

Digital City Farming and Social Entrepreneurship: Promising Projects for Sustainable Development of Russian Regions

S. A. Goryunova^a, Yu. V. Safronova^b and V. N. Shchennikova^c

Institute of Law and National Security,

Russian Presidential Academy of National Economy and Public Administration, Moscow, Russia

Keywords: Social Entrepreneurship, Digital Economy, City Farming, Hydroponics, Aeroponics, Aquaponics.

Abstract: The article considers the possibility of organizing digital city farming in the regions of Russia, using hydroponics, aeroponics, and aquaponics, as part of the implementation of social entrepreneurship. The strengths of city farming are noted, as well as the problematic points, that arise when cultivating crops without soil in urban conditions. The authors pay special attention to the characteristics of the social entrepreneur of the future, noting, that in the context of digitalization and globalization of the economy, he must constantly look for new solutions, bright ideas, competitive projects, aimed at solving social problems and providing support to socially vulnerable and seeking help people. The article focuses on the sustainable development of Russian regions by means of implementing digital city farming projects, which not only ensure food security of the regions of our state, but also create conditions for the implementation of an import substitution policy.

1 INTRODUCTION

Currently, digitalization has a significant influence on the economic and social development of the entire world community. Any information is now presented in digital terms, and the rapid development of digital technologies and innovations creates opportunities for the effective functioning of the digital economy, the main components of which are:

- supporting infrastructure (hardware and software, networks, telecommunications);
- e-business (any processes, carried out by an organization through computer networks);
- e-commerce (on-line transfer of goods) (Mesenburg, 2011).

Dudin M.N. and Omarova Z.K. note, that the digital economy determines the digital transformation of all spheres of life, providing them with significant economic and social effects, which, in turn, opens up new opportunities for the development of entrepreneurship (Dudin and Omarova, 2019).

Digital entrepreneurship is entrepreneurship, using new digital technologies (especially social

networks, large amounts of data, as well as solutions for mobile devices or “clouds”) (Dudin and Omarova, 2019), which are the core of the digital economy (Figure 1).

^a <https://orcid.org/0000-0001-8004-5900>

^b <https://orcid.org/0000-0002-9131-5440>

^c <https://orcid.org/0000-0001-5031-9544>

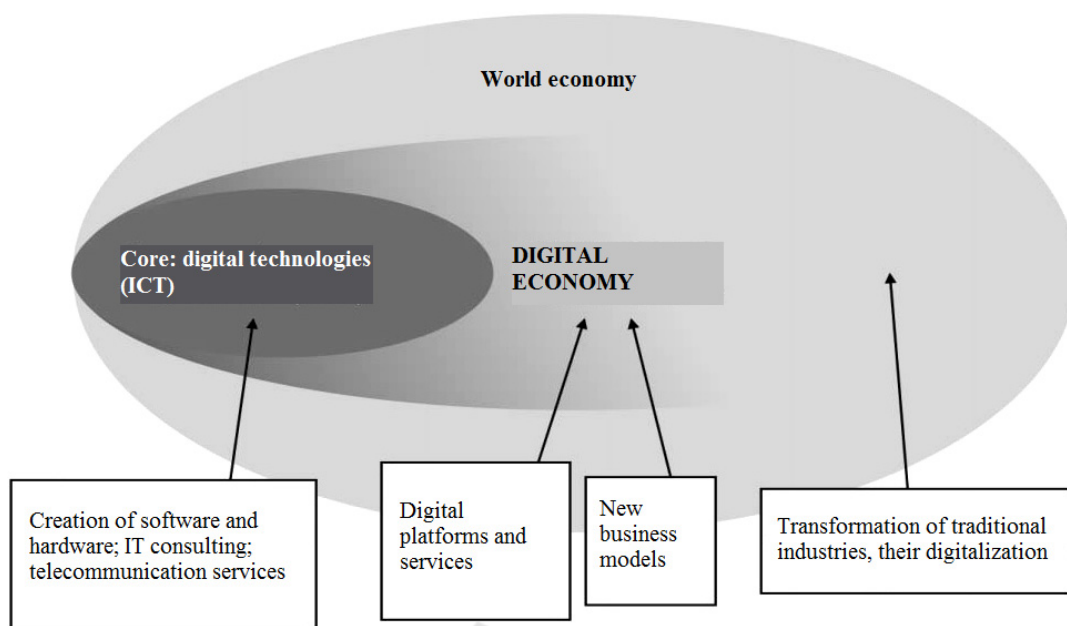


Figure 1: The digital economy as part of the global economy (International cooperation, 2021).

