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The Meta-synthesis of Dimensions and Challenges of Urban Agriculture

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Abstract
The urban population is increasing daily, and meeting the nutritional needs of this population is one of the serious problems for municipal planners and managers for now and then. In this regard, many people consider the urban agriculture as a reliable and sustainable way of responding to the growing needs of cities. Therefore, various studies have been carried out to explore different aspects of urban agriculture. Each of these studies has looked at this category from a specific and restricted angle and ignored many important issues. Thus, in order to clarify the different dimensions and challenges of urban agriculture in this research, after analyzing them, 34 articles have been selected from amongst various articles, extracted based on the Meta-synthesis method, and formed a comprehensive model for challenges and dimensions of urban agriculture. After that, with a review of the statistics in the encoded tables, it was revealed that the dimensions of "supportive and facilitating policies" in the category of attitudes and policies, as well as the "food security" in the social category, had the highest number of references in these articles. Plans and studies in this area are still novice and the qualitative issues and deep concepts such as the role of urban agriculture in social interactions and spatial attractiveness have been overlooked. Separating this area from the urban green space could be one of the main reasons of this problem. A serious method should be designed in order to solve this problem and perform as an integrated plan with regards to urban green spaces.

Keyword: *Food Security, Urban Population Increase, Urban Agriculture, Meta-synthesis, Urban Agriculture Dimensions*

Introduction
One of the most important demographic phenomena resulting from the economic development and industrialization of countries is the rapid growth of cities and urban populations. The phenomenon of urbanization also has a very wide range of economic and social consequences, but its main impact is on the consumption patterns. Today, the amount of consumption in cities is far more than the villages. The pattern of consumption of urban people is also incompatible with nature, contrary to the pattern of consumption of villagers. In total, nearly four-fifths of the world's resources are consumed in cities that occupy only one-fifth of the earth's surface. Definitely, with the expansion of cities and the growth of urban populations, demand for food will increase, and food supplies will be offered to millions of people. Agriculture has always been the main provider of human nutrition, so at any time, it must have the power to meet the nutritional needs of the population and create food security for the community. Therefore, urban agriculture, which is a way to reduce the vulnerability of urban populations and in line with the goals of sustainable development, has been considered. The documentary evidence of the importance of urban agriculture has been presented since 1939, during and after the Second World War; however, only in the mid-1980s, due to the United Nations University's nutrition research program, researchers sought to investigate more about the possibility of farming inside urban frontiers. Since then, research literature on the benefits of urban agriculture has expanded. These benefits are based on the three dimensions of stability (economic, social and environmental). Albeit, urban agriculture faces many challenges. The answer to many of these challenges is still ambiguous given the novelty of urban agro research, and much more research is needed to make these dimensions more transparent. One of the initial steps to further clarify the dimensions of this topic is to review the research carried out in the field of urban agriculture and its categorization. In this regard, one of the most suitable methods for qualitative analysis of studies is the over-combination method. This research attempts to examine a number of selected studies in this field and analyze them by the over-combination to clarify the dimensions and challenges of the researchers' concern and after specifying them, it tries to categorize the dimensions and challenges of urban agriculture. By focusing on different dimensions of the research, it also tries to analyze its causes and to determine which

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dimensions and why are more interesting to the researchers and what aspects of them are overlooked.

2. Theoretical Foundations

2.1 Urban Agriculture History

The first footprint of urban agriculture can be found in Egyptian civilization, where people discovered water and vegetable crops were located along the waterways until the cultivation season [i]. Then in the nineteenth century, urban agriculture was introduced as a response to poverty and food insecurity in Germany, and during World War I and II the "victory" ground was created in the United States, Canada and Britain to help the war. In the agricultural revolution, land was set up in the city for agricultural work [i]. The idea behind the production of food products outside of the rural borders was proposed in the wake of major wars and a period of depression (a period of food shortages); therefore, in 1893, the occupants of Detroit who were suffering from depression were given lands for vegetable planting, and it was the beginning of urban agriculture. These lands generated income, self-sufficiency, and the production of food products at times of difficulty. By 1919, 5 million pieces of land were being planted and more than 500 million pounds of crop was harvested, producing over $ 8.2 million in food during a major depression. Then in the 1960s, a number of urban agricultural lands were built in the UK, which affected the American urban agricultural movement. The first urban farm was built in London in 1972, which was a combination of farmland and animal husbandry, which itself was the prelude to urban agriculture in Australia and the Netherlands []. In Figure 1, the appearance of the concept of agriculture within the boundaries of the city is shown in detail.

