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## DEVELOPMENT OF "CLEVER AGRICULTURE» IN THE REPUBLIC OF UZBEKISTAN

**Abstract:** Possibilities of digital economy in development and management of agriculture the big. If the share of the economy using digital technologies, increases, will appear possibility to leave on higher qualitative and quantitative level of production and productivity of a clap - a raw, melons and gourds etc. In article development questions of "clever agriculture» in foreign countries and in the Republic of Uzbekistan are considered.

**Key words:** digital economy, digitalization, agricultural works, smart technics, exact agriculture.

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### Introduction

Possibilities of digital economy in development and management of agriculture is bigger. If the share of the economy using digital technologies, increases, will appear possibility to leave on higher qualitative and quantitative level of production and productivity of a clap - a raw, melons and gourds of labor productivity Growth at performance of agricultural works will be more by profitability of actives.

The main catalyst of digital economy in agriculture is the Internet of things (Internet of Things, IoT), where a combination of technologies in the field of the analysis of the data, in working out of sensor controls and the homing (pilotless) technics, and also the connected network decisions, control systems, platforms and appendices which deduce ways of cultivation of plants on new level.

Transition of agriculture of the country to technologies of exact agriculture, is a part of technological break, it is transition of agriculture to

new technological level. Exact agriculture it also is digitalization of agro technologies, and introduction of these technologies.

Piloted tractors and combines accelerate work on fields already ten years, but today it is already not enough of them for maintenance of necessary capacities. Manufacturers of units for agriculture gradually start the production which is capable to become a part of the Internet of things. In Europe about 80 % agricultural technicians is issued with navigation systems. Clever tractors and combines can work independently and presence of the person does not demand. It gives the chance to use them at any time. Prototypes of smart technics for a field are supplied by set of additional functions. For example, tractor John Deere with GPS is issued with the built in systems against wreckers. These cars are already used in fields, but still many workings out similar to them while are at a testing stage. And spring of this year the Russian firm Cognitive Technologies analyzed the

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system which can make any agricultural machinery pilotless. It is so-called agro droid C2-A2 (Cognitive2-Agro2 Droid1) - according to developers, it can be connected to combines, tractors and sprayers and to replace with it a digital brain [1-4].

The Internet of things offers agricultural branch not only clever tractors and combines. Also flying machines concern smart units also. Drons equipped with chambers and sensitive gauges, can inspect fields and monitoring a crop condition. Similar devices on a level with tractors can collect the information for working out of cards; make the schedule of application of fertilizers, even to protect fields.

Some decisions from area of the Internet of things concern by the time of when the crop is already collected.

Production of American firm Check It Now concerns them - these storehouses check temperature, humidity and light exposure of a premise. At infringement of conditions the system corrects a situation and notifies on changes of the owner of a warehouse.

In spite of the fact that many clever decisions for agro sector are only tested, and on their introduction time is required, forecasts of experts are optimistically. According to analysts from Goldman Sachs Group, application of IoT-decisions in agriculture by 2050 year will increase world production by 50 %.

Scientists consider that in the future of the car and robots can replace completely manual skills of the person in agriculture. Already now technologies, including based on the Internet of things, help to automate and supervise processes on farms, accelerate processing of the information and solve specific problems of manufactures.

Israel does phenomenal successes in agrarian sector. On the area hardly there are more than 20 thousand square kilometers the most part from which occupies the desert, farmers of Israel grow up vegetables and fruit. It allows not only to close internal requirements, but also to export the goods - citron and tropical fruit from here are delivered almost in 40 countries of the world, among them about 20 countries of Europe, including Russia. In total amount of export plant growing production occupies about 3 %. According to The Observatory of Economic Complexity, in 2016 Israel has earned on vegetables and fruit almost \$2 billion.

Arising because of a small amount of deposits deficiency of fresh water does necessary and universal application of systems of drip irrigation. Israel became one of the first countries in the world which has started to use this technology. Plants receive strictly necessary quantity of moisture, and the special gauges collecting the data about a condition of soil on the ground areas watch it.

