


The Scientific-Pedagogical Legacy and Practical Activities of Professor Makhmudjon Mamajonov In Irrigation and Hydraulic Structures

¹  Zulfiya Alimjanovna Makhmudova

¹ Senior Lecturer of Department of History and Social Sciences of Andizhan Branch of Kokand University, Uzbekistan

Received: 20th Oct 2025 | Received Revised Version: 25th Nov 2025 | Accepted: 05th Dec 2025 | Published: 19th Dec 2025

Volume 07 Issue 12 2025 | Crossref DOI: 10.37547/tajssei/Volume07Issue12-08

Abstract

This article provides a systematic overview of professor Makhmud Mamajonov's scientific and pedagogical contributions to the fields of irrigation and hydraulic structures. It outlines his educational and scientific milestones and analyzes how these achievements have shaped his research and teaching. The paper highlights his more than 160 scholarly and methodological publications, authored textbooks and manuals, the establishment of the "Pump Devices" educational-scientific laboratory, and leadership in grant-funded applied projects. Examples of his pedagogical innovations - multimedia presentations, interactive "brainstorm" lessons, and hands-on student training - are discussed. Under his supervision over 75 engineer-hyrotechnicians, 47 bachelors and 5 masters were trained; his textbooks are widely used across Uzbek higher-education institutions. The article assesses his role in forming an academic school and the practical impact of his work on regional water management systems.

Keywords: Irrigation; hydraulic structures; pump stations; scientific-pedagogical legacy; educational-methodical works; laboratory development; grant projects.

© 2025 Zulfiya Alimjanovna Makhmudova. This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0). The authors retain copyright and allow others to share, adapt, or redistribute the work with proper attribution.

Cite This Article: Zulfiya Alimjanovna Makhmudova. (2025). The Scientific-Pedagogical Legacy And Practical Activities Of Professor Makhmudjon Mamajonov In Irrigation And Hydraulic Structures. The American Journal of Social Science and Education Innovations, 7(12), 44–48. <https://doi.org/10.37547/tajssei/Volume07Issue12-08>

1. Introduction

Nowadays, the rational use and effective management of water resources is one of the most pressing issues around the world, especially in Uzbekistan, where "dry climatic conditions." The water resources available in the republic are limited, most of them are formed from transboundary rivers. Therefore, among the urgent scientific and practical tasks are economical water use in agriculture, especially in cotton growing, gardening and grain growing, modernization of irrigation systems and improvement of reclamation conditions. The ongoing reforms in the agricultural sector of Uzbekistan, improving the efficiency of irrigation and reclamation systems play an important role in the sustainable development of agriculture and ensuring food security. In

this direction, one of the priority areas is to ensure the reliable operation of pumping stations and hydraulic structures in the water sector, the introduction of energy-saving technologies and the development of modern scientific approaches.

2. Methods

In solving these urgent problems, many scientific schools have been formed in the republic, among which the activities of Professor Mamajonov Makhmudjon occupy a special place. His scientific research is aimed at increasing the efficiency of pumping stations of irrigation systems, reducing cavitation-abrasive processes and developing new designs of water intake structures. These studies have yielded high results not only theoretically, but also in practice. In particular, the

solutions developed under the guidance of the scientist were introduced into the activities of pumping stations in the Andizhan and Ferghana regions and contributed to an increase in annual economic efficiency. The activities of Professor Mamajonov indicate that he was able to combine scientific research directly with practice. More than 160 of his scientific and methodological works, including textbooks and manuals, are used in many higher educational institutions of our country. In particular, such works as "Pumps and pumping stations," "Hydraulic machines," "Use of pumping units" play an important scientific and practical role in the training of specialists working in the irrigation and reclamation system.

Thus, the relevance of the practical implementation of scientific achievements in solving the problems of water resources of the country is increasing. The scientific heritage and pedagogical activities of Professor M.M. Mamajonov play an important role in ensuring scientific and innovative development in the field of irrigation and hydraulic engineering, and serve as an invaluable source for training specialists of the future generation.

3. Results

Professor Mamajonov Makhmudjon was born in 1947 in the Dangarinsky district of the Ferghana region. In 1964 he graduated from secondary school No. 34 of this area and in the same year was admitted to the irrigation and reclamation department of the Andizhan Cotton Institute. In 1969 he successfully graduated from the institute with a degree in hydraulic engineering and began his career in this institution. He first worked as an assistant and gained his first teaching experience. All the labor activity of Mamajonov Makhmudjon is inextricably linked with the Andizhan Agricultural Institute (a former cotton growing institute). For more than half a century of his activity, he worked at almost all levels of the institute: assistant, senior lecturer, associate professor, deputy dean, department head and professor". His total work experience is more than 50 years, and during this time he made a great contribution to improving the scientific and theoretical potential of the institute [1]. In 1978 he graduated from the Moscow Civil Engineering Institute, successfully defended his thesis on "Convenient procedures for working with cavitation-abrasive degradation of axial pumps in hydropower plants" and received the degree of candidate of technical sciences. In 2006, at a specialized council of the Tashkent Institute of Irrigation and Reclamation, he defended his doctoral dissertation on the topic "Increasing the efficiency of

using centrifugal and axial pumps at pumping stations of irrigation systems" and received a doctorate in technical sciences. In 2015, the Supreme Attestation Commission under the Cabinet of Ministers of the Republic of Uzbekistan awarded him the title of professor.