2.2 Definition of Urban Agriculture

There are several definitions in the field of urban agriculture that the common point in majority of them is doing agricultural activity in and/or around the city. Based on one definition, urban agriculture is an activity that produces, processes and sells a wide range of crops, gardens, livestock and fuels in or around the city, mainly for the purpose of providing the daily necessities of urban households. Intensive cropping, utilization and recycling of natural resources and municipal waste are used in the production's process []. In other words, urban agriculture is considered to be activities in the city or around it to produce, process, and sell a set of edible and non-food products, using different natural and human resources []. In the new definitions, special attention has been paid to how urban agriculture can influence the socio-cultural, political and ecological aspects of the city. In definitions for urban agriculture so far, there have commonly been identifiable concepts that briefly include:

- The ability to grow and nurture the edible plants within urban boundaries;
- Improving aesthetics;
- Supplying urban nutrition systems;
- Optimum use of open urban spaces, income generation and employment, as well as effective management of water resources.

Urban agriculture is defined and justified in the context of indigenous conditions and specific requirements of each urban region. The important point is that the purpose of agriculture in the city is not 'agriculture and cultivation' as its general meaning. The production of basic agricultural products, such as wheat, rice and cereals, requires professional and advanced farming conditions to meet national and macro-scale needs. The meaning of creating agriculture in the city is to plant and produce small products with easy and minimal facilities. The production of vegetables, seafood and some native fruits in urban residential areas is not only possible and feasible, but also due to the needs of urban development, is considered to be useful and necessary [].

2.3 The Dimensions of Urban Agriculture

2.3.1 Economic Dimensions of Urban Agriculture

As urban agriculture has a complex system with a wide range of processes including production, processing, distribution, marketing, supply, consumption, etc., it is naturally of great economic importance and has many economic benefits. One of its benefits is to provide economic activity for women along with their other roles, as well as the vulnerable and marginal stratums of society, and thus empowering them []. Another economic benefit of urban agriculture can be attributed to the development of the tourism industry. Fascinating private spaces created as a result of urban agriculture, especially vertical gardens or green courtyards, allow landlords to benefit more from rent increases. Also, hotels can gain more benefits through the construction of vertical gardens and higher hotel rates, in addition to attracting more customers. [] Generally, by providing job and employment opportunities, as well as access to cheaper food, urban agriculture decreases the poverty of communities and paves the way for achieving stability. New industrial opportunities include the industrialization and sale of materials intended to create and maintain green roofs, sale of plants and special agricultural inputs, and the design and implementation of green roofs and gardens and fields by recycling of organic and unused materials. Reducing fuel consumption, chemical fertilizer, maximizing the use of available resources and materials, and reducing the significant costs of transportation, could decrease the production costs and can be considered as an economically viable business [].

2.3.2 Social Dimensions of Urban Agriculture

Urban agriculture can be a source of empathy, attracting people's participation, and improving interpersonal communication and even social affairs. The presence of green spaces and vegetation has many positive psychological and mental effects, such as faster disease

improvement, feeling of vitality, elimination of negative thoughts and positive thinking, reducing stress, eliminating malnutrition and creating food security, access to healthier and fresher food, etc., [] []. Investigations show that in cities with more vegetation and greenery, the crime rate has dropped dramatically. Also, these places create safe environments for recreation and leisure time, especially for children. The presence of different plant species has attracted the attention of nature enthusiasts. Green spaces with these species are an accessible and suitable place for teaching these concepts, so that scientific and educational utilization in these places can be traced. In this regard, urban agriculture plays an important role in expanding the knowledge of different people []. Today, due to the nature of urban life, sedentary and obesity and other consequences have created problems in urban communities. As urban agriculture is a physical activity, it can increase the mobility of people and reduce some of the mentioned problems, in addition to creating happiness and improving the morale of individuals.

