SCIENCE DEVELOPMENT IN THE USA IN THE 20TH -EARLY 21TH CENTURIES

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Annotation:*This article talks about the great inventions in the USA in the 20th and early 21st centuries that brought great benefits to the human world and led to the current appearance of the world we live in. What conditions caused it and what changes and innovations occurred in human life after the invention are revealed in the sequence of events.*

Key words: *Science,scientific and technical revolution,computers controlled technology,modern medicine, scientific research, science societies,innovation.*

Science and technology have always progressed. However, since the 20th century, this development has grown to an unprecedented level. Because of this, the term scientific and technical revolution (ITI) began to be used in the literature. So, what is the scientific and technical revolution? The scientific and technical revolution is the fact that science has become a direct force for the production of society due to the universal discoveries in science and technology in the 20th century. This phenomenon is the essence of ITI. ITI has led to the intermingling of science and technology, science and production. This cross-breeding, in turn, ensured a reduction in the period of introduction of discoveries into production. ITI has changed all components of productive forces (energy, lasers, robots, machinery, labor materials, technology) and even man himself.

For example, the growing need for energy sources led to the construction of a completely new source - nuclear power plants. It also ensured the discovery of the use of the Sun, the ocean, and deep underground energy. Production is fully automated. In 1946, American scientists J. Mashley and J. Eckert created the first computer. Computer-controlled technology was soon introduced. It was essentially unmanned technology. However, no matter how powerful ITI is, it has not been able to displace the human factor from the production process. On the contrary, it encourages people to master highly sophisticated and sophisticated techniques and technology. This made it necessary for a person to grow his knowledge and skills at the level of the times. Consequently, the intellectual ability, mind, and outlook of a person are rapidly changing. Today's worker, engineer is not the worker or engineer of the early 20th century. Today's worker (employee) is not a machine element, but a machine controller. ITI, in turn, led to the introduction of a

completely new technology (for example, laser, gas plasma, electron-beam, ultrasound treatment of materials) into production. ITI/ has also led to the creation of the information industry. This, in turn, has become a powerful factor in further accelerating the development of science and technology. ITI is also distinguished by the creation of completely new generations of computers. Today's computer has covered almost all areas of social life. ITI has provided an unprecedented rate of accumulation of scientific knowledge. For example, at the beginning of the 20th century, millions of new information on chemistry were collected in more than 30 years, but now 4 years are enough to collect so much information. Revolutionary changes in production, in turn, led to radical changes in the social stratum of the population. For example, the majority of the population switched to working in the service sector rather than in the material production sector. In addition, labor productivity is increasing. This leads to shorter working hours, longer vacations, and an increase in the labor income of the population. This situation allows the person who is responsible for the practical application of new techniques and technology in production to constantly re-learn, to change his skills, and to quickly adapt to the changing conditions of production. Government and private producers have the greatest interest in maintaining the high skills of their workers and employees. Therefore, it is no coincidence that in the USA, the cost of one worker's retraining and further improvement of his skills is 400,000 dollars in one year. In turn, every $35,000 spent on training a worker brings $965,000 in profit.5

First of all, physics was the basis of the scientific and technical revolution. In the 20th century, great discoveries were made in physics. For example, in 1919, for the first time in history, the fission of the atomic nucleus was discovered, and on the eve of the Second World War, the chain reaction of the splitting of uranium atoms was discovered. In 1942, nuclear energy began to be obtained in the USA. These discoveries eventually led to the creation of the atomic bomb. Thus, man, the author of all discoveries for good, created a weapon capable of exterminating all living beings in the world, including himself. (This weapon was also used in 1945.) The creation of the physics of electromagnetic waves led to the birth of television in the 1920s, radiolocation in the 1930s, radio astronomy in the 1940s, and quantum electronics in the 1950s. Quantum electronics, in turn, made the discovery of a device that provides space communication with magnetic amplifiers a reality. It also led to the discovery of the laser.

