Urban farming as a form of innovative entrepreneurship in a digital economy

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Abstract. The article discusses the problem of urban farming as a form of innovative entrepreneurship in the framework of sustainable development and the development of the digital economy. The best foreign and domestic experience in organizing agricultural production in megacities is analyzed. Mechanisms for optimizing the distribution of manufactured products using digital technologies are proposed.

1. Problem statement and research methods
Active urbanization, accompanied by the development and specialization of industry in large cities, has formed in the mass consciousness a steady division into “city” and “village” when it comes to areas of professional activity and leisure. In particular, it is believed that agriculture has long and irrevocably gone beyond the borders of cities where it is more profitable to deal with it, due to economies of scale in production, the availability of developed logistics schemes and the availability of cheap labor. Agriculture itself becomes the prerogative of large vertically integrated holdings aimed at maximizing profits and introducing globally proven innovations in accordance with the concluded license agreement.

Nevertheless, at present, the conditions for the development of the digital economy make it possible to talk about effective grass-roots innovations that can in the future solve the most acute problems of the socio-economic development of urban areas and urban agglomerations. It is, first of all, about the combination in the practice of environmental management at the city level of environmental education and best environmental practices in the framework of the movement, called "eco-urbanism". In particular, much attention is paid to the "ecological footprint" of the city [1], expressed in the concentration of the environmental impact of the environment of the compactly living in cities of the population. Based on the analysis of foreign and domestic experience, in this work, we consider the prerequisites, conditions and prospects for the development of urban farming as a form of innovative entrepreneurship that accumulates opportunities to solve the most acute problems of urban areas in the future.

As a research method, a comparative method is used to identify the general and special in the development of this phenomenon in various cities and countries of the world, as well as the activity based costing (ABC) undertaken to find optimal business models of innovative entrepreneurship with the existing system supporting production activities from development institutions at the local, regional and federal levels.

2. Preliminary analysis
Development trends of modern agricultural production allow us to fix a steady trend for the introduction of resource-saving technologies along with the spread of fashion for “organic” food products, that is,
those grown with minimal use of synthetic fertilizers, pesticides, plant growth regulators, and feed additives. Following the “smart” houses and “smart” cities, “smart” enterprises are gradually appearing, including in the field of agriculture. All of the above against the backdrop of the “digitalization” of most areas of economic life makes us take a fresh look at the problem of the optimal size of the enterprise, its territorial location, as well as the ratio of the processes of centralization (concentration) and decentralization (dispersal) of production, as well as the role of innovation in the development of production spheres [2].

All of the above is reflected in the development of “urban farming” in the largest cities in the world (Tokyo, New York, Los Angeles, Mumbai, London), as well as in countries with a developed agricultural culture (Netherlands, Switzerland, Finland). Despite the traditional and sometimes “anti-innovative” nature of production at modern “eco-farms”, the profession of a city farmer promises to be very popular in the future [3]. So, in the Atlas of New Professions, it is noted that such a lesson will become relevant until 2020 and the city farmer’s area of activity will include “equipping and servicing agro-industrial enterprises (including food production) on the roofs and buildings of skyscrapers of large cities” [4].

At the same time, the functions of urban farming are not limited to maximizing the supply of environmentally friendly food products based on the efficient use of accessible surfaces, coupled with the preservation of farmland within the city limits. Enlightening and educational along with the possibility of uniting and consolidating the local community [5] becomes an equally important function of such enterprises. The joint work of the inhabitants of the earth in the framework of familiarization and training events, the common care of a small vegetable garden or garden carries a pronounced social function.

In addition, in recent years, urban farming has become a popular area for the development of startups, including using innovative technologies as part of the development of a digital economy infrastructure [6].

3. Review of best practices

Let us consider the experience gained in the development of urban farming in the leading countries and cities of the world. Among the most sustainable forms of development of this form of distributed agricultural production we are proposing the following ones [2]:

Organization of farms on roofs of buildings and wastelands, the use of empty premises of abandoned factories [7]. Such initiatives are actively supported by local authorities and can increase the return on the use of urban property and increase production efficiency: “water consumption is reduced by 10 or more times; industrial water is used in closed cycles and is purified. Proximity to consumers saves energy and costs. Production does not depend on meteorological conditions; drought, bad weather no longer pose a danger. Plants bear fruit not once a year, but constantly. As a result, productivity per unit area increases sharply” [8].

Support for projects to preserve agricultural enterprises within the city, subsidizing production and its technical re-equipment, introducing a moratorium on the transfer of land into categories involving development. New York and Tokyo in this regard are the most revealing example in view of the extreme high cost of urban land and its efficient use [9-10].

Organization of “public allotments”, allowing to introduce another type of unifying activity in the local community. In this regard, we can mention the “public gardens” in Los Angeles, Amsterdam, Basel, and even in the depressed and on the verge of bankruptcy Detroit under the concept of “permaculture” by David Holmgren and Bill Mollison. In the framework of this concept, urban gardens are considered as “consciously organized landscapes that imitate patterns and relationships found in nature and at the same time supply a sufficient amount of food, fiber and energy for local needs” [11].