2.3.3 Ecological Dimensions of Urban Agriculture

The excessive and heterogeneous growth of the world population has caused heavy consumption in cities and the transformation of natural resources into urban waste. Although the general population suffering from malnutrition lives in the African and Latin American countries, this growing trend of consumerism is still hidden in developing and even developed countries [1]. Today, most cities face environmental problems such as global warming, air pollution, water and soil pollution, greenhouse gas emissions, and so on. The benefits of urban agriculture to the environment can be attributed to rain management and water retention, reducing the effects of urban heat loss, biodiversity, reducing noise pollution [], soil protection, recycling garbage and food and water resources management.

2.4 Theoretical Model of Research for Categorizing the Research Subjects

Based on the studies carried out on theoretical basis of the research and considering the various functions of urban agriculture, as well as an overview of previous articles and studies, a general thematic template can be achieved to categorize a variety of research fields for now and then. This research framework is outlined below.

3.Research Method

Qualitative research synthesis (QRS) has become a valuable approach for systematic reviews in social and health disciplines []. QRS is even described as a goldmine for evidence-based practices because researchers collate qualitative research accounts on the same topic across a large area of literature to synthesize the best evidence []. The qualitative synthesis methodology originates from meta-theorizing discussions in sociology, ethnography, and nursing [] and from a meta-analysis of quantitative studies estimating effect sizes of interventions and relationships []. The method of research in this study is Meta-Synthesis Method with a descriptive-analytic approach that combines and integrates the results and abstracts by evaluating the research done. This research has benefited from library studies by the use of available resources and documents. The method of analysis in this research is qualitative. Initially, by studying the theoretical foundations and final conclusions, as discussed in the previous section, we arrived at a theoretical framework for this research in order to categorize different types of research in urban agriculture. In the next step, by reviewing various articles in this field and the targeted screening of papers, 34 useful articles in urban agriculture have been selected. The reason for relying on their scientific judgment is to make them a reliable reference for other resources. Screening and targeted monitoring of the papers as shown in Figure 3, were on the basis of their title in the first stage, and the titles have been chosen to cover a variety of subject areas in urban agriculture (used the Urban Agriculture title clearly). Then, by studying the abstracts, articles that were over-condensed with the same fields were deleted and, at the final stage, articles that their content and purpose were not merely a topic of urban agriculture or vague ones, were removed. In the next step, we categorized screened articles using the mentioned framework (theoretical framework of the research). Thus, at first, three main categories (economic, social and ecological) of urban agriculture were considered, and various issues were separated based on the relation to these three categories; items that did not relate to any of these three categories were separately examined and a novel category entitled "Governmental and Local Attitudes and Policies" was obtained. Then, according to the concept of the words and phrases in each category, each one was placed in a separate subject theme. After dividing the categories and sub-categories (themes) and taking important words and phrases in different themes (and forming a code), the frequency of each theme was determined in a variety of articles. Then, by plotting the frequency of topics, we analyzed the qualitative analysis of the results and discussed the importance of different issues for researchers in this field and along with their sources, as well as research gaps in urban agriculture.

4. Results

In the first step, 34 selected studies were briefly examined and then the articles were presented on a thematic basis, based on four main categories: "social", "economic", "ecological", "governmental and local attitudes and policies", and a code was assigned to each article. The result was the table (1) that we observe in depth.

5. Analysis (Meta-synthesis) of Abstracts and Results of the Articles

After categorizing and coding, and a general overview of the subject and content of selected articles that led to the breakdown of articles based on the four main categories of "economic", "ecological", "social" and " governmental and local attitudes and policies ", now it is time to get a closer look at the selected articles. At this stage, the abstracts and the results of the articles are being studied for the purpose of interpretation. A detailed study reveals various themes for each category, and these themes are categorized individually. First, according to the theoretical model in the Figure 2, the identical terms and words, or the ones with the same concept and alignment with each of the categories of this model, were separated, and each of them formed a code and a theme. Then according to the concept of words and remaining phrases that were not included in any of the previous categories, new codes were resulted, each of which was placed within a new topic. In the next step, by putting together categories and themes and codes, i.e. combining together the open codes, axis codes and categories of conceptual tables (encoded tables), the number 2 was obtained. It is noteworthy that at this stage, the categorization of concepts, sentences and words is not merely based on the dominant subject matter of the article, and many of the concepts and words fall into more than one category. Also, many of the batches of theoretical model are eliminated or added here. See Table 2 below.