Working out of Israeli agro technical company Roots - clever pipes which are laid in soil. System

RZTO (Root Zone Temperature Optimization) counts and establishes optimum temperature of the earth for each site. Water filling pipes heat up a root zone in the winter and cool it within summer, maintaining rather stable temperature. Besides, pipes which pass on a soil surface are used for condensation of moisture from air and an irrigation of plants. According to all available data from the company, clever pipes are already used in hothouses in a river Jordan valley, plain Sharon, agricultural communes of Karmia and Ain-Jahav, at cultivation of cucumbers, tomatoes, strawberries, melons, a basil and salad. After introduction of technology productivity of various cultures has increased from 10 to 66 %.

Only 15 % of territory of Japan is suitable for agriculture conducting. To compensate poor natural resources, the country stakes on working out of clever technologies which allow rising labor productivity of farmers. Automatics, gauges and a difficult technique are used in many areas of agriculture, including in animal industries which while are developed very poorly. By means of the Internet of things farmers watch a physical condition of cows and even their mood.

The system developed by one of IT corporations Fujitsu largest in Japan, has received name GyuHo SaaS (« walking cow» with Japanese) or Connected Cow (« connected cows»). The special bracelet which considers the steps made during the day is put on an animal. The data about activity of herd goes to a cloud, is analyzed and transferred to the smart phone or the computer of the farmer. The information is updated each hour, thanks to it experts can correct feeding, milking and a dream of animals. Disease can be found out in «the connected cows» at an early stage, after all an animal to which its feel unwell, will move less.

The main task of a clever bracelet it to calculate the favorable period for conception. The gauge allows making it with the big share of probability as during the period, the number of the steps made a cow, increases in times. As a result, according to developers of system, success of artificial insemination from 44 % grows to 90 %. Also the system predicts date of sorts and allows watching process by distance.

Actively to introduce system in Japan have begun in 2013 year. The system has connected about 40 thousand cows. According to Forbes, by 2017 year technology Fujitsu was used on 64 farms in Japan, Korea, Poland, Romania and Turkey.

Norway, as one of the main supplier's salmon on the world market. Trade extraction here gradually is forced out by fish farms. The main enemy of fish factory owners is crayfish *Lepeophtheirus salmons*, known as the salmon louse. The parasite breeds on a skin of a salmon, putting a serious loss to health of fish and leading to huge losses of the enterprises [5-12].

Trying to solve a problem, in Norway since 2016 year develop system of recognition of fishes on farms.

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Now the technology passes test tests at enterprises Cermaq Group - one of the largest Norwegian companies which are engaged in cultivation of a salmon and a trout. To reveal the salmon infected with a parasite, each individual is scanned by means of gauges and 3D-chambers. The system distinguishes fishes on the basis of unique stains round eyes, a mouth and the gills, each of the individuals who have got to an objective receives own virtual medical card. Thanks to it experts constantly watch a state of health and increase in weight of each individual, can notice in time if fish is sick, and to send it in quarantine.

«iFarm becomes the considerable contribution to the decision of problems which faces aquaculture, - general director Cermaq of Gejr Molvik in official release of the company makes comments. When the salmon passes through the touch chamber, we can take separate fish, for example, to process from louses, without disturbing the others. And as we supervise each individual, we see when rate of increase of fish has decreased or development has stopped. It can be a sign of that with fish something not so».

It is expected that it is required to developers about six years completely to fulfill technology and to prepare for mass use. By estimations of experts, disease revealing at an early stage will allow to reduce death rate approximately to 50-75 %.

The agriculture of Great Britain is considered one of the most effective in Europe. Farmers are engaged in it basically, it is not enough large enterprises. In branch it is occupied about 2 % of the working population, and this number is gradually reduced. Thus productivity, on the contrary, grows - thanks to introduction of modern technologies. And the country main task in this sphere - to make agricultural products manufacture profitable. Therefore farmers are supported actively by the state. And scientists and suppliers of digital decisions continue to experiment, automating manufacture.