Successes in the field of radio electronics made it possible to create the first electronic computing machines (ECM) in the USA in the 1940s. In 1957, the first Earth satellite was launched in the former USSR. In 1960, Toman Neumann created the first laser device. In 1961, former USSR citizen Yu. A. Gagarin flew into space on a rocket. At the same time, it became possible for cosmonautics to serve the national economy. In 1969, Neil Armstrong (US citizen) managed to walk on the moon. Advances in physics have also fundamentally changed transportation technology. For example, the installation of a jet engine in an airplane solved the problem of the airplane overcoming the sound barrier. Now airplanes began to transport all kinds of cargo over thousands of kilometers. 0.5 mln. ocean tankers that can hold tons of oil have been created. ITI would not have happened without the development of chemistry. These scientific discoveries made it possible to obtain substances

that are very clean and very hard, as hard as steel, and at the same time 7-8 times lighter, and it was possible to create plastics, rubber, synthetic fibers, and medicine. Unparalleled discoveries were also made in biology. By the middle of the 20th century, genetics had become a leading field. The structure of nucleic acids was discovered. Its role in protein synthesis was also determined. In the 1990s, a new science - gene engineering (genetic engineering) emerged. He achieved great success. As a result, microorganisms that help to create vitamins, antibiotics and fertilizers were created. It became possible to breed animals and create disease-resistant plant varieties. Biological and biochemical discoveries, in turn, created new important branches of medicine, such as resuscitation, anesthesiology and immunology. Surgery has been taken to a whole new level. This phenomenon was expressed in the transplantation of the kidney, then the heart, lungs and other organs of the human body. In medicine, it was possible to create an artificial heart. Non-surgical methods of treatment were discovered. For example, today kidney stones are crushed by ultrasound pulses. Human vision is being restored with the help of a laser. Patients are being diagnosed with computer tomographs based on nuclear magnetic vibrations. But ITI also poses acute problems for humanity. Soil, water and air are being damaged. Due to the atom, the ecological disaster zones are increasing.

Science development in the USA has a rich history and continues to be a driving force in global scientific advancements. The United States boasts some of the world's most prestigious research institutions, cutting-edge laboratories, and renowned universities.

One of the key factors contributing to science development in the USA is investment in research and development (R&D). The federal government, through agencies like the National Institutes of Health (NIH), the National Science Foundation (NSF), and the Department of Energy (DOE), allocates substantial funding for scientific research. This funding supports a wide range of disciplines, including biology, chemistry, physics, engineering, medicine, computer science, and environmental sciences.

Universities in the United States play a crucial role in scientific research and development. Institutions like Harvard University, Massachusetts Institute of Technology (MIT), Stanford University, and California Institute of Technology (Caltech) are renowned for their contributions to various scientific fields and cutting-edge research. These universities not only attract top talent from around the world but also foster interdisciplinary collaborations and drive innovation.

The USA also has a strong tradition of partnerships between academia, industry, and government. Collaboration between scientists, engineers, and industry leaders has resulted in advancements in various sectors, including biotechnology, pharmaceuticals, aerospace, telecommunications, electronics, and information technology. These collaborations enable the translation of scientific discoveries into innovative technologies and commercial applications.

Another significant driver of science development in the USA is the presence of numerous scientific conferences, seminars, and symposiums. These events provide a platform for scientists, researchers, and scholars to share their findings, exchange ideas, and collaborate on new projects. Events like the American Association for the Advancement of

Science (AAAS) annual meeting, the Society for Neuroscience (SfN) annual meeting, and the American Physical Society (APS) March Meeting attract scientists from all over the world.

Furthermore, the United States promotes scientific literacy and education through initiatives like STEM (Science, Technology, Engineering, and Mathematics) education. Efforts to improve science education at all levels, from primary schools to universities, aim to cultivate the next generation of scientists, innovators, and problem solvers.

In recent years, the United States has been actively investing in emerging fields such as artificial intelligence, robotics, renewable energy, nanotechnology, and space exploration. These areas present exciting opportunities for scientific breakthroughs and technological advancements.

However, it is important to note that science development is not without challenges. Funding constraints, competition for research grants, and geopolitical factors can impact scientific progress. Additionally, the COVID-19 pandemic has highlighted the importance of global collaboration in addressing complex scientific challenges.

Despite these challenges, science development in the USA remains vibrant and continues to shape the world through its contributions to knowledge, innovation, and technological advancements.

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