Recently, both in the regions of the Russian Federation and throughout our country as a whole, digital entrepreneurship has been actively developing. In this research, special attention will be paid to potential social projects in the field of digital city farming, as the most popular way of cultivating agricultural crops in urban conditions.

2 RESEARCH METHODOLOGY

The work is presented using analytical materials and statistical sources, empirical and analytical generalization of educational and scientific literature, the use of comparison, classification of economic, legal and social concepts, synthesis of significant events in the field of food security.

3 RESEARCH RESULTS

In order to study the issue of digitalization of the Russian economy and the use of new generation technologies, attention was drawn to the Federal Project "Digital Technologies", approved on May 28, 2019, by Protocol No. 9 of the meeting of the Presidium of the Government Commission on digital development, the use of information technologies for improving the quality of life and conditions for doing business, is aimed at creating the so-called "end-to-

end", that is, key digital technologies, that have the most significant influence on the development of markets.

End-to-end digital technologies include: new production technologies; industrial internet; artificial intelligence; wireless technology; robotics components and sensorics, etc. (Digital economy, 2021).

It should be emphasized, that any digital technology will work only after receiving a certain digital signal, which is converted in an integrated infrastructure (network) and then follows a certain route. This requires network personal communicators (PCs), which are combined into a network and create a new integrated infrastructure for information transfer, based on digital signal processing and packet traffic management means (Figure 2).

In the State Research Center of Russia "Central Research Institute of Robotics and Technical Cybernetics", design work has been fully completed and there are first prototype models of PCs, that have passed certification according to the requirements of the Federal Service for Technical and Export Control (Lopota et al., 2021). In the short term, networked PCs will appear in Russia, which will make it possible to transfer information with high digital accuracy and extensively control equipment, devices, installations without human participation, combining computers, office, household, industrial equipment, all kinds of sensors, video surveillance cameras, etc. into the networks.

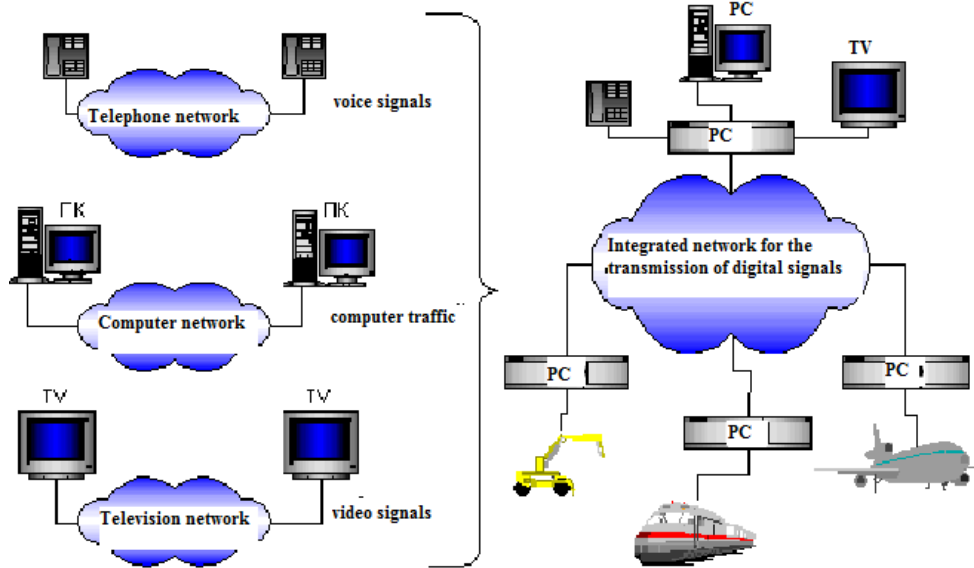


Figure 2: Action of network personal communicators (PCs) (News channel, 2021).

