 DOI: 10.22616/rrd.28.2022.023

FACTORS AFFECTING THE DEVELOPMENT OF URBAN AGRICULTURE IN LATVIA

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Abstract
Urban agriculture is not only a practice of providing food, but also a social lifestyle trend. Different approaches to practice provide the opportunity of different forms and functions, from growing products for household self-consumption to setting up community gardens and commercial practices. Despite the international experience and the potential of urban agriculture in the sustainable development, in Latvia the practice is mostly implemented through individual or community initiatives. The development of urban agriculture in Latvia is influenced by several factors; therefore, the aim of the scientific article is to identify, classify and characterize factors affecting urban agriculture in Latvia. To achieve the aim, tasks are set: 1) to identify factors influencing urban agriculture, 2) to classify factors and characterize the impact. Several methods have been used in the study to fulfil tasks: systematic theoretical review for factor selection, coverage and characterization, methods of analysis, synthesis and deduction for identification and classification of factors, mathematical statistics correlation method for data correlation, force field analysis for the visualization of the factors impact.
Results show that urban agriculture in Latvia has several obstacles – unclear status in legislation, the high cost of needed resources compared to rural areas, the increasing level of the household income. However, there are also factors that contribute to the development, such as criteria for urban greening and sustainability in the development strategies, the concentration of food-demand-driven businesses in cities, food-growing habits and positive attitudes among urban dwellers, and the potential of urban agriculture to promote environmental sustainability.
Key words: urban agriculture, factors, development, Latvia.

Introduction

Since the second half of the 20th century urban agriculture is experiencing a new stage of the development, characterized by its integration into sustainable development processes and goals, rapidly growing research activity, technological development that allows greater adaptation of territory to practice, and changing social values, emphasizing minimalism, zero waste, nature-linked and other aspects of lifestyle (Dobele & Zvirbule, 2020). However, despite the functionality of urban agriculture and the diversity of its adaptation and practices, the development varies in different regions and countries. It is influenced by both general factors similar to all regions and aspects specific to national situations.

Cities are seen as a key factor in prosperity and development, but they are also very resource-intensive, responsible for most of the pollution, unsustainable growth and social inequalities. Europe is the third most urbanized region in the world, with 74% of its population living in cities (World urbanization prospects.., n.d.). Urbanization is a trend that characterizes the development of society, which is largely influenced by the imbalance in the ability to raise individual living standards with the burden of total resources and the environment, which increases significantly as the proportion of people living in cities is growing. Several aspects characterizing the urbanization are the direct influencing factors in the development of urban agriculture – the availability of land resources for agricultural practices, social stratification, the increasing topicality of the environmental diversification. However, in general, as urbanization increases, so does the role of urban agriculture as a factor in ensuring a healthy, fresh, local food supply, thus reducing the pressure of urbanization on the ecosystem and reducing the risk of creating so-called food desserts (Boneta *et al*., 2019).

In Latvia, urban agriculture is still practiced mainly for self-consumption and in the form of micro-agriculture. Historically, agriculture has been a traditional occupation of the Latvian population, but the improvement of living standards reduces the amount of individual practice. However, the opposite trend is also taking place: people in different regions are increasingly looking for the linkage with nature and traditional activities, including agriculture. Thus, urban agriculture in Latvia is affected by various factors, often in opposite directions. Analysing the role and development of urban agriculture, it is necessary to identify the influencing factors and determine the direction of their impact. Therefore, the aim of the research is to identify, classify and characterize the main factors influencing urban agriculture in Latvia.

Materials and Methods

In order to identify influencing factors, two approaches have been used in the research: 1) compiling a sample of factors from the results of research in other countries published in scientific articles (publications in the databases Scopus and Web of Science, published in the period from 2015

to 2021); 2) supplementing and adjusting the list of factors by analysing tendencies of urbanization in Latvia. In the analysis of factors, 12 the most important are identified and selected, which were classified in 4 groups.

From the beginning of 2011 until July 1, 2021, there were stated 9 cities of national importance in Latvia. From July 1, 2021, as a result of the administrative reform, the country's largest cities have been defined as the capital and 9 state-cities. As in the research, data from the period 2016-2021 are used in order to evaluate the practice of urban agriculture in Latvia, cities of the former status of the national importance were analysed.

