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RURAL ECONOMY IN THE PRODUCTION OF PRODUCTS AND ITS PLACE IN THE NATIONAL ECONOMY

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ABSTRACT

The article presents the main scientific developments of the national economy in recent years: filtering and sorption nonwoven fabrics;

- Biologically active nonwoven materials, providing comfortable conditions for human life; - nonwoven materials filled with Nano scale components.

Keywords: Innovative nonwovens, research, development, filtering, sorbing, protective, Nano-sized particles, modified fibers.

INTRODUCTION

Fifty-five years of its history of nonwovens has been engaged in research in the field of creating nonwovens based on textile fibers and threads. The sectorial affiliation of the institute to the textile industry in the past has left its mark on the scientific specialization of our activities in the present. The scientific directions of the institute's activities in recent years are provided both by a new scientific reserve, and by the rational use of the scientific potential developed over decades, the constant improvement of the applied technologies and the introduction of scientific developments at the scientific and production base of the institute and at industrial enterprises of the country. Therefore, scientific research is aimed at studying the needs of potential consumers and improving the quality characteristics of products, and expanding its range with an optimal price quality ratio. This is achieved both by improving known technological methods, and by creating new technological operations and finishing non-woven materials of new structures and technical means for their implementation. In accordance with this, the main, most significant priority areas of research are determined, which in many ways contributes to solving the most difficult task of today - import substitution. The leading scientific direction in the activities of the institute is still the creation of highly efficient filtering and sorption nonwoven materials, incl. for protection from man-made impacts. Filtering non-woven materials are developed and developed for use in various industries, ferrous and non-ferrous metallurgy, metalworking, woodworking industry, at enterprises for the

production of mineral fertilizers. The materials are intended for cleaning air, liquid suspensions and solutions, fuels and lubricants, waste water, for trapping aerosols of acids, alkalis, etc. A number of developed filter cloths are intended for work in extreme conditions of combined action of aggressive media and high temperatures. Using the theoretical foundations of filtration processes based on traditional fibers and threads, competitive filter materials are created with a filtration purity of up to 5-10 microns and a heat resistance of up to 2400 C. To date, more than 50 items of filter materials are produced at the institute on a pilot basis, and 8 more are under development. Patent protection is supported for 5 types of materials. For the environmental protection of the environment, sorption materials are being developed for collecting and removing oil pollution from the surface of the soil and water, for cleaning household, industrial, waste and storm water. The achieved sorption capacity of these materials today is 10-25 kg/kg. The number of regeneration cycles for reuse is at least 10, a decrease in concentration was achieved during the post-treatment of wastewater from oil products - 8 times; suspended particles - 2 times. Sorption materials and products made from them are protected by three patents for inventions and a trademark certificate.

As part of the implementation of the state order under the State contract with the Federal Agency for Science and Innovation, a new biomass carrier material has been developed that has a high absorption capacity for petroleum products and resistance to multiple mechanical regeneration. Comparison of the properties of the nonwoven bio carrier with the developments that determine the world level indicates that the bio sorbent developed by us has a stronger adhesion of biomass to the nonwoven carrier, which makes it possible to expand the scope of such materials, especially for wastewater treatment conditions in dynamic mode. As before, an important scientific direction in the work of the institute is the development and development of new dressing and surgical materials and sanitary and hygienic products, incl. for emergencies. The Institute has developed a whole range of non-woven fabrics and medical products, pilot industrial batches of which are produced on the experimental basis of the Institute. These include: thermo bonded non-woven fabrics for hats, masks, shoe covers; hygroscopic cloths for tampons; canvas stitched moisture-absorbing fabrics for special clothing; aromatic materials; non-woven materials for the manufacture of medical blankets used in the rehabilitation of patients. Technical regimes, scientific and technical documentation have been developed for the range of products produced; received 3 patents. Currently, the institute’s specialists are working on the creation of biologically active materials, incl. with antimicrobial properties. Research is being carried out in the direction of creating polyfunctional non-woven materials for therapeutic and prophylactic dressings that provide minimal trauma to the wound surface during application and removal, have antimicrobial properties and high