At present, the following systems successfully operate, using communicators: “smart wallet”, “smart calculator”, “smart home”, “smart restaurant”, etc.

Not everyone shares the view, that the digital economy is effective.

Many are sure, that it poses a threat to the population, since there is a gradual robotization of production and the service sector, which will lead to mass unemployment in countries, where material production prevails.

The rapidly occurring changes in the world economy and in the Russian economy cannot help but take a toll on the activities of social enterprises. The development of digital technologies will contribute to their entry into electronic markets, the products manufactured or the service provided, will soon undergo huge competition, and the number of job sites will be sharply reduced. However, these are realities of the time, this process cannot be stopped, therefore, the social entrepreneur of the future is simply obliged to look for new solutions, bright ideas, competitive projects, aimed at solving social problems and providing support to socially vulnerable and seeking help people.

As an interesting and promising social start-up, it is necessary to propose several digital city farming projects for consideration, that are possible for implementation in the regions of Russia, which have proven themselves not only abroad, but also in our country, although still, as a commercial entrepreneurship.

Half of the world's population and three quarters of Russians live in cities, and this indicator is

increasing every year. It is becoming more and more difficult for citizens to get fresh natural fruits and vegetables for the table. Often, agricultural crops have to travel many thousands distances before getting on a plate to a potential consumer.

With the development of agriculture, the number of inventions increases in order to simplify the work of the farmer, advanced technologies for the growing and cultivation of various crops at the lowest cost, but with improved product quality, are developing.

City farming is the cultivation of greenery, vegetables, fruits, berries, fish farming in urban conditions. This requires special greenhouses and installations using hydro-, aero- and aquaponics. With this kind of plant cultivation, no soil is needed, and there is no need for large water reservoirs for fish farming, which creates conditions for farming in urban conditions.

Hydroponics is a method of cultivating crops in artificial environments without soil, by immersing plant roots in water or nutrient solution (Figure 3).

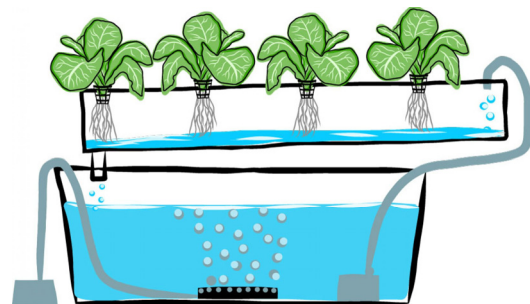


Figure 3: Hydroponics installation structure (City farming, 2021).

Hydroponic systems are placed on vertical farms (in basements or on the roofs of buildings), where greenery, cherry tomatoes, strawberries, radishes, that is, low plants, that can be placed on special shelves, are successfully cultivated.

Aeroponics is a method of cultivating plants in the air environment without using soil, in which

nutrients are delivered to the roots of plants in the form of an aerosol. However, watering is carried out using dripping irrigation systems, which saturate the plants with water and nutrients, dissolved in it (City farming, 2021) Aeroponics installation structure is shown in Figure 4.