In September, 2017 year in Great Britain have reaped the first crop which has been grown up by robots. Scientists automated all processes to prove that in modern conditions it is not obligatory to landowner most to get into the car a tractor or a combine. The clever technics has independently landed, has grown up and has cleaned barley on skilled hectare. The first crop from a field into which the foot of the person did not go, has made 4.5 tons of grain.

The robotized farm is a project of University Harpera of Adams. On farm Hands Free Hectare used drones which spent shooting of grounds by means of multispectral gauges: it allowed understanding, in what condition crops, and also in time to begin struggle against weeds and wreckers. Land cars took earth samples, analyzed and selected suitable fertilizers. For crops and cleaning used the small automated combines, tractors and the seeders

equipped GPS. All data arrived in the uniform center, whence developers watched automatics work.

Cost Hands Free Hectare has estimated in \$356 thousand. The project was financed by company Precision Decisions specializing on agriculture and mechanical engineering, and the British agency on innovations Innovate UK.

In November, 2017 year, after success with barley, experimenters have landed winter wheat. This year developers have continued to work improving technics. Now design group Hands Free Hectare plans to release hands of agriculturists not on one, and already on 20 hectares.

The Republic of the Uzbekistan can dominate in the foodstuffs world market for this purpose, it is necessary to develop new grades and new effective technologies of "clever agriculture», including technology of exact agriculture. Technologies of exact agriculture is first of all the software, gauges, sensor controls, hardware-software complexes, satellite/air photography and the land measurements interfaced to them, and many other things.

The big prospects, in creation of intellectual systems, the systems based on knowledge and network services on their basis.

By estimations of working group FoodNET of the National technological initiative, the program, the volume of the world market of technologies of "clever agriculture» by 2035 year will make an order of \$480 billion. It is big, only beginning to develop the market.

Under forecasts of analysts from company Future Market Insights, by 2026 year the clever market of agricultural decisions will grow to \$40 billion planet Population will increase, and new capacities will be necessary for extraction of food resources.

The agriculture is one of branches in which technologies of the Internet of things master fastest, and it occurs all over the world. Clever devices open before economy the big prospects for development and become important competitive advantage; after all it is automation of labor-intensive processes, economy of resources and exact forecasts for acceptance of strategically important decisions. Active support of process digitalization of economy on government level of the Republic of Uzbekistan remains the driver of development of the new standard of the market of the Internet of things in agriculture.

For increase of competitiveness of products of agriculture of the Republic of Uzbekistan, decrease in production costs, increase in productivity of cultures and efficiency of animals its accelerated innovative development on the basis of close integration of manufacture, science and education, working out and introduction of domestic scientific researches, a transfer of foreign effective technologies, preparations and the retraining of personnel, claimed on the agrarian market of the country is necessary. The analysis has shown that for studying of requirements

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of agrarian sector in high technologies and increases of efficiency of agriculture close interaction of an agrarian science, formation with the best foreign partners in agriculture is necessary. Joint working out scientific and educational programs forces of scientific research institute, universities and experts of agriculture, and also a transfer of technologies with a view of satisfaction of requirements of business structures of the Republic of Uzbekistan joint researches with foreign technological leaders on c\X are necessary [1-4].

For creation of effective system of support of a transfer of foreign technologies expediently on the basis of agrarian university to develop monitoring on transfer technologies. It is necessary startups in agrarian sector of the Republic of Uzbekistan. For example, in March, 2018 in Russia there is begun a startup on working out agricultural purpose. For these purposes "AgroDronGrup" has received investments at a rate of 25 million rubles from the Russian-Belarus fund of venture investments.« AgroDronGrup »creates system of monitoring of a condition of areas under crops and health of plants with use drones. Gauging and pictures are transferred to the platform developed by the company which offers recommendations about carrying out of agricultural works. Cards of the analysis of fields allow defining a condition of soil and level of the maintenance of nitrogen, to supervise productivity, to reveal a contamination of soil and to find out the centers of defeat from illnesses and wreckers. In 2018 year the company has opened for itself five segments of clients: agro manufacturers (farmers and holdings), the agrochemical enterprises, the agricultural technician, the agro insurance companies and state structures. Sales in these directions were already generated in Russia and Kazakhstan; besides, "AgroDronGrup" has spent a number of adaptations of the product to Indonesia. It is expedient to scale new segments in Uzbekistan. The Ryazan Company Avrora Robotics develops a startup - the software which allows making technics and vehicles pilotless. Control system Avrora Robotics unites the information arriving from various sensor controls, creates a card of surrounding space, finds obstacles and independently the decision on movement of a pilotless platform makes.

