtained through diversity will enrich the neighborhood certification system to be developed. In comparisons with existing applications (Ergönül et al., 2020), it is thought that SEEB-TR Neighborhood system developed for Turkey is to be an important measure in improving urban spaces, enhancing the quality of life and environmental awareness.

The system will also provide a significant employment opportunity for the city in the sense of creating sub-sectors as training, expert and auditor and the knowledge in this field of universities and R&D.

However, with the COVID 19 pandemic, the necessity of revising all existing certification systems has emerged, and it has been observed that new criteria are needed in the context of health and urban. With the gains we have achieved from the pandemic, it is seen that sustainable evaluation systems should be improved by taking into account the importance of remote work/education, digital technology, green spaces, transportation and the accessability of healthy food. Today, green infrastructure systems for the development of urban agriculture practices along with access to healthy food are expected to be considered as part of new social infrastructure-based scenarios. In urban spaces planned with water-sensitive approaches, it is seen that the number of many important topics, from integrated resource management to the management of public services has increased rapidly, especially after the pandemic.

In today's technology era, there is a transition from sustainability assessment to smart cities which focus on modern technologies compared to sustainability. The concept of smart cities aims to improve sustainability with the help of technologies. An unsustainable city is not really "smart" (Ahvenniemi et al., 2017). Further studies integrating the concepts of sustainability and smart city will make significant contributions to the development of cities.

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