Methods of monographic, descriptive, analysis, deduction and mathematical statistics (correlation analysis) were used to characterize the influence of factors. For the correlation analysis, statistical data were obtained from the database of the Central Statistical Bureau of Latvia.

Aspects of the habits of the population were identified and analysed using results of the survey of the population of Latvia conducted in 2021 (753 respondents), the aim of which was to identify the tendencies, motivation and attitude of the population towards urban food in Latvia. Aspects of motivation and opinions were evaluated using the calculation of the significance coefficient in the range from 0-1, where 0 – insignificant factor, 1 – significant factor.

To visualize results of the factor impact assessment, the method of the force field analysis was used.

Results and Discussion

The long historical development of urban agriculture practices has led to its multifunctional role in the urban environment (Dobele & Zvirbule, 2020). Different approaches and realizations on a global scale have demonstrated the functionality of urban agriculture in terms of food security, generating additional household income, realizing short food chains and thus reducing the environmental impact of the food logistics, promoting social cohesion in public gardens, diversification and greening of urban environment, improving air quality, promoting and diversifying the physical activities of the population, promoting a healthier, fresher diet, improving mental health and recreation (Dobele, Zvirbule, & Dobele, 2021). However, its development varies, depending on specific situations and factors in different regions and countries.

In this research, factors influencing the development of urban agriculture in Latvia are classified into four groups: ***political, economic, social and environmental factors***.

The most important **political factors** that affect the development of urban agriculture in Latvia are:

- principles of the urban sustainability (P1);
- the sustainability of food systems and the inclusion of short food chains in development plans and strategies (P2);
- lack of concept and status of urban agriculture in laws and regulations (P3).

The rapidly growing world population, rising demand for consumer goods, increasing life expectancy, urbanization and other factors determine that further development is only possible through the principles of sustainability. Sustainable development is a major challenge for cities. ***Urban sustainability*** is one of UN's goals for sustainable development, which includes several areas of action: balancing resources consumed by cities, improving the quality of the environment, promoting climate neutrality, greening public areas, etc. (United Nations, n.d.). Urban agriculture, as one of urban landscaping forms and thus of processes that shape environmental diversity and quality, is also in line with the Food and Agriculture Organization's guidelines for the future, green cities, by maintaining the urban biodiversity, improving the emotional and physical health of the population, promoting healthy lifestyle and decreasing temperature and pollution (Rethinking the future…, 2018). One of the priorities of Latvia's sustainable development strategy is a high-quality living environment and territorial development, which envisages the development of a biologically diverse and healthy environment and the growth of green areas in cities (Latvija2030, 2010). Thus, principles of urban sustainability strategies are related to the implementation of urban agriculture practices and are important contributing factors.

The growth of the population and its demands have determined challenges to ***food security and sustainability***. Urban agriculture is able to ensure at least partial self-sufficiency of food resources, as it implements the principle of short food chains and the idea of a 21st century's foodshed (WinklerPrins, 2017). The EU's strategy 'The Farm to Fork' also focuses on the sustainability of food systems and the promotion of short food chains with a neutral impact on the environment (European Commission, 2020). Although food transportation in Latvia has a smaller impact on the environment than in larger countries, the reorientation of development strategies towards short food chains and flexible local food supply is a factor that promotes urban agriculture.

The most important political factor hindering the development of urban agriculture in Latvia is the ***lack of concept and status*** in legislation documents. Agricultural trends and support systems in Latvia are subordinated to the EU's Green deal and the Common agricultural policy, incorporating the basic principles into the law On Agriculture and Rural Development.

Table 1

The base of cadastral values for land types in state-cities and counties in Latvia, in the period of 2016-2022, euro m^{-2}

Territory	I*	II*	III*, average value	IV*
Riga	1.00	8.54	72.49	1.00
Daugavpils	0.28	7.40	2.78	0.28
Jelgava	0.43	7.40	4.06	0.43
Jekabpils	0.14	4.27	1.92	0.14
Jurmala	0.71	7.83	30.99	0.71
Liepaja	0.43	7.40	8.43	0.43
Rezekne	0.14	4.98	2.14	0.14
Valmiera	0.14	6.83	3.95	0.14
Ventspils	0.28	7.40	5.06	0.28
State-cities, average	**0.39**	**6.89**	**42.03**	**0.43**
Counties, average	**0.09**	**2.73**	**1.00**	**0.09**

* I – agriculture is the main economic activity, II – agricultural warehouses and processing buildings, III – undeveloped land for construction of individual residential buildings, IV – natural bases, parks, green areas, etc. objects of recreational significance

Source: authors'compilation on the basis of data from Kadastrālo vērtību bāze, 2020.