6. Dimensions and Challenges of Urban Agriculture

At the end of studying the theoretical foundations of the article, we reached a theoretical model (Figure 4) on the subjects studied and various urban agriculture with respect to three features and functions. After analyzing the articles studied and completing the previous table, we achieved to a charting model of the challenges and issues of urban agriculture. This model can give a true picture of the issues and dimensions of urban agriculture advancement, and helps researchers who want to do research on different aspects and also planners and designers of the city and decision makers to provide a comprehensive perspective of the categories, small and large-dimensions of urban agriculture and based on that, a general decision taking into account, due to the current issues and progress of urban agriculture.

7.Summary

At the stage of analyzing articles, the four main categories of "economic", "social", "ecological" and " governmental and local attitudes and policies " were taken into account, and based on the analysis of words and sentences, we extracted the concepts and themes related to each category in the encoded tables. At this stage, with the interpretation of the tables, the following results were obtained in each category:

- In the category of "Economics", many studies were concerned with issues such as employment, livelihoods and income, food shortages and injections of well-being into different parts of the city; various issues in this category were divided into four sections (themes): "job creation", "livelihood and more farmers' and owners' income", "more and cheaper food production", and "strengthening the economy of the city and the poor urban areas". The most frequent references were "livelihood and more farmers and owners' income" and "strengthening the economy of the city and the poor urban areas." In these two themes, there were different codes such as meeting the financial needs, generating income for the household, the impact of agriculture on welfare and coping with the deterioration of the economic situation, improvement of the conditions of slum areas, and the role of urban agriculture in strengthening the countryside's economy, all of which suggest a perspective on the empowerment of communities and cities. Sometimes the scale of study is limited to one city or country or sometimes the cities of a geographically specific region.
- In the "Ecological" category, the most important concerns of researchers were how much urban agriculture could improve the quality of our environment and solve our environmental problems. as the dimensions of the environmental issues are widespread and their range have been examined in the articles, an attempt has been made to elaborate the thematic categorization. In relation to this topic, themes include "optimal use of land and area", "sewage and waste recycling", "reducing CO2 and greenhouse gases", "improving soil quality", "improving climate and microclimate," "mixing and multi-purpose space", "saving resources and materials", "coping with environmental hazards" and "space biodiversity desirability". Among these themes, "sewage and waste recycling" and "reduction of CO2 and greenhouse gases" were the most frequent references. One of the most important issues different countries are facing, is urban waste. These wastes are the result of energy and food consumption, but much of them still leave the cycle of energy and materials without any useful usage, and have a deleterious effect on nature, while these wastes can be a source of city power. In this theme, discussions such as the reuse of waste and a safe way to disinfect sewage, have been proposed, all of which emphasize the need to recycle waste through urban agriculture and the separation and disinfection of garbage before using in urban agriculture. Also, the problem of air pollution and greenhouse gases is a complex problem in most metropolitan cities, today. In a study that explores issues such as "the importance of urban agriculture in reducing carbon emissions" and "the most suitable product for the greatest reduction in greenhouse gases," the emphasis is that urban agriculture has the potential to absorb CO2

more than other urban green spaces and converting the CO2 to food, could bring us more advantages.

- In the "Social" category, the researchers' focus was on social infrastructure of the community, with the aim of addressing issues such as increasing health and improving food conditions and increasing equity and social participation that urban agriculture could help to achieve these goals. In this category, the themes of "increasing mobility", "health and sanitation", "social security", "education for increasing the social participation", "food security", "social justice" and "increase of aesthetics" were extracted from the articles. Among the social themes, the discussion of "food security" followed by "health and sanitation" had the highest point of reference with 19 and 9, respectively. In "food security" category, concepts including increasing the access to food, solving the problems of urban food insecurity and food security in developing countries, were discussed, which highlights the importance of urban agriculture in food security and the efforts to make it even more accessible to people living in urban areas, especially in developing countries. In the "health and sanitation" section, the articles point to "healthy and balanced diets" and "improving quality of life" which emphasized that urban agriculture does not have the health problems of traditional agriculture and provides safe food to urban consumers. Considering the close proximity of social and economic categories to each other and the content of these three issues, it seems that the concern of many officials and planners in many countries of the world, especially the poor countries, is to empower poor social and urban marginalized populations and save them from food poverty by the development of urban agriculture.