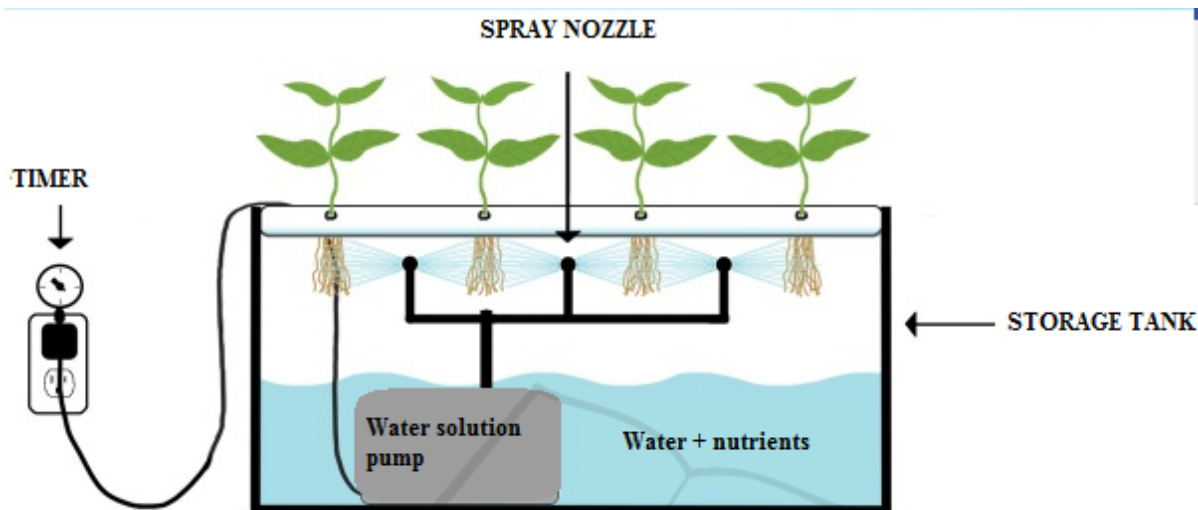


Figure 4: Aeroponics installation structure (City farming, 2021).

Aquaponics is a new high-tech agricultural technology, that combines both the cultivation of

plant products and the production of fish products (Figure 5) (Prospects for urban farms, 2021).

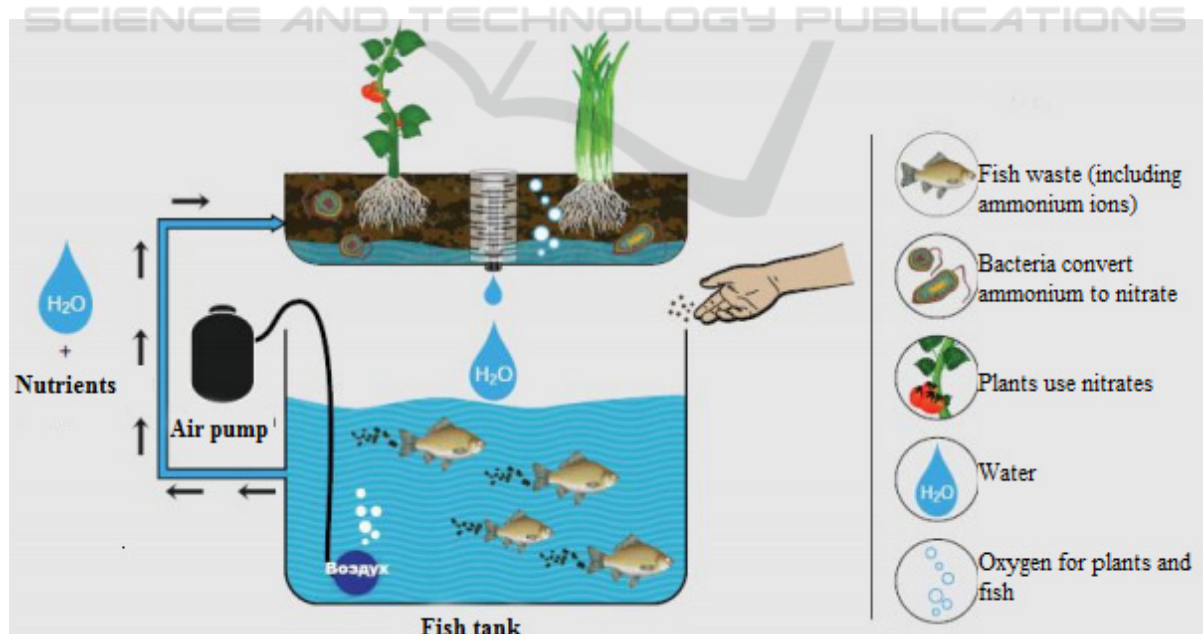


Figure 5: Aquaponics installation structure (Prospects for urban farms, 2021).