sorption capacity. Unfortunately, it is difficult for the institute to compete with the huge amount of modern cheap medical materials imported from abroad. In this regard, we pin special hopes on the further implementation of the state program of import substitution in healthcare. An equally important scientific direction is the creation of non-woven materials that provide comfortable conditions for human life, incl. safe working conditions. Within the framework of this problem, a whole series of new highly effective types of nonwoven materials has been developed for professional protection of personnel working in extreme conditions. Of greatest interest are: • heat-shielding non-woven materials used in the manufacture of combat clothing for firefighters and workers in the Far North; • acid protective non-woven materials used in tailoring to protect against the effects of mineral acids and potent toxic substances (vapors of chlorine, ammonia, phosphorus-containing compounds, hydrazine derivatives, etc.) for the manufacture of respirators that protect the respiratory organs from exposure to hydrogen fluoride, etc.; • moisture-absorbing non-woven materials intended for underwear, sports shirts, suits, etc.; • multifunctional non-woven materials for footwear and footwear industry.

An important scientific area also includes the development of non-woven materials technology for the manufacture of highly effective professional protective equipment using new types of fibrous raw materials (new ion-exchange fibers, heat-resistant fibers, high-modulus fibers and their waste). Among those requiring further research and implementation on an industrial scale is the technology, initially focused on the processing of short-fiber textile waste with a fiber length of 2 to 15 mm, which was developed on the basis of a new canvas formation system. Non-woven materials made using the new technology contain from 80 to 95% short fibers in their structure. Due to the stochastic nature of the location of the fibers and the type of their bonding, materials have unique properties in terms of elasticity and resistance to multiple compression. The degree of elastic recovery is 73-89% with a bulk density of 32-70 kg/m3 and a thickness of up to 50 mm. The developed necessary design and regulatory and technical documentation for the industrial development of this technology is not in demand today by domestic machine builders. In recent years, the Institute’s scientific plans have included topics related to nanotechnologies. In our opinion, the institute’s work on the creation of nonwoven materials filled with nanosized structural components can be attributed to promising areas. To date, two works have been performed that differ from each other in terms of the technological principle of introducing and fixing nanosized functional particles in the structures of materials. The Institute, within the framework of the state order, conducted research on the nano-modification of non-woven materials with nano-sized particles of metals and their complex compounds. The filling of the structure of non-woven material with nano-

sized functional particles is carried out by nano-modification of fibers directly in the process of their preparation for processing into non-woven materials. A technological method has been developed for nano-modification of fibers in order to impart antibacterial properties to them, which is based on a combination of nano-modification and treatment of fibers with antistatic preparations before combing, which is protected by a patent of the Republic of Uzbekistan.

Release of innovative products by industrial production organizations

The next issue of the newsletter of the Science, Technology, Innovations series presents data on the production of innovative goods, the performance of works and services by Uzbekistan industrial organizations.

Country context (Fig. 1).

Uzbekistan	2021
Population, million	35.0
GDP, current US$ billion	69.2
GDP per capita, current US$	1,980.2
Life Expectancy at Birth, years	71.8

