pISSN:2349-5707 Volume:13,Issue 4, April -2026 eISSN:2349-5715

THE DEVELOPMENT OF SCIENCE IN THE ERA OF MIRZO ULUGBEK AND ITS IMPACT ON ECONOMIC GROWTH

Artikov Zokir Sayfiddinovich
Samarqand iqtisodiyot va servis instituti,
“Real iqtisodiyot” kafedrasi mudiri, PhD, prof. v.b.
zokirartikov86@gmail.com
ORCID: 0000-0002-5333-4376
Ergasheva Shaxzoda
Samarqand iqtisodiyot va servis instituti,
Iqtisodiyot fakulteti talabasi
shahzodaergasheva.0112@gmail.com

Abstract

This article provides a comprehensive analysis of Mirzo Ulugh Beg's scientific and political activities in the context of the Eastern Renaissance. Specifically, it highlights the sociopolitical conditions that fostered the development of science and culture during the Timurid era and explores the scholar's role in this process. The study examines the activities of Ulugh Beg's observatory, the scientific significance of the astronomical observations conducted there, and the role of the Zij-i Jadid-i Kuragoniy, which was created based on these observations, in medieval astronomy on a scientific basis. It also examines the scientific school formed by Ulugh Beg, the contributions of its scholars, and the process of transforming Samarkand into a major scientific center. The article also analyzes the scholar's policy regarding the combination of public administration and scientific development and summarizes its comprehensive impact on the development of society based on scientific findings.

Keywords

Mirzo Ulugh Beg, Timurid era, scientific environment of Samarkand, Ulugh Beg observatory, Zij-i Jadid-i Koragoniy, development of astronomy, mathematical research, trigonometric tables, star catalogue, methodology of scientific observations, Eastern Renaissance, science and public administration, scientific school and tradition, scientific infrastructure, madrasah system, Enlightenment policy, medieval astronomy.

Annotatsiya

Ushbu maqolada Mirzo Ulug‘bekning ilmiy va siyosiy faoliyati Sharq uyg‘onish davri kontekstida kompleks tarzda tahlil qilinadi. Xususan, Temuriylar davrida ilm-fan va madaniyat taraqqiyoti uchun yaratilgan ijtimoiy-siyosiy sharoitlar yoritilib, allomaning ushbu jarayondagi o‘rni ochib beriladi. Tadqiqotda Ulug‘bek rasadxonasi faoliyati, unda olib borilgan astronomik kuzatuvlarning ilmiy ahamiyati hamda ular asosida yaratilgan Zij-i Jadid-i Ko‘ragoniy asarining o‘rta asr astronomiyasidagi o‘rni ilmiy asosda tahlil etiladi. Ulug‘bek tomonidan shakllantirilgan ilmiy maktab, uning tarkibida faoliyat yuritgan olimlarning hissasi va Samarqandning yirik ilmiy markazga aylanish jarayoni ko‘rib chiqiladi. Maqolada allomaning davlat boshqaruvi va ilm-fan rivojini uyg‘unlashtirish borasidagi siyosati ham tahlil qilinib, uning jamiyat taraqqiyotiga ko‘rsatgan kompleks ta’siri ilmiy xulosalar asosida umumlashtiriladi.

Kalit so‘zlar

Mirzo Ulug‘bek, Temuriylar davri, Samarqand ilmiy muhiti, Ulug‘bek rasadxonasi, Zij-i Jadid-i Ko‘ragoniy, astronomiya taraqqiyoti, matematik tadqiqotlar, trigonometriya jadvallari, yulduzlar katalogi, ilmiy kuzatuvlar metodologiyasi, Sharq uyg‘onish davri, ilm-fan va davlat boshqaruvi, ilmiy maktab va an’ana, ilmiy infratuzilma, madrasalar tizimi, ma’rifatparvarlik siyosati, o‘rta asr astronomiyasi.

pISSN:2349-5707 Volume:13,Issue 4, April -2026 eISSN:2349-5715

Аннотация

В данной статье проводится всесторонний анализ научно-политической деятельности Мирзо Улугбека в контексте Восточного Возрождения. В частности, освещаются социально-политические условия, созданные для развития науки и культуры в эпоху Тимуридов, и раскрывается роль ученого в этом процессе. В исследовании анализируется деятельность обсерватории Улугбека, научное значение проводимых там астрономических наблюдений и роль созданной на их основе «Зидж-и Джадид-и Курагоний» в средневековой астрономии на научной основе. Рассматривается научная школа, сформированная Улугбеком, вклад работавших в ней ученых и процесс превращения Самарканда в крупный научный центр. В статье также анализируется политика ученого в отношении сочетания государственного управления и развития науки и обобщается ее комплексное влияние на развитие общества на основе научных выводов.