-In the category of " Governmental and local attitudes and policies " it should be pointed out that not only in the studies reviewed in this paper but also in most studies in the field of urban agriculture, the most discussed issues, among other issues, is urban agriculture, either in the title or in the dominant text of the articles in this field. Repetitive topics are in large in the category of "planning and supporting policies" and "facilitating programs and policies". More than half of the analyzed articles deal with these two issues, but in legal issues, these articles have been dealt with less. Since the urban agro-industrial process is at an early stage, it is natural that the primary concern of managers and planners and governmental and non-governmental organizations is to provide an effective political framework for this issue. Serious weaknesses in plans and programs and laws have led to the lack of competition and the lack of confidence in the private sector and the negative attitude of people and residents towards urban agriculture. To this end, the first step in this direction is the formulation and implementation of supportive and facilitating policies and programs, such as incentives and financial and legal exemptions to gain public trust. By looking at the encoded tables and the number of articles pointing to various urban agriculture issues, we will go into Table 3, the frequency of each of the key codes (themes) and categories. This table shows that the topic of "food security in the social issues" as well as the theme of "supportive plans and policies" in the category of attitudes and policies of the state and local communities were the most discussed topics in various papers.

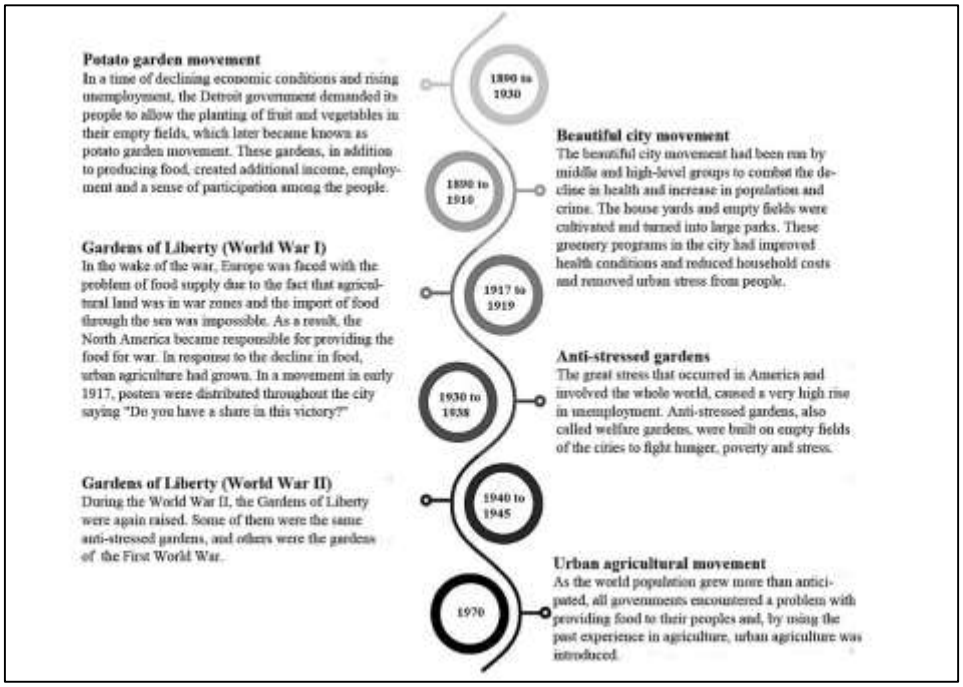


Figure 1. History of Urban Agriculture [i] i i

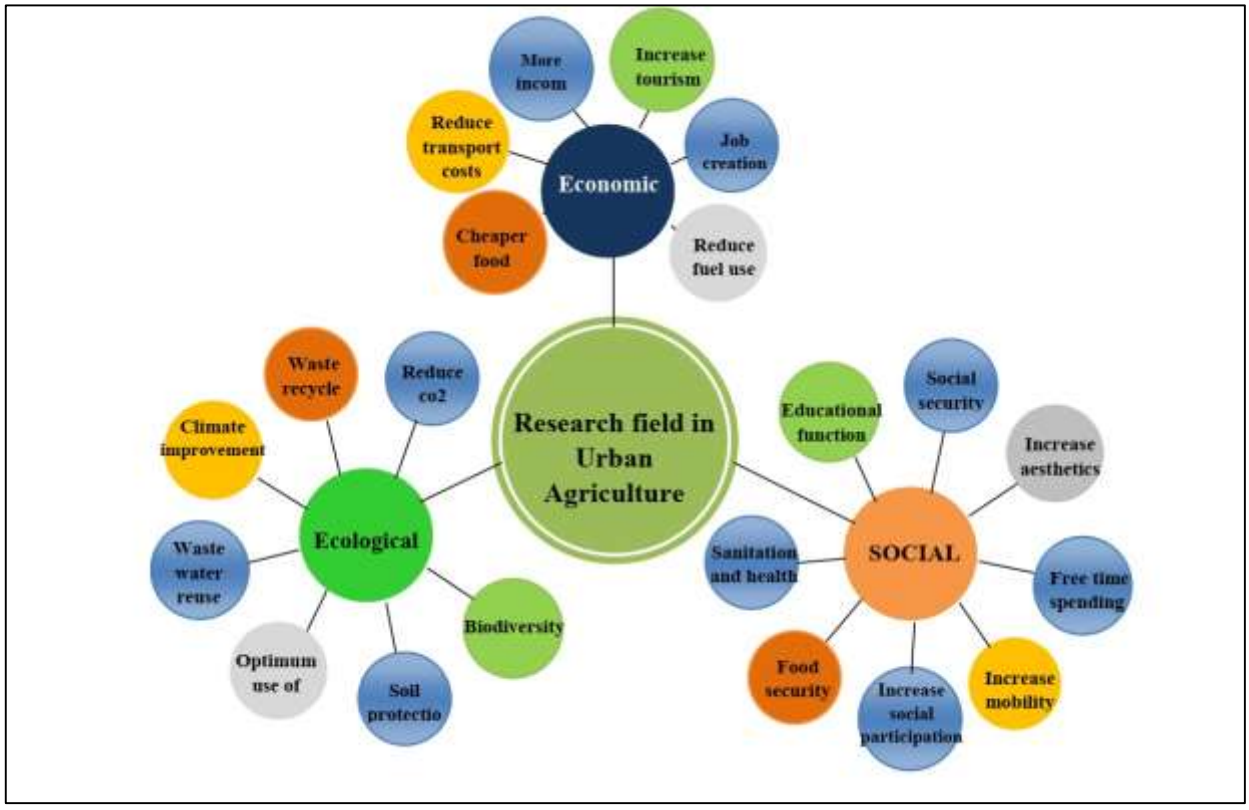


Figure 2. Theoretical Model of Research for Categorizing the Research Subjects in Field of Urban Agricultur (Reference: author)