Aquaponics is an artificial ecosystem. In it, a person himself (aquaponist) balances the impact of abiotic components (temperature, light, water hardness, pH, etc.) on biotic components.

The world has already learned how to use aquaponics. So, the largest farming project in Europe is a vertical farm in Hague in the former six-story Phillips office, vegetables and microgreenery are grown on the roof, and fish are fed on the 6th floor below.

Ideally, city farming solves the following tasks:

- ensuring food and economic security of the country, including import substitution of products;
- year-round cultivation of fresh and useful agricultural crops, without chemical fertilizers and additives;
- presentation of a wide range of agricultural products;
- increasing the yield of crops cultivated regardless of weather (external) conditions and human factor;
- saving water, in fact, 95% less water is consumed, than when cultivating crops in the ground;
- fast delivery to the consumer, logistics and resources saving;
- saving space due to close and story placement of agricultural crops;
- saving land area, water reservoirs;
- reducing the time and physical spendings for cultivation of crops;
- forming ecological thinking;
- the forming a healthy lifestyle;
- automated cultivation and tendance.

However, it should be noted a number of difficulties, arising in the running city farming, which must be taken into account by the entrepreneur in the course of planning and organizing a social enterprise:

- rather large financial costs for the purchase and maintenance of special automated equipment and devices;
- equipment failure leads to a large loss of yield;
- the penetration of viruses and bacteria contributes to the complete loss of yield;
- manual pollination of crops;
- large yields can be obtained only when using greenhouses, and it is rather difficult to work in them due to high temperatures and humidity;
- crops cultivated may still contain pesticides and nitrates, that unprincipled farmers add to nutrient solutions. This is why many

consumers are distrustful of products, cultivated without soil;

- lack of highly qualified personnel by profession of "City farmer".

Thus, the profession "City farmer", according to the Atlas of new professions, posted on the website <http://atlas100.ru/catalog/selskoe-khozyaystvo/>, will officially appear in Russia before 2021.

In a number of regions of our country (Bryansk region, Vladimir region, Voronezh region, Moscow, Novosibirsk region, Nizhny Novgorod region), work-study sites (centers) are actively being created, where students, youth, unemployed citizens have the opportunity to get additional education by profession of "City farmer". Students acquire the skills to work on metalwork, soldering, electrical equipment, master the work with measuring instruments, installations for the preparation of solutions of a given concentration, study marketing, management, principles of operation of modern equipment (automated greenhouses, hydro, aero or aquaponic systems).

All equipment for city farms is developed using digital technologies and innovations, systems are controlled through an integrated network by special consoles, smartphones, electronic devices, and digital signals are coming directly to personal switches (described above). This equipment is mainly produced abroad (city farms from the companies Tower Garden, Philips, Naava, Click & Grow (average cost is 4,800,000 rubles), but Russian developments also appear (Troysun smart home farm, "CityFerma" (average cost is 2,500,000 rubles). Automated phytomodules, phytocabinets, phytoboxes (price range is from 3,000 to 80,000 rubles) are also popular.

Digital city farming is a popular niche for social entrepreneurship, whose activity is aimed at achieving socially useful goals and solving social problems of society (Federal Law, 2019).

Let us consider the main characteristics of the projects "Digital City Farming: Hydroponics", "Digital City Farming: Aeroponics", "Digital City Farming: Aquaponics", which are possible for implementation, which have a social orientation and imply the appearance of visible social effects.

Our main consumers:

- socially vulnerable and seeking help people (single parents and parents with many children, low-income citizens, disabled people and persons with disabilities, parentless children, pensioners and people nearing pension age);

- people with a special diet (with diabetes mellitus, eating raw plant foods (vegetarians, vegans);
- mothers, older people, athletes who eat healthy food, etc.