The law does not define urban agriculture and although it does not restrict agricultural practices to rural areas, support mechanisms and requirements are largely enforceable only for agriculture in rural areas with appropriate processing approaches and production volumes (On Agriculture and.., 2004). Other laws of the Republic of Latvia and regulations of the Cabinet of Ministers, including plans for receiving various types of support and their criteria, also do not specify urban agriculture. Without defining and including a specific status and functions in the development, the impact of legislation documents regulating agriculture in Latvia is negative.

The impact of **economic factors** on urban agriculture is ambiguous. Previous research looks at a wide range of aspects, which include the development trends of the national economics, such as inflation, employment, wage levels, etc. factors, as well as productivity, consumption and demand for resources, including food and energy (Foodmetres..., 2015; Glavan *et al*., 2016).

For the analysis of the development of urban agriculture in Latvia, the main economic factors have been identified:

- the value of land resources (E1);
- entrepreneurship trends (E2);
- number of households and average income (E3);
- changes in the consumption of different groups of food (E4).

Land resource value and prices are one of factors with the greatest negative impact on urban agriculture. According to the data of the State Land Service's base of cadastral values (Kadastrālo vērtību bāze, 2020), the highest value of the land where the main economic activity is agriculture, is in Riga (1euro m^{-2}), relatively lower in other cities, but in counties the average value is 0.09 euro m^{-2}, with a moda of 0.07 euros m^{-2}.

Other values of agricultural land are also significantly higher in state-cities. The average value of land as a type of agricultural warehouses and processing buildings is 6.89 euros m^{-2} in state-cities and 2.73 euros m^{-2} in counties. Comparing costs of land resources, they are significantly higher in cities, which hinders the development of agricultural practices. The negative impact of the land value factor is further exacerbated by the comparison of land types in the real estate group – for example, the average value of undeveloped land for construction of individual residential buildings is 42.03 euros m^{-2} in state-cities and 1.00 euro m^{-2} in counties, with a moda of 0.14 euros m^{-2}. The base value of commercial and public construction land is also higher in cities: for the type of recreational areas it is an average 0.43 euros m^{-2} in state-cities and 0.09 euros m^{-2} in counties. The value of land resources in cities is much higher, due to which the possibility to purchase additional land resources to increase the volume of agricultural production is relatively low. In addition, land values in the urban environment are much higher for commercial and industrial activities (Kadastrālo vērtību bāze, 2020), which makes the type of agricultural land in cities economically unprofitable.

No less important factor in the development of urban agriculture is ***entrepreneurship trends***.

According to the data of the Central Statistical Bureau of Latvia (Tirgus sektora ekonomiski.., n.d.), in 2020, which is the latest data collected on March 1, 2022, only 2.15% of all agricultural enterprises in the country (3.10% of the agrarian sector) are registered in the state-cities, which shows a lack of interest in commercial practices in urban agriculture. Although this aspect reduces the intensity of competition for existing and potential entrepreneurs in the urban environment, the proximity of rural areas and, consequently, rural enterprises significantly reduces the competitiveness of urban agriculture enterprises, primarily in terms of land availability and price. However, aspects of entrepreneurship trends such as the number of companies involved in food processing and food use and market participants in cities that are direct demanders of urban agricultural products have a positive impact on the development of urban agriculture. 11.52% of all participants in food production are registered in state-cities (another 23.67% in close regions), 14.71% in accommodation (+ 23.26% in close regions) and 17.92% (+ 52.24% in close regions) catering companies, 20.21% (+ 47.16% in close regions) participants in educational institutions, 13.79% (+ 44.83% in close regions) in social care with accommodation and 20.96% (+ 40.40% in close regions) in health care sector. The concentration of market participants in these sectors in and around state-cities indicates the territorial accessibility of consumers of urban agricultural products. In addition, the number of market participants in all sectors has a strongly positive correlation with the number of the population (the correlation coefficient in the analysed groups varies from +0.95 to +0.99). With the exception of the number of market participants in the agricultural sector, a positive correlation is also with the base of the cadastral values of land in other categories (the correlation coefficient ranges from +0.76 to +0.82).