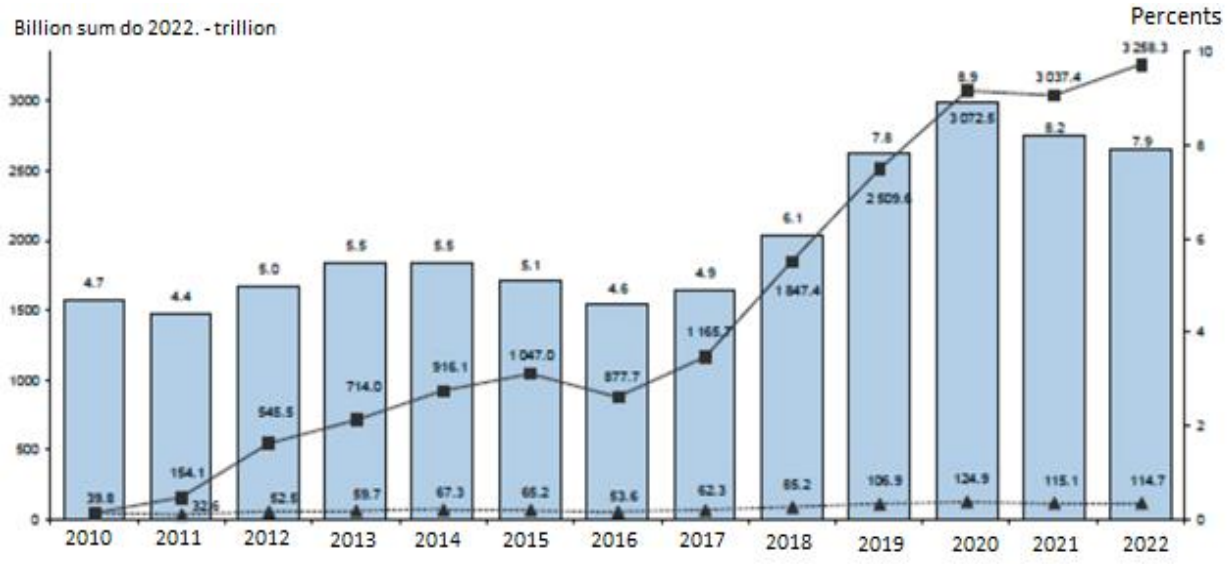
Despite the fallout from the war in Ukraine, Uzbekistan is expected to grow by 5.3 percent in 2022. The medium-term outlook remains positive, as ongoing economic reforms are expected to continue to invigorate private sector led growth.

Uzbekistan has pursued an ambitious initial set of trade and price liberalization reforms in recent years. However further reforms are needed to continue to spur productivity, private sector-led growth, and job creation. The focus should shift to addressing weak factor markets, high trade and transit costs, dominant state-owned enterprises, the weak regulatory environment, and further strengthening market incentives and sustainability in agriculture and across the economy.

The government recognizes the need for a more inclusive transition. According to the new national poverty line, about 17 percent of the population lived in poverty in 2021. The recent reform efforts to expand coverage and strengthen the targeting of social assistance will be key to supporting those who may otherwise fall behind.

Evaluation of the results of innovative activity is based on indicators of the volume of innovative products, their structure from the standpoint of the level of novelty. In 2022, the output of innovative goods (works, services) by large and

medium-sized industrial production organizations amounted to 3.3 trillion sums, which in comparable prices roughly corresponds to the level of the previous year (Fig. 2).



share of innovative goods works, services total volume of goods loaded, works performed, services

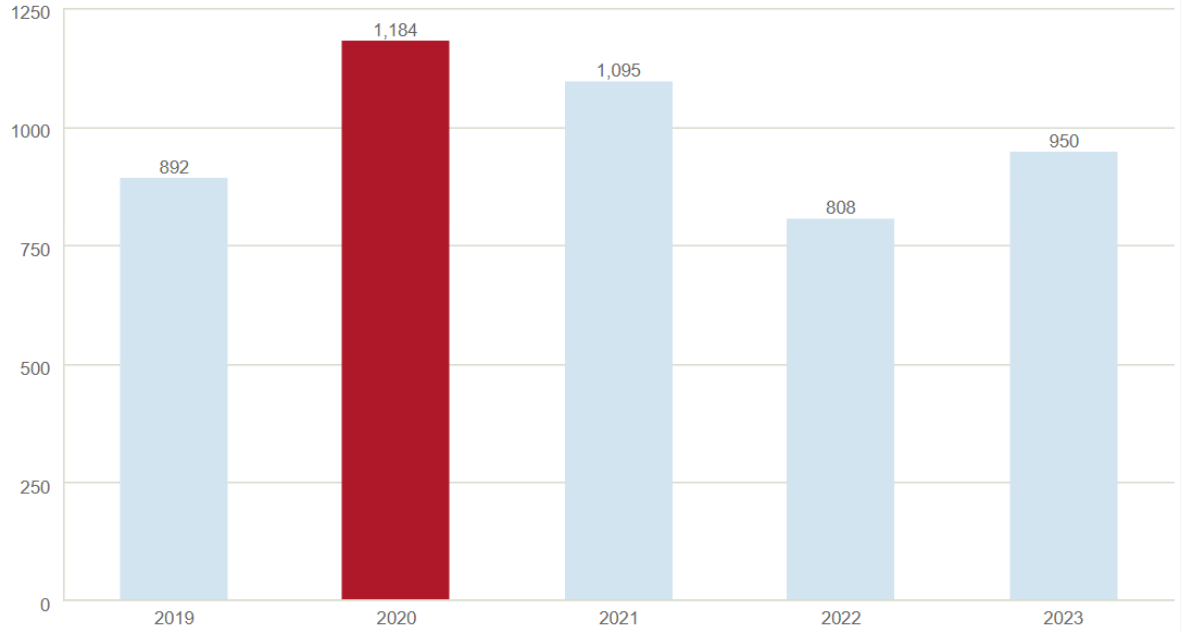
the volume of innovative goods, works, services in current prices