Product range:

leaf lettuces ("Lolla rossa", "Dubolistny", "Skorokhod", "Robin" and 11 other types of varieties); basil (green, red, and premium); arugula (wild and cultivated); parsley, celery, green onions, cilantro, dill, sorrel; leaf chard; "pepper" mint, "Melissa"; wild strawberries and strawberries of fall-bearing type; head salads and cabbage ("Frillis", "Pak Choi", etc.); microgreenery and seedlings of grain legumes; cherry tomatoes, hot peppers, carps, perches, crayfish.

Production flow is all year round, regardless of the season.

The goods can be sold both on the basis of concluded contracts, and through the official website of a social enterprise:

- to orphanages, homes for the disabled and the elderly people; pointwise, socially vulnerable and seeking help people (families with many children and low-income families; people in rehabilitation after severe operations; singles with minor children, including disabled children, parents);
- to social enterprises, where food is cooked or sold (shelters, private kindergartens and schools, family guest and leisure centers, social rehabilitation centers, specialized sports and travel companies for the disabled, etc.);
- to municipal educational and medical institutions;
- to a sanatorium, holiday centres and health centers;
- to cafes, restaurants, pizzerias, fast food organizations, shops, offices, processing plants;
- during the period of forums, gatherings, conferences, competitions, etc.

Goods delivery:

- specialized road transport;
- specialized issuing points of perishable products;
- pickup from the warehouse of a social enterprise.

The cost of products in accordance with the price list, presented on the official website, is for socially vulnerable and seeking help people (categories will

be detailed on the company's website), prices for products are reduced by 20-30%.

Payment:

- a) cash and non-cash payments;
- b) a flexible system of discounts is provided for regular customers;
- c) delay of payment for non-cash payment up to 10 working days from the date of receipt of the goods by the buyer.

Specialized automatic equipment:

installation devices for hydroponics, aeroponics and aquaponics, equipped with: thermal insulation, heating, ventilation and air conditioning, LED lighting, ultrasonic humidification, sensors and controllers, automated fertigation and irrigation units for nutrient irrigation.

Marketing: as marketing tools to attract buyers, it is possible to use:

- distribution of leaflets and business cards;
- paid posting on social networks (popular urban publics and groups) (Goryunova, 2019);
- managing the official website, conducting promotions with the distribution of finished products,
- as well as sales funnel tools: lead magnet, tripwire, upsell, upgrade and bundle.

Employment of socially vulnerable citizens (with preliminary training in some specialties), the need of a medium-sized enterprise: 60 - 90 people:

- disabled people and people with disabilities (2 people);
- single parents and parents with many children, with minor children, disabled children (part-time employment is possible, 10 people);
- pensioners and citizens nearing pension age (8 people);
- leavers of orphanages under the age of twenty-three (20 people);
- persons released from prison and having an unexpunged or outstanding conviction (20 persons);
- refugees and internally displaced persons (with the possibility of providing housing, 10 people);
- low-income citizens (5 people);
- persons of no fixed abode and occupation (with the possibility of providing housing, 5 persons).

Possible risks in the implementation of city farming projects:

- violation of the cultivation technology (incorrect composition of the nutrient solution, failure in the irrigation system, power supply) and storage of agricultural crops;
- entry of viruses and bacteria;
- poor pollination of plants.

Regional city farms in Russia: UrbaniEco, Moscow; iFarm Project, Novosibirsk region; "Agrorus", Bryansk region; "RusEko", Vladimir region

Possible financial support for the presented social projects: budgets of different levels, charitable organizations (Russian and foreign), donations from commercial companies, private donations, loans from non-governmental organizations.

Possible non-financial support for the presented social projects (information support from trusted experts and consultants).

Possible state support for the presented social projects: federal competitions, federal subsidies, loans from government organizations, etc.

4 DISCUSSION OF RESULTS

Approbation of research results. The results and main provisions of the research work at various stages of its preparation were presented and reported by the author at the following events:

1. "Summer School for Young Researchers-2019 "Planet Earth": - poster presentation "City farming as a way to preserve the agroecosystem and ensure food security in our country" (September 2019, distance participation).

2. International research-to-practice conference "The role of the state in the well-being of the development of entrepreneurship and the formation of economic interrelations in society" (c. of Minsk), report: "Cultivation of crops in artificial environments as a factor in maintaining human health" (September 2019, in-person participation).