From the point of view of entrepreneurship tendencies, not only the concentration of entrepreneurs in state-cities, but also the ***unemployment rate*** is important. The registered unemployment rate in Latvia in 2020 was on average 6.0% and the data show a very different situation in cities and counties. However, the difference between the average unemployment rate in state-cities (6.3%) and the rest of Latvia (6.7%) are insignificant (Bezdarba rādītāji un.., 2021). The correlation analysis between the unemployment rate and the number of market participants in observed sectors revealed a weak negative, statistically insignificant relationship. No correlation was found between population and unemployment either (correlation coefficient: -0.06, statistically insignificant). Consequently, it is concluded that the unemployment rate and its interaction with the number of market participants and the population in cities and counties do not show a statistically significant effect.

In Latvia, the level of disposable income per ***household*** tends to increase, moreover, with a different amount in urban and rural areas. In state-cities, there are on average 50.6 thous. households, while in the rest of the country: 3.4 thous. (Privāto mājsaimniecību

Table 2

Consumption of food products on average per household member per year in Latvia in 2015, 2016, 2019

Product group, unit of measurement	2015		2016		2019		Cities, 2019/2015, %
	cities	counties	cities	counties	cities	counties	
Beef, kg	1.57	0.78	1.60	0.83	1.33	0.41	-15.3
Pork, kg	16.57	21.81	16.73	24.00	14.24	21.08	-14.1
Poultry meat, kg	12.65	8.79	13.25	10.27	12.27	9.56	-3.0
Eggs, pcs.	190.10	208.62	202.36	218.29	204.00	224.00	+7.3
Local garden fruits, kg	19.10	13.75	23.04	17.36	20.84	15.47	+9.1
Leaf and stem vegetables, kg	2.28	2.83	2.44	2.88	2.39	2.77	+4.8
Cucumbers, kg	9.72	10.24	10.13	10.03	10.09	10.83	+3.8
Tomatoes, kg	12.91	11.92	12.97	11.35	12.87	11.96	-0.3
Pumpkin seeds, courgettes, legumes, sweet peppers, kg	6.22	5.10	7.76	7.09	7.99	7.26	+28.5
Onions, kg	6.35	5.89	6.61	6.19	6.18	6.43	-2.7
Radish, etc. root crops, kg	1.09	1.04	1.27	0.90	1.29	1.14	+18.3
Potatoes, kg	56.14	82.04	54.19	78.87	41.81	61.13	-25.5
Honey, kg	0.74	0.88	0.92	0.62	0.73	0.67	-1.3

Source: authors' compilation on the bases of data from Pārtikas produktu patēriņš.., n.d.

kopējais.., n.d.), and in cities the average income in 2020 was 656.86 euros per person, but in rural areas – 573.24 euros (Mājsaimniecību rīcībā esošo.., n.d.). Data on individual cities and counties are not available, so correlation analysis is not possible. But the higher income level is often associated with changes in consumer habits, including the purchase of household products rather than growing them themselves. Therefore, household income trends can be assessed as a negative factor for the development of urban agriculture in Latvia. A stable economic and security situation, combined with agricultural subsidy payments, keeps food prices low in Europe, making food growing and saving money from urban agriculture practices secondary (Glavan *et al*., 2016).

Urban agriculture is most often associated with the cultivation of plant products, which are primarily affected by the availability of land resources and specific aspects of the urban environment that hinder livestock farming. Therefore, the affecting factor is the ***consumption of different food groups*** and its trends in terms of resource use.

Table 2 summarizes the information on the product groups that are most commonly grown in urban agriculture and those that affect their consumption: the consumption of meat products reduces the need for products most commonly grown in urban agriculture: vegetables, berries, herbs and others. The Central Statistical Bureau of Latvia has published consumption data for years 2015, 2016 and 2019. The average food consumption of the Latvian population shows a tendency that the urban population consumes more product groups such as beef and poultry, fruits, berries, cabbage, tomatoes, courgettes, legumes, sweet peppers and radishes compared to the rural population. With the exception of beef, other product groups can be produced in urban agriculture during the season, thus promoting the consumption of fresh products and reducing the resource burden on rural areas. In general, the share of household consumption expenditure in food and non-alcoholic beverages is declining (Mājsaimniecības patēriņa izdevumu.., n.d.). But this aspect does not negatively affect the development of urban agriculture, as the share of expenditure decreases, but not the volume. The correlation analysis revealed a statistically significant, close negative correlation (correlation coefficient: -0.87) between the level of household income and the share of expenditure on food – this means that as the level of income increases, the share of expenditure on food decreases.