Among company projects - the pilotless bus with system of scheduling of "KagroBot", mobile vending device for sale of production "VendBot", walking swimming means of "AkvaBot", an educational complex of a mobile robotics "Junior" and cross-country vehicle "Mars". For modernization of agriculture the company has created "Agroboat" - system of auto piloting of agricultural machinery that will allow lowering expenses of farmers and agro holdings for fuel and raises productivity. The startup of "UrbaniEko" develops at once three lines of activity: manufacture of greens and salads on vertical

cities-farms under a brand «Local roots»; equipment manufacture, building on a turn-key basis and service of vertical cities-farms and other decisions for cultivation in the closed premises (house systems, mobile farms, decisions for shops and restaurants); creation of schools of cities-farmers, i.e. training of a trade of the city farmer and training on a farm.

In 2018 year of "UrbaniEko" has started to grow up greens in own hothouses. In the summer of 2018 year fund TealTech Capital invested about 6 million Russian roubles in creation vertical city-farm «Local roots».

«Urbany Eco» intend to continue sales of "clever hothouses» for schools and educational institutions and to start a ruler of automatic house systems for cultivation of greens and salads.

In the Republic of Uzbekistan also there is begun development of startup in the field of agriculture. In Tashkent are summed up a startup-accelerator for projects in sphere of green technologies and water questions. Nine projects are let out. All commands are awarded by memorable certificates and figurines.

Two best startups have received prize-winning certificates on a trip to Amsterdam on ending ClimateLaunchpad-2019 year. Accelerator Water Solutions Innovation Lab is spent by company Green Business Innovation within the limits of project USAID/CAREC Smart Waters on the basis of klaster of innovations and scientific researches with support of the Republic of Uzbekistan the water management ministry and the Tashkent institute of engineers ирригации and agriculture mechanization. Group «Engineering Research» Group has developed the project of creation highly effective Freely line hydraulic turbine; Group "Gardenn" has created the project on development Urban Gardening in Uzbekistan with technology of "incubator" for cultivation of plants and mushrooms, for houses, offices and schools, «Green Fitness» has developed the project on creation of new technology on equipment of the sports centers by the training apparatus making energy at the expense of solar panels and trainings of users; «SmartGidro» has created the integrated system of power supply, water supply and a drop irrigation for the remote regions of Republic of Uzbekistan; «TheMET» has developed the integrated methodology for agriculture with GIS-modeling use;

«VIOM» work out the project on manufacture of a water-soluble and bio decomposed film on the basis of natural raw materials for packing of dry products/goods and application in agriculture. Agro startup one soil will introduce IT decisions in the Republic of Uzbekistan: the project will be realized пилотно on an example of one area with use of satellite pictures of cultures on fields in a multispectral range. The Ministry of Agriculture of the Republic of Uzbekistan, company OneSoil and Boston Consulting Group have signed the joint agreement on use of the

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satellite data in agriculture of Uzbekistan. The agreement provides realization of works on active introduction of digital technologies in agriculture within the limits of the concept «Clever agriculture», objective картированию the earths and cultures of Uzbekistan through use of modern technologies. The project in our country will be realized пилотно on an example of one area with use of satellite pictures of cultures on fields in a multispectral range. In August of this year have passed the seminars directed on creation of an investment portfolio on a diversification

of agriculture and finding-out of the data on conditions of growth of cultures, working out of decisions. OneSoil - an agro technical startup from Belarus which creates applications and an online platform for exact agriculture. Company products are under construction on algorithms of machine training and the analysis of space pictures Sentinel-1 and Sentinel-2 which are in open access.

Chair "Agrologistics" Tashkent agrarian university organizes special groups on on rendering of ex-sweaty services in the field of agriculture.

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