Mamajonov Makhmudjon in 2008-2012 headed the Department of Land Reclamation and Hydraulic Structures of the Andizhan Agricultural Institute, and since 2012 he worked as a professor in this department. Because of his hard work, search, exactingness, and modesty, he was held in high esteem by colleagues and students. The teacher died in 2020. His life and work left a great scientific heritage and pedagogical tradition for the irrigation and hydraulic engineering industry of Uzbekistan. Even after his death, his scientific works, teaching aids and scientific school serve as an invaluable source for specialists and the younger generation. For his selfless work, he actively participated not only in scientific and pedagogical, but also in public work. He constantly participated in scientific councils, educational and methodological councils and various organizational events of the institute, showed leadership and initiative qualities. During his career, several new areas of study were opened at the institute, modern laboratories were created and the base of practical classes for students was strengthened.

Thus, the life and work of Professor Mamajonov Makhmudjon are inextricably linked with effective research aimed at creating a scientific school in the field of irrigation and hydraulic engineering in Uzbekistan, training highly qualified personnel, as well as strengthening the integration of education and production. Scientific research of Professor Mamajonov Makhmudjon is aimed at increasing the efficiency of hydraulic structures used in irrigation systems, especially pumping stations. From the very beginning of his scientific activity, he conducted in-depth research on the analysis of cavitation and abrasive processes that arise during the operation of pumping units, and reducing their negative impact.

In 1978 he defended his thesis at the Moscow Civil Engineering Institute on the topic "Favorable operating modes for cavitation-abrasive degradation of axial pumps in hydropower plants" and received the degree of candidate of technical sciences. In this study, he theoretically and experimentally substantiated the hydrodynamic properties of pumps, their optimal operating conditions and efficiency during operation. The results of the study helped reduce maintenance costs

and extend the life of pumps in hydropower plants. In 2006, at a specialized scientific council of the Tashkent Institute of Irrigation and Melioration, he successfully defended his doctoral dissertation on the topic "Increasing the efficiency of using centrifugal and axial pumps at pumping stations of irrigation systems." In these studies, he developed ways to improve the efficiency of pumping units used in irrigation systems. In the course of the study, scientifically based solutions were proposed on the design features of centrifugal and centrifugal pumps, technical and energy problems arising during their operation, as well as new designs of water intake structures.

The dissertation research of Professor Mamajonov played a theoretical and practical role in the rational use of water in irrigation systems and improving energy efficiency. He not only conducted theoretical research, but also took an active part in introducing them into production. For example, the drainage wall water intake facilities developed under his leadership were introduced at pumping stations in the Andizhan and Ferghana regions and significantly increased the annual economic efficiency. For his scientific activities, the scientist also led several large grant projects. In particular, within the framework of the projects "Development of methods for increasing the efficiency of water intake facilities of pumping stations of the irrigation system" under the code KSA-7-048 (2012-2014) and "Development of methods for reducing turbidity in water intake facilities of pumping stations" under the code KSA-7-054-2015 (2015-2017) of the Republic of Uzbekistan. Based on these projects, new scientific and laboratory bases have been created, which are used as a practical base in the process of training specialists.

The scientific and methodological heritage of the professor is extensive: more than 160 scientific and methodological works have been published, including textbooks, teaching aids and methodological recommendations. They present 2 textbooks, 4 teaching aids and 37 teaching aids. "These resources serve as the main source of updating the educational process and organizing practical exercises.

Professor Mamazhonov actively used multimedia and interactive methods of organizing classes: PowerPoint presentations were prepared for all lectures and practical classes, open classes were regularly held to solve problems (an interactive method of "mental attack"), some of them were covered in the media. Topics of open lessons held in different years (for example, water outlet

structures of pumping stations, pressure pipes and fittings to them, features of vane pumps, etc.) contributed to the strengthening of practical skills. The department was created and fully equipped with the educational and scientific laboratory "Pumping units"; the laboratory has 7 operating pumping units developed by the author, which makes it possible to organize experimental and computational work for students. In accordance with textbooks and teaching aids for practical classes, special computer programs have been developed that allow students to make calculations and analyze the performance of pumping stations.

This laboratory and related resources served as the basis for the opening in 2013 of a new direction of undergraduate education 5450400 - "Operation of hydraulic structures and pumping stations"; initially 25 students were admitted in the 2013-2014 school year, and 50 students per year starting in 2015-2016.

As a teacher, he trained specialists of several generations. Under his leadership, more than 70 hydraulic engineers, about 50 bachelors and several masters were trained. He also supervised the candidate dissertations of several young scientists, among whom such applicants as B. Shokirov, R. Shermatov, A. Khamrakulov were especially noted. Professor Mamazhonov sets as his constant goal to instill in students independent thinking, interest in scientific research and an increase in professional skills.