As one of the city farming activist notes, “urban farming is not necessarily food. In fact, we need a lot from agriculture, not just food. Clothing, building materials, herbal medicine - all this is connected with the theme of city farming. Now people have such ideas about these things that even a coconut support for plants is brought to garden shops thousands of kilometers away. Although the willow grows
in the courtyard, the bark of which contains antibiotics, it used to disinfect the earth with it, and the first antibiotics were made from it. There should be a big transition period when urban farming will not work so much on food. First you need to convey a lot of experience and knowledge about how it all works” [12].

Based on this, it is now possible to talk about the innovative vector of urban farming development, based on the maximum dispersal of production and the most efficient use of available areas and volumes. We are talking primarily about “vertical farming”, which allows you to get a crop per 1 square meter of usable area, comparable to modern centralized agricultural enterprises, but exceeding its performance due to the vertical arrangement of "beds", which makes it possible to speak not about usable area of farmland, but about usable volume. The applied technologies of aeroponics and hydroponics with respect to the most promising crops for city farming do not significantly affect the microelement composition and taste of the products (we are talking primarily about greens and microgreens, carrots, radishes) and allow us to successfully compete with traditional products origin. “The largest farming project in Europe, a vertical farm in the former 6-story office of Phillips in The Hague, grows vegetables and now fashionable microgreens on the rooftop, and raises fish below on the 6th floor. No wonder, the world has already learned to use aquaponics” [13]. Similar successful initiatives can be mentioned in relation to Berlin (the building of the former malting plant, Malzfabrik) and Tel Aviv (roofs of ordinary residential buildings).

The business model used to create vertical farms is also viable in the microformat of individual farms, the production and marketing activities of which are coordinated using digital technologies with elements of distributed computing (as a Russian example of such solutions, we can mention the GreenBar Digital Cityfirm, which received support within the framework of Acceleration Agency for Strategic Initiatives Social Projects Support Fund programs in 2018). According to Research and Markets, the global vertical farming market in 2017 amounted to about $ 2.3 billion, and by 2023 it will grow to almost $ 7.5 billion, adding more than 20% annually [14]. Currently, the market presents ready-made solutions for potential city farmers worth from 20 to 300 thousand rubles (from Agrorus, UrbaniEko, RusEco) with the need for starting investments in the range of 50 to 500 thousand rubles. A preliminary assessment of the startup payback period in the field of urban agricultural production is 12-15 months with an estimated profitability taking into account the low market saturation - 30-40%. Ecofarm products are referred to as traditional retail chains as well as vending machines as consumers. In general, we can agree that in modern conditions, urban farming, according to the distributed production model, is more of a fashionable passion and demonstration of technological capabilities for software manufacturers than a real market niche for innovative entrepreneurs.

In general, the problems of the development of urban farming as a form of innovative entrepreneurship boil down to the following problems:

a) the absence of legislatively provided forms of support for agricultural producers in the city - mainly in the form of subsidies for the compensation of capital costs;

b) the lack of readiness of most retail chains to cooperate with small manufacturers, mainly of local origin;

c) possible problems with management companies and the local community in organizing production in territories adjacent to residential areas;

d) the lack of economic mechanisms to stimulate the use of urban areas for clusters of new enterprises as part of the revitalization processes of former industrial zones and outdated housing stock.

4. Directions and solutions to identified problems

As a decision to the above problems, we consider the following solutions that are complex and multifaceted in nature and capable of ensuring the realization of the interests of the widest possible range of interested parties in the process of socio-economic development of urban territories [15, 16].

First, existing innovation entrepreneurship support programs should be unified within the category of “urban environmental initiatives” by analogy with the strong expression “urban hacking,” which means “using the inventive power of the world to design and solve local problems on the ground” [17].
In the framework of such a grouping, support can be given to complex entrepreneurial projects that, on the one hand, solve traditional problems, and on the other, use the latest achievements and trends of the digital economy and have wide social impact.

Second, it is necessary to adjust the norms of land use and redevelopment in the city, so that the investor makes a decision on the type of facility being built, based on business tasks and the innovative nature of the activities of related business projects [18-19]. In this case, the “green” nature of the facilities being built should be a priority and be decisive in coordinating urban planning decisions [20, 21].

Third, it is necessary to conduct a wide explanatory work among the population in order to increase awareness in the process of daily consumption and use of energy [6]. The environmental focus of the strategy of socio-economic development of the territory should cease to be perceived as a temporary hobby for representatives of the government that conflict with the interests of economic entities [23-25].

These problems, if successfully resolved, will make it possible to raise a new question about the prospects for the development of urban farming in modern urban conditions as the most striking and advanced example of innovative entrepreneurship that can improve people’s lives.

5. Conclusions
According to the results of the analysis, it can be concluded that the innovative form of entrepreneurial activity is being established and developed in modern conditions - microenterprises in the field of urban farming, related to the cultivation and sale of a limited range of crop products with the prospect of a transition to the cultivation of salmon or protein substrate from insects. The complex nature of the activities of such enterprises using innovative technologies from the field of agriculture and information technology, along with great potential in the field of environmental education and community cohesion, necessitates a review of existing forms of support for startups and the allocation of such initiatives in a separate category - “urban environmental initiatives”.

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