Social factors often interact with other factors influencing urban agriculture. The most significant social factors influencing the development of urban agriculture in Latvia are:

- increase in the proportion of the urban population (S1);
- current trends in food growing among the urban population (S2);
- people's views and attitude towards urban food (S3).

Population number changes are one of the characteristics of the urbanization – the emigration of people from rural to urban areas, driven by economic motivation for higher employment, higher wages, social services, better infrastructure and other specific benefits from cities. According to UN's data, more than half of Latvia's population has lived in cities since 1960, in 2020 it was already 68.3% and in 2050 it is planned that 75.9% of Latvia's population will live in cities (World Urbanizations Prospects.., n.d.). In 2021, 49.09% of the population lived in 9 largest cities (Iedzīvotāju skaits un.., n.d.). The social factor of the population concentration in urban areas has a positive effect on the development of urban agriculture – urban population growth increases risks of the resource congestion and growing demand that emphasizes the topicality of the balance between the food consumption and production, the potential of wider, more populated and interactive communities and the transfer of the experience of the food growing from rural to urban areas.

Results of the survey of the population of Latvia, conducted in 2021, show that 65.4% of residents of state-cities are engaged in growing at least one type of food products in their households. This confirms the relevance of ***food growing traditions*** and the positive impact on the development of urban agriculture. However, in Latvia it is mostly practiced as micro-agriculture, as 86.5% of practitioners grow food for their own consumption, and 56.4% grow only up to 10% of the required food in the respective product group. The role of food growing traditions in the development of urban agriculture is also proved by the motivation aspects of the practice - one of the most important motivators for respondents is that food growing is a family tradition (significance coefficient: 0.78). In addition, 69.81% of practitioners gain knowledge of agriculture from the family. That makes cultivating traditions in the family as a contributing factor for the development of urban agriculture.

An important factor promoting the development is the ***population's views*** and ***attitude*** towards urban agriculture and the food produced in cities. Results of the population survey show that the population evaluates urban agriculture as a complementary aspect of the school programs (significance coefficient: 0.85) and as a promoting practice for additional education and knowledge (significance coefficient: 0.84). Equally important are views that urban agriculture diversifies, creates a greener urban environment (significance coefficient: 0.83) and is a way to minimize negative climate change (significance coefficient: 0.72).

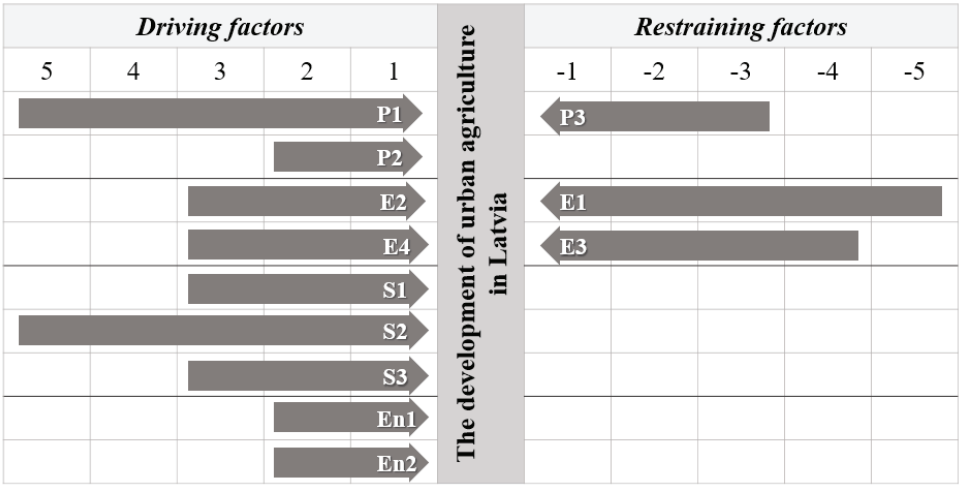

Figure 1. Factors affecting the development of urban agriculture in Latvia.