During the lesson, the teacher paid great attention to the introduction of modern pedagogical technologies. He delivered lectures through multimedia and made effective use of interactive techniques such as "psychic assault." Many open lessons were covered in the media and demonstrated as best practices at the institute level. In addition, with the help of laboratory devices created by him, students have the opportunity to directly experiment in practical classes and strengthen their professional skills [2].

Mamazhonov's social activities also occupied a special place in the life of the institute. He took an active part in scientific councils, educational and methodological councils and various organizational events. He participated as a member of many scientific councils, an official opponent in the defense of dissertations, as well as an expert in the activities of specialized councils. At the institute, he was also actively involved in organizing spiritual and educational events, sports competitions and cultural and educational meetings with students. For

example, the fact that among the students he led there were winners of republican sports competitions, holders of a state scholarship, testifies to the effectiveness of the professor's pedagogical and social activities.

In his professional and social activities, Professor Mamazhonov has always shown himself to be a conscientious, honest and selfless person. Under his leadership, new areas of education were opened at the institute, the laboratory base was strengthened and advanced teaching methods were introduced. Pedagogical and social activities of the teacher today occupy a special place in the history of the institute and are valued as a school for the younger generation.

The effective scientific and pedagogical activity of Professor M.M. Mamazhonov, which lasted more than half a century, was highly appreciated by the state and the scientific community. The teacher's career path manifested itself not only in the learning process, but also thanks to a huge contribution to the development of irrigation and hydraulic engineering in Uzbekistan [3].

A special place in the scientific heritage of Mamazhanov is occupied by textbooks and teaching aids. In particular, the co-authored textbook "Pumps and pumping stations" was awarded an incentive place at the Republican competition "The best textbook of the year and the author of educational literature," held by the Ministry of Higher and Secondary Special Education of the Republic of Uzbekistan in 2013. This award testifies not only to the personal achievements of the scientist, but also to the recognition at the state level of innovative methodological approaches introduced into the educational process through his textbooks.

For his activities, Professor Mamazhonov was also awarded certificates of honor, letters of thanks and diplomas of various levels. His scientific research, developed new design solutions and implemented technologies have played an important role in improving the efficiency of the water management system. In particular, the technologies developed by him as a result of projects that increase the efficiency of water intake facilities and pumping stations were introduced into the production process in the regions and led to a significant increase in economic efficiency.

State awards and thanks are the embodiment of the scientist's contribution to education and science. Mamazhonov received recognition not only for textbooks and manuals, but also for active social work,

for directing the younger generation to scientific research and fostering professionalism. His students continue their scientific research and take their teacher's scientific school to the next level. It should be noted that the recognition of the professor should not be seen as a sign of personal success, but as the achievement of the entire science of irrigation and reclamation. The scientific and practical solutions developed as a result of his work contribute to ensuring the sustainable development of the water economy of Uzbekistan, the effective use of water resources and the further improvement of the educational process.

4. Conclusion

The scientific and pedagogical activity of Professor M. Mamazhonov plays an invaluable role in the development of irrigation and hydraulic engineering in Uzbekistan. More than half a century of selfless work of the teacher is aimed at solving pressing problems in the water management system, improving the educational process and creating a scientific school. The scientist's candidate and doctoral dissertations are devoted to a deep scientific analysis of water management problems and the development of their practical solutions. The results of studies on improving the efficiency of pumping stations, reducing cavitation-abrasive processes, improving water intake structures were used not only theoretically, but also in production practice. This indicates that his scientific research was carried out in accordance with practice.

Educational literature, textbooks and professor's manuals serve as the main methodological basis for training specialists in irrigation and hydraulic engineering at the republican level. In higher educational institutions, such works as "Pumps and pumping stations," "Hydraulic machines," "Mechanization of irrigation" are widely used. The technological solutions created by him on the basis of educational and scientific laboratories, grant projects are still an integral part of the research and educational process. The scientific school of Professor Mamazhonov is also of particular importance. Among his students, scientists appeared who successfully defended their candidate and doctoral dissertations. And today his scientific legacy continues with young applicants. From this point of view, the school he created created the basis for the sustainable development of irrigation science in Uzbekistan. The work of a scientist awarded state awards and diplomas is recognized at the state level. These recognitions show that his scientific legacy is important not only for the educational process,

but also for the development of production and society.

In general, the scientific school created by Professor M.M. Mamazhonov, together with scientific activities, pedagogical research, grant projects and students, serves to ensure sustainable development, integration of science and practice in the field of irrigation and hydraulic engineering. The name and scientific heritage of the teacher left a deep mark on the science of water management in Uzbekistan, and his work today remains relevant and serves as a reliable source for educating specialists of the future generation.

References

1. Archival documents of the Andizhan Oblast Water Management Department and Land Reclamation Inspectorate (2003-2004). - Andizhan: Water Management Meeting, 2004.
2. Issue of the newspaper "Agriculture" for 2004. - Andzhan Oblast Seal Archive. - 2004.
3. Ministry of Agriculture and Water Management of the Republic of Uzbekistan. Archived copies of curricula, statistical bulletins and certificate samples of the Andizhan Agricultural College and advanced training centers. - Tashkent: MAWM, 2004.