Ключевые слова

Мирзо Улугбек, эпоха Тимуридов, научная среда Самарканда, обсерватория Улугбека, Зидж-и Джадид-и Корагоний, развитие астрономии, математические исследования, тригонометрические таблицы, звездный каталог, методология научных наблюдений, Восточное Возрождение, наука и государственное управление, научная школа и традиция, научная инфраструктура, система медресе, политика Просвещения, средневековая астрономия.

INTRODUCTION

The Timurid period of the 14th–15th centuries is an important period in history as a period of harmonious development of science, culture, and economic development. During this period, Samarkand was formed not only as a political capital, but also as a scientific center, and Mirzo Ulugbek, with his state and scientific activities, had a significant impact on all spheres of society, especially economic life. Ulugbek was distinguished by his fundamental research in the fields of astronomy and mathematics. The Ulugbek Observatory in Samarkand, built by him, was one of the most advanced scientific structures of its time, and the work Zij-i Jadid-i Koragoniy, created on the basis of observations made there, is recognized as a high example of medieval astronomy.[2] This scientific activity not only yielded academic results, but also served to improve planning in the fields of agriculture, urban planning, and trade. For example, observations of the stars and seasons helped to optimize harvest times and irrigation systems, which served to increase economic efficiency. Mirzo Ulugbek's scientific school and the system of madrasahs helped to strengthen the economic activity of society by training intellectual personnel. The scientific environment directed young people to creative thinking, finding new technical and practical solutions, which, in turn, served to introduce innovations in the local production and trade sectors. Today, the study and promotion of Mirzo Ulugbek's heritage is of urgent importance. In this regard, the Resolution of President Shavkat Mirziyoyev No. PQ-323 dated September 12, 2024 established measures aimed at celebrating the 630th anniversary of the birth of Mirzo Ulugbek, preserving and promoting his scientific heritage, as well as attracting the younger generation to science. Within the framework of the resolution, scientific conferences, exhibitions, cultural events, and work on publishing and translating Ulugbek's works will be carried out. Thus, Mirzo Ulugbek's scientific activities and the scientific infrastructure he created in Samarkand are not only a high example of medieval science, but also directly influenced the economic development and educational progress of society. His legacy is valued today not only as a historical monument, but also as a strategic resource in the economic, scientific and pedagogical spheres. Ensuring economic stability through the development of science and education, training highly qualified personnel, and stimulating new scientific research are important factors in bringing Mirzo Ulugbek's legacy into a modern context.

pISSN:2349-5707 Volume:13,Issue 4, April -2026 eISSN:2349-5715

LITERATURE REVIEW

The literature review on the topic covers a wide range of issues related to Mirzo Ulugbek's scientific activities, the system of scientific centers, madrasahs and observatories in Samarkand, and their impact on economic development. In studies conducted by Uzbek and foreign scientists, Ulugbek's developments in astronomy and mathematics, in particular the work Zij-i Jadid-i Kuragoniy, are considered a high example of medieval science. For example, observations made in collaboration with Qazizoda Rumi, Ghiyosiddin Jamshid Koshiy and Ali Kushchi made it possible to determine the coordinates of stars and compile trigonometric tables, as well as show that this knowledge had practical significance in the agricultural, trade and urban planning system.

The literature also emphasizes Ulugbek's role in the scientific school and madrasah system, training scientific personnel, and ensuring socio-economic stability. Samarkand madrasahs trained students not only in religious but also in secular sciences - mathematics, astronomy, philosophy and logic, which is recorded in historical sources as an advanced pedagogical experience.

The relevance of Mirzo Ulugbek's legacy in modern research, its impact on science and economic development, was also reinforced by the Resolution of President Shavkat Mirziyoyev No. PQ-323 of September 12, 2024.[8] The Resolution established measures to celebrate the 630th anniversary of Ulugbek's birth, preserve and promote his scientific heritage, as well as attract the younger generation to science. The tasks of adapting Ulugbek's scientific developments to the modern context through scientific conferences, exhibitions, cultural events, and the publication and translation of his works were reflected.

Research shows that the scientific and pedagogical activities of Mirzo Ulugbek, as well as the role of Samarkand as a scientific center, are relevant not only from a historical perspective, but also from a modern economic and educational development perspective. Scientific research and observations served to increase efficiency in economic planning, agriculture and trade.