volume of innovative goods, works, services in constant prices in 2012

Fig 2- Dynamics of the volume of innovative goods (works, services) of industrial production organizations

LENDING

Uzbekistan: Commitments by Fiscal Year (in millions of dollars) (Fig. 3).



Amounts include IBRD and IDA commitments

Most of the innovative products in 2023 belong to medium-tech industries of high and low levels (63.9%), the leaders include producers of coke and petroleum products (26.3%), automobiles (12.6%), as well as metallurgy (10 .6%). The share of the high-tech sector in the total volume of innovative goods, works, services is 10.3%; low-tech - 8.6%.

Strategy World Bank Portfolio (Fig. 4).

Number of active projects	27
Lending	$4.76 Billion
IBRD	$1.75 Billion
IDA	$3.01 Billion

In May 2022, the World Bank Group's new Country Partnership Framework (CPF) for Uzbekistan was endorsed by the World Bank's Board of Executive Directors. The document outlines the Bank's financial and analytical support to the Government for the period FY2022–26 period in support of its development goals.

The CPF supports three high-level objectives that should be achieved to accelerate Uzbekistan's transition to an inclusive and sustainable market economy.

They included:

1) increasing private sector employment;

2) improving human capital; and

3) supporting the shift toward a greener growth model for improved livelihoods and resilience.

The CPF also supports the Government in its efforts to close gender gaps, as well as strengthen citizen engagement and accountability in public services.

The CPF selectively contributes to the implementation of the Government's plans as outlined in the National Development Strategy for 2022–26 to reduce poverty by half by 2026 and to achieve the status of an upper-middle-income country by 2030.

Key Engagement

The World Bank's financial and analytical support to Uzbekistan has grown substantially since 2017, bolstering the Government's efforts to implement a comprehensive program of market reforms.

As of October 1, 2022, the World Bank's country program in Uzbekistan consisted of 27 projects, with net commitments totalling around US$ 4.76 billion. These include loans from the International Bank for Reconstruction and Development (IBRD) for US$1.75 billion and concessional credits from the International Development Association (IDA) for roughly US$3.01 billion.

These projects provide support in critical areas, such as macroeconomic reforms and the modernization of agriculture, water resource management, water supply and sanitation, energy, transport, health, education, social protection, urban and rural infrastructure, national innovation, tax administration, statistical and financial systems, and more. They also help in the mitigation of the health, social, and economic implications of the COVID-19 pandemic.

The World Bank's project portfolio in Uzbekistan is complemented by a comprehensive program of technical assistance and advisory and analytical services provided to the government. The current program includes inputs to the national strategies in health, social protection, and land management, as well as technical assistance activities supporting reforms in agriculture, energy, aviation, tax administration, banking sectors, trade facilitation, and poverty reduction.

Recent Economic Developments

Uzbekistan's GDP grew by 5.4 percent in the first half (H1) of 2022, led by strong remittances, exports, and investments. Exports (in US$) grew by 40.5 percent year-to-year. Non-gold exports were 22.5 percent higher. Imports expanded by 27.4 percent.

Net remittance inflows doubled as a share of GDP in H1 to 16.7 percent due to favorable exchange rate movements with the Russian Ruble and more labor migrants going abroad. These drivers narrowed the current account deficit to just 1.4 percent of GDP in H1 2022, compared with 4.8 percent in H1 2021.