3. Regional research-to-practice conference "State and prospects of socio-economic development of Russia" (Kaluga branch of the RANEPa, distance participation), scientific article: "Precision farming as a way to solve the issue of food and economic security of our country" (October 2019, distance participation).

4. V International scientific conference of students and graduate students "Speransky readings", report: "Social entrepreneurship in Russia: problems and prospects, RANEPa, December 2019, in-person participation).

5. Open international student scientific conference "SSC Moscow Polytechnic University-2020", report: "Application of new generation technologies in agriculture as a way to solve the issue of food security in our country" (April 2020, in-person participation).

5 CONCLUSIONS

In conclusion, I would like to note, that social entrepreneurship is an integral part of the development of the Russian economy, projects with a social focus will always be in demand and accepted in society.

Russian social entrepreneurs, operating in the regions of the Russian Federation, should be offered some recommendations:

- always look for new solutions, bright ideas, and most importantly, competitive projects, aimed at providing support to socially vulnerable and seeking help people;
- not mess about the development of documentation, a business plan, think over the development strategy of your enterprise, its financing, calculate the possible risks, determine the circle of competitors, study management and marketing;
- cooperate with municipal, regional and federal services, enterprises, organizations;
- be responsive, hardworking, fair and decent social entrepreneurs, do not forget, that there are people next to you, who constantly need your effective help and timely support.

REFERENCES

- City farming: new opportunities for entrepreneurs. Access mode: URL: <http://www.xn--peamercaodu9a.cl/tienda/productos/sistema-de-cultivo-hidroponico-casero-hidroponik/> (date of access 24/01/2021).
- City farming: new opportunities for entrepreneurs. Access mode: <https://россельхоз.рф/stati/rastenievodstvo/ayeroponika-ili-vyraschivanie-na-vozduhe.html> (date of access 01/29/2021).
- Digital economy in Russia. Access mode: <https://digital.gov.ru/ru/activity/directions/858/> (date of access 01/20/2021).
- Dudin, M.N. and Omarova, Z.K. (2019). Digital entrepreneurship in the service sector and the trade sector: essence, purposes, objectives, assessment of economic benefits. *CITISE*, 1(18).

Federal Law of July 26, 2019, No. 245-FL "On Amendments to the Federal Law "On the Development of small and medium-sized entrepreneurship in the Russian Federation" in terms of consolidating the concepts of "social entrepreneurship", "social enterprise". The official Internet portal of legal information <http://www.pravo.gov.ru>, 08/06/2019, publication number: 0001201907260077.

Gataulina, G.G., Bugaev, P.D. and Dolgodvorov V.E. (2018). *Plant growing: textbook*. M: INFRA-M.

Goryunova, S.A. (2019). Features of blogging on Instagram: the social aspect. *Materials of the LXVI student international research-to-practice conference*, 7(66).

International cooperation on food security. Access mode: https://wtcmoscow.ru/services/international-partnership/analytcs/tsifrovaya-ekonomika-i-puti-ee-razvitiya/? Sphrase_id=14291 (date of access 01/18/2021).

Lopota, V.A., Zaborovsky, V.S. and Khavrov, V.A. The third generation of network technologies - the inevitable transition from computer telecommunications to digital signal processing and control networks. *State Research Center "Central Research Institute of Robotics and Technical Cybernetics"*. <http://www.neva.ru/conf/art/art5.html> (date of access 01/22/2021).

Mesenburg, T. Measuring the Digital Economy (2011). *US Bureau of the Census*. Suitland. MD. Retrieved from: <http://www.census.gov/content/dam/Census/library/workingpapers/2011/econ/umdigital.pdf>.

News channel. Access mode: URL: <http://www.neva.ru/conf/art/art5.html> (date of access 01/19/2021).

Prospects for urban farms. Access mode: https://globalab.org/ru/project/cover/akvaponika_isku_sstvennaja_ekologicheskaja_sistema.ru.html#.XUKqY5DI6Uk (date of access 01/28/2021).