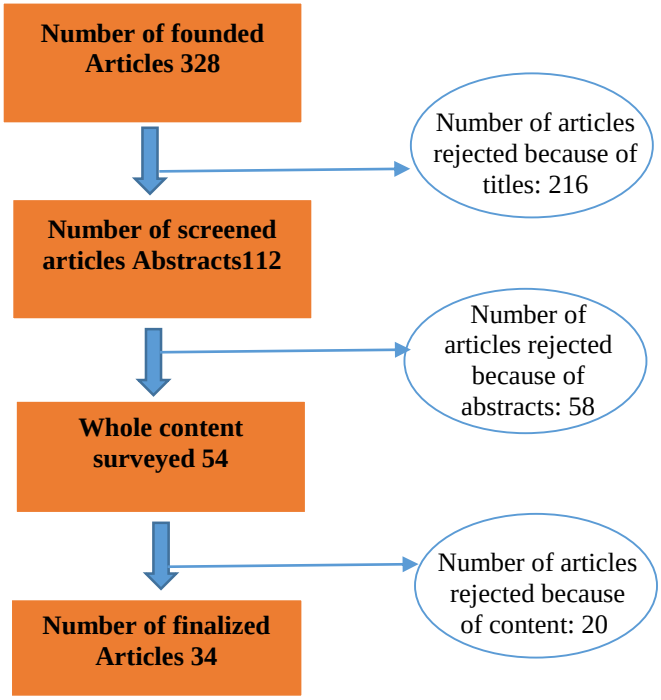


Figure 3. Article Screen

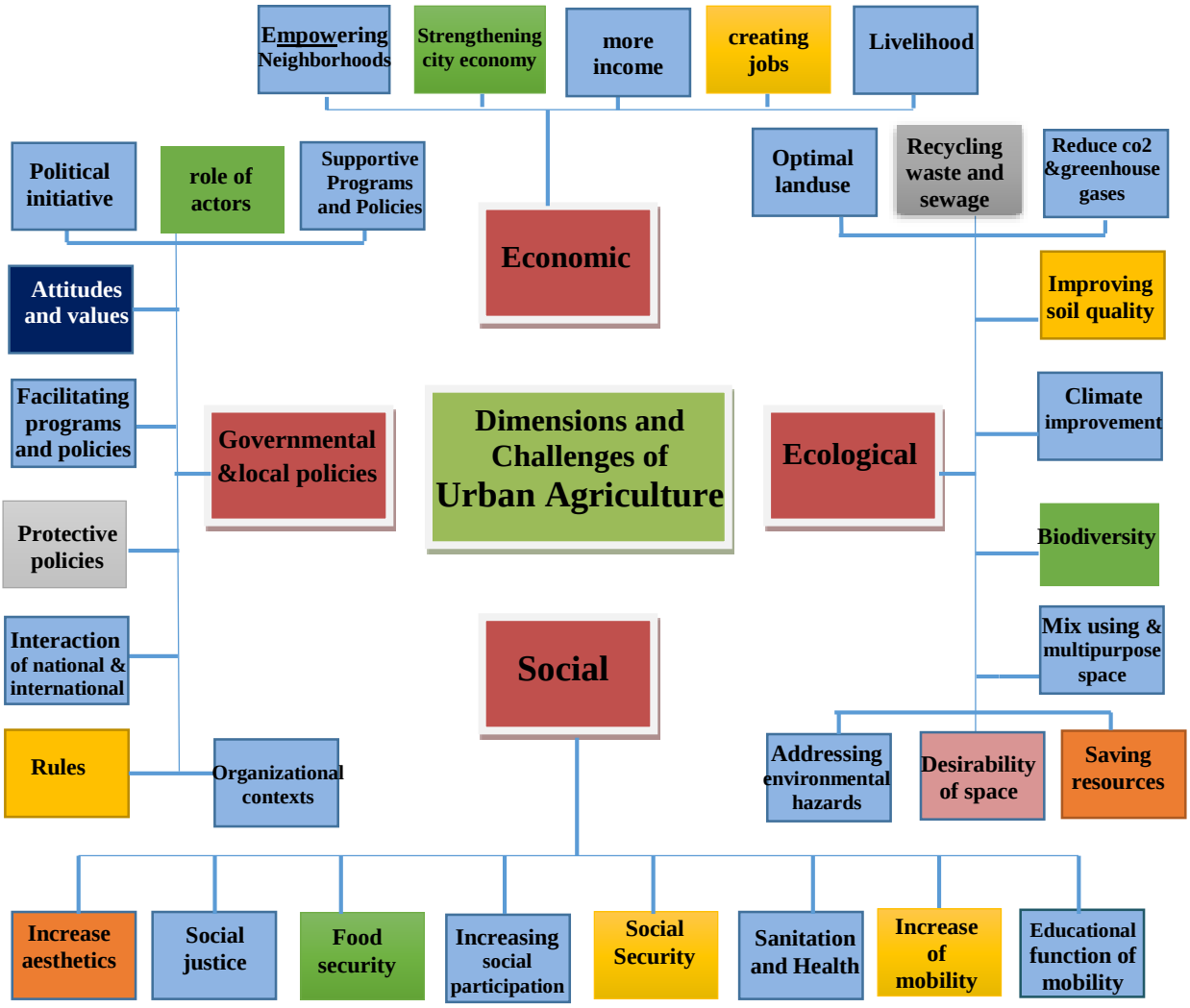
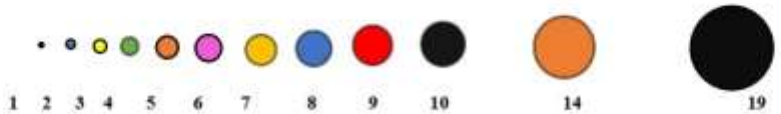