Growing food in cities is recognized by the population as a modern trend (significance coefficient: 0.72) that encourages community's interaction (significance coefficient: 0.71). When evaluating food that is grown in cities, respondents have the impression that it is healthier compared to that bought in a store (significance coefficient: 0.72), potentially also more expensive (significance coefficient: 0.68). The correlation between views, attitudes and respondents' place of residence (a city or countryside) and opinion in urban agriculture shows no statistical significance. That allows to conclude that population's views on urban agriculture are sustainable and general, regardless of their place of residence or experience in urban agriculture.

The development of urban agriculture cannot be seen in isolation from **environmental factors**. The most important in Latvia's case are:

- topicality of urban environment diversification and issues of preservation and maintenance of ecosystem service (En1);
- waste management trends (En2).

Promoting ***urban biodiversity*** is becoming an increasingly important challenge of the development. Cities have long been considered to be not only 'not-green' but also anti-environmental, consuming much more resources than they are able to produce on their own (WinklerPrins, 2017b). Cities are characterized by over-exploitation of the environment beyond their potential for bio-capacity, which not only pollutes the air and soil, but also increases the air temperature in the urban environment and contributes to the risks of climate change. Conservation of the biodiversity is an essential aspect of environmental sustainability, as it helps to ensure the stability and protection of the ecosystem by redistributing environmental risks and stabilizing critical key points of fragility (White, 2017). Principles of diversification of the urban environment have a positive effect on the development of urban agriculture, as it diversifies the urban environment, both in terms of households and, in particular, the community and public gardens, while preserving and promoting its biodiversity. Also, urban agriculture can provide important ***ecosystem service*** functions that are related to: 1) microclimate conditions - reducing the urban heat island effect; 2) dust absorption and air purification; 3) conservation of biological diversity; 4) the use of biological waste for fertilizers; 5) reuse of water (Ferreira *et al*., 2018). Urban development planning with integrated, environmental and climate-neutral conditions has a positive effect on the development of urban agriculture, taking into account the potential of practices in the diversification and greening of the urban environment.

The circular economy in the EU is one of the preconditions for sustainable development. A separate implementation of the principles is envisaged in the field of ***waste management***, not only by reducing the amount of generated waste, but also by reusing sorted waste. Existing requirements and development plans have a positive impact on the development of urban agriculture and its topicality in two aspects: 1) self-grown food allows to reduce food waste, as food requires a short delivery time and is fresh for a longer period (Foodmetres.., 2015), 2) bio-waste can be used as compost for urban agriculture, thus reducing its amount by a process of reuse (Ferreira *et al*., 2018). Latvia's waste management plan envisages both the reduction of waste and the implementation of separate collection of bio-waste by 31 December 2023 (Par Atkritumu apsaimniekošanas.., 2021). The implementation of the waste management plan has a positive impact on the development of urban agriculture, as it has the potential of both - to reduce the amount of food waste and to reuse bio-waste, thus fitting into the principles of the plan.

Summarizing the impact of the most important factors of urban agriculture in Latvia and using the force field analysis, the sum of the impact of factors overall is positive (+16), which shows that urban agriculture in Latvia has wide development opportunities, justified by political, economic, social and environmental factors.

Conclusions

Urban agriculture is able to play a supporting role in a number of challenges of the sustainable development and urbanization, so its development is desirable and should be encouraged in the form of both urban planning and individual and community initiatives. However, development is influenced by a number of factors, which may vary in different countries and regions.

The development of urban agriculture in Latvia is mostly influenced by political, economic, social and environmental factors. The highest negative impact factor on the development is the cost of resources needed for agriculture compared to the practice in rural areas, thus making agricultural practice in cities less economically advantageous. The increase of the household income level, which allows consumers to switch to purchasing products by reducing the need to grow their own food, and the lack of a definition and regulation of urban agriculture in legislation documents, which hinders the attraction of agricultural support instruments, also have a negative impact.

However, mostly influencing factors are contributing the development, especially the goals of the sustainable development and urban sustainability strategies and food-growing habits and traditions in the society.

Urban agriculture in Latvia has both potential and high development opportunities, supporting and promoting the improvement of the urban environment and the quality of life of urban dwellers. But for more successful adaptation of practice in urban processes, the state and municipal support in the context of the regulation and support systems is required.

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