The fiscal deficit declined from 5 percent of GDP in H1 2021 to 4.2 percent in H1 2022. International reserves increased to US$35.6 billion, equivalent to 11 months of imports. Higher costs of food, fuel, and logistics drove CPI inflation up to 12.3 percent in June 2022, compared with 10.9 percent in June 2021. While the banking system remains resilient overall, non-performing loans spiked from 2 percent in end-2020 to 6.2 percent in August 2021, but gradually decreased to 4.9 percent in H1 2022. Poverty declined from 17 percent in 2021 to 15.7 percent in 2022. The unemployment rate fell to 8.8 percent in H1 2022.

Economic Outlook

In Uzbekistan, growth is expected to slow to 5.3 percent in 2022. Increased logistical challenges linked to the sanctions imposed on Russia will dent private consumption growth. Private investment and exports will grow strongly, and the current account balance will improve due to strong global commodity prices and

increasing remittances. FDI is not expected to pick up in 2022, with the trade deficit to be financed largely by official borrowing.

The fiscal deficit will decline from 6.2 percent of GDP in 2021 to 4.4 percent in 2022 – higher than the 2022 budget target of 3 percent of GDP, due mainly to higher social protection and infrastructure spending. An anticipated fiscal consolidation by 2023 is to be delayed due to a prioritized social protection spending increase in response to pressure from rising food prices.

Poverty will reduce to 14.5 percent in 2023 and 12.2 percent in 2024. Public debt and total external debt will gradually fall to 32 and 55 percent of GDP, respectively, by end-2024.

Risks to the outlook are tilted to the downside, including a prolonged war in Ukraine, further sanctions on Russia, and tighter global financial conditions. Potential positive surprises include higher global commodity prices and stronger productivity growth arising from on going structural reforms.

To achieve a wide range of antimicrobial activity of nonwoven materials, various compositions have been investigated and a preparation with silver nanoparticles has been found, for which an application for an international patent has been filed and registered. Unfortunately, the Institute failed to continue research in this direction. Meanwhile, further research can lead to the creation of not only materials with antibacterial properties, but also materials with increased resistance to ultraviolet radiation, the ability to bind hazardous toxic substances, and resistance to hard radiation. The second direction in the field of nanotechnology requires the creation of new technological equipment, since the specifics of the formation of a new structure of non-woven material for sorption-filtration purposes, filled with non-fibrous components, led to the creation of a number of new technological operations that are not used in textiles. In this work, for the first time, the technological foundations for the formation of the structure of a new type of textile carrier of active particles, incl. nano-sized, developed on the basis of a new, created at the Institute of Technology, canvas formation and related equipment. In this case, the introduction of particles into the structure of the material is carried out in the process of its formation. The method of introducing particles, aligning and fixing the structural composition with a uniform and stable nature of the distribution of components throughout the volume of the formed material is the know-how of our institute. So far, work in this area has been suspended for objective and significant reasons. It is assumed that the continuation, development and implementation of these works will be carried out within the framework of the projects of the technology platforms "Medicine of the Future" and "Textile and Light Industry" In conclusion, it should be noted that in order to carry out work with a social orientation (medicine, ecology, sanitation), it is necessary to

consolidate the efforts of specialists in the field of various scientific disciplines and serious financial resources, primarily budgetary ones.

CONCLUSION

The characteristics of the polymer solution largely determine the geometry and morphology of ultrathin PHB fibers obtained by the ESP method. The transition from a drop-like product to fibrillar structures depends on such important properties of the spinning solution as electrical conductivity and viscosity. To obtain cylindrical fibers, a number of modifying low molecular weight additives, such as TBAI and MA, were introduced into a solution of PHB in chloroform, which increased the electrical conductivity of the system. In addition, increasing the viscosity of the solutions by increasing the concentration and/or MW of the polymer also leads to an improvement in the uniformity of the fibers in thickness and affects the diameter and width of the distribution of ultrafine fibers in diameter. Modification of ionogen solutions with an electrolyte (TBAI) and a hydrolytic agent (HA) reduces the initial MW of the polymer and leads to an increase in the viscosity of the system as a response to the hydrolytic process. The resulting fibers have found their application in biomedicine.

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