Figure 4. Dimensions and Challenges of Urban Agriculture

Table 3. Number of Articles Pointing to Various Topics of Urban Agriculture

Number of articles pointing to the topic	Social	Number of articles pointing to the topic	Ecological
	Increase of mobility		Reduce CO2 and greenhouse gases
	Sanitation and Health		Biodiversity
	Food security		Recycling waste and sewage
	Social justice		Improving soil quality
	Social security		Climate and micro climate improvement
	Increase of aesthetics		Optimal use of land and area
	Educational function		User mixing and multipurpose space
	Increasing social participation		Saving resources and materials
Number of articles pointing to the topic	**Governmental and local attitudes and policies**		Addressing environmental hazards
	Organizational contexts		Desirability of space
	Supportive Programs and Policies	**Number of articles pointing to the topic**	**Economic**
	Interaction of national and international levels		
	Political initiatives		Livelihoods and more income of owners and farmers
	Facilitating programs and policies		More and cheaper food production
	Protective policies		creating jobs
	The role of actors		Strengthening economy of the city and empowering poor Neighborhoods
	Rules		
	Attitudes and values		



Number of Articles in each subset

8. Conclusion

Traditional and rural agriculture alone will not meet the need for tomorrow's cities, because, in addition to unilaterally consumed resources, due to problems such as increasing transportation costs, avoiding the target market and costs and production constraints in the near future, there is no adequate response to the needs of the cities. To this end, urban agriculture is a sure answer to the growing urban population and to the growing need for growing food in cities. Urban agriculture, along with providing food, brings various benefits such as improving climate, reducing greenhouse gases, social interactions, and mobility and physical well-being, but

what matters is the priority of our expectations. In poor countries, where food poverty and livelihood and hardship are fueled, the priority of any planning for urban agriculture in these areas should be to eliminate poverty and empower the inhabitants. In terms of socioeconomic categories, it is more important. On the other hand, if we take into account the economic and social issues together, we find that the highest number of topics discussed in the articles under consideration is in the series. The topics of "food security" and "health" among social issues, and "economic strengthening of the poorer cities and neighborhoods" and "livelihoods and more income "are among the issues of economic importance. Also, the issue of "employment" in the economic category and "increase in mobility" and "aesthetics" in the social category were less likely to be taken from the context of the studies of articles in this field, which were often carried out in developing countries. In contrast, in developing countries that are less involved with food poverty issues (other than marginal issues), there are other issues, such as ecological and environmental issues, such as recycling waste and sewage and reducing greenhouse gases affecting topics such as biodiversity and the fragility of space. In the category of "governmental and nongovernmental attitudes and policies", which is a major and favorite axis of more than half of the research in the urban agricultural field and most often addressed by major issues, researchers pay attention to "programs", "supportive policies" and "facilitators". And less are the prospects for providing the necessary legal framework for urban agriculture, but the need to properly implement the various urban policies is to provide its legal basis.Urban agricultural research seems to be a long way to maturity. This research has often focused on the overall dimensions of economic, social and political categories, and to some extent on the environmental aspects of urban agriculture, as well as on issues that are more real. Food security, livelihoods and financial empowerment are less relevant to qualitative issues and deeper concepts than the role of this space in social interactions and spatial appeal. One of the main causes of this issue can be to distinguish this space from space. Urban Green has taken place in research that needs to be addressed to solve this problem and its integrated planning with space The green city was seriously thought.

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