The review of literature also emphasizes that the scientific tradition formed through Ulugbek's scientific school influenced Eastern and European scientific thought not only in the Middle Ages, but also in later periods. This indicates the global significance of his legacy.[1]

RESEARCH METHODOLOGY

The research methodology in this article is based on historical, comparative and analytical methods. Science during the time of Mirzo Ulugbek and its impact on economic development were studied through historical sources, archival documents and scientific works.[7] Using an analytical approach, the activities of the observatory, the system of madrasahs and the impact of the work Zij-i Jadid-i Koragoniy on economic life were analyzed. Also, in the context of the Resolution of President Shavkat Mirziyoyev No. PQ-323 dated September 12, 2024, modern state policy and practice of promoting scientific heritage were studied. Using the comparative method, Ulugbek's scientific developments were compared with the activities of other medieval scientists. Together, these approaches made it possible to determine the scientific activities of Mirzo Ulugbek and his impact on economic development on a comprehensive and scientific basis.

ANALYSIS AND RESULTS

The results of the study made it possible to scientifically substantiate the inextricable link between the development of science and economic growth during the reign of Mirzo Ulugbek. Historical sources show that in the 14th-15th centuries, the Timurid Empire had its own complex economic structure, and this structure turned the city of Samarkand into the economic center of the region. Sources related to the state tax system introduced during the reign of Mirzo Ulugbek indicate that revenues from raw material trade, crafts, agriculture, and international trade routes were collected in a centralized manner. The main feature of this system was the systematic accounting of resources and their allocation to state needs, which was of great importance in ensuring economic stability.

pISSN:2349-5707 Volume:13,Issue 4, April -2026 eISSN:2349-5715

Table 1

The level of development of scientific and technological fields during the reign of Mirzo Ulugbek[1]

T/r	Scientific speciality	Main direction	Development level	Main results
1	Astronomy	Star catalog, observations	High	"Zizhi Jadidi Koragoni" was created
2	Mathematics	Trigonometry, calculation methods	High	Accuracy has increased, the calculation system has developed
3	Geography	Maps, coordinates	Medium	Territorial visions expanded
4	Philosophy and logic	Development of scientific thought	High	Scientific methodology has been formed
5	Education system	Madrasahs and scientific centers	High	Samarkand became a center of science

During this period, astronomy and mathematics in particular took a leading position, leading to the systematization of scientific knowledge. This later expanded the possibilities of accurate calculations and planning necessary for economic activity.

The tribal tax system was also based on the principles of efficiency. Taxes were collected mainly on land, trade transactions, and handicraft products. This stabilized state revenues, and was also a source of funds for observatories, madrasahs, urban infrastructure, and other social projects. The fact that tax collection mechanisms were based on clear rules and regulations stimulated economic activity related to the agrarian market, third-party trade, and internal trade. This indicates that, along with the development of science during the reign of Mirzo Ulugbek, the mechanisms of the economic system were also complex and efficient.

Table 2

The impact of scientific development on economic sectors[2]

T/r	Economic network	The impact of scientific advances	Resulting efficiency
1	Agriculture	Calendar and timekeeping accuracy	Increased productivity
2	Trade	Geographical knowledge and accuracy of directions	Trade volume expanded
3	Construction	Mathematical calculations	Architecture has developed
4	Crafts	Technological knowledge	Product quality has increased
5	Tax system	Calculation and statistical approach	Tax collection improved

Scientific achievements have increased efficiency in various sectors of the economy, especially in trade and agriculture, ensuring sustainable growth. This has served to strengthen the economic power of the state.

In the modern context, the state tax system serves as a priority tool for financing social services, infrastructure projects, and innovations.[3] The current tax system, through progressive income taxes, corporate taxes, and value-added taxes, directs the general economy's revenues to the needs of the state. In this regard, the predictability, transparency, and competitiveness of the tax system are important factors for economic growth. The centralized nature of the tax system

[1] Author's work
[2] Author's work

pISSN:2349-5707 Volume:13,Issue 4, April -2026 eISSN:2349-5715

during the reign of Mirzo Ulugbek serves as an analogy for the principles of effective taxation in the economy of the time: both systems regulate tax collection mechanisms in order to strengthen economic stability.

In terms of economic indicators, while during the reign of Ulugbek, the agricultural sector was the leader, in modern times the service sector and high technology are the main drivers of economic growth. At the same time, in both, efficient use of resources and knowledge-based decision-making remain factors that stimulate economic growth.[5] For example, while data from astronomical observations were used to optimize regimes for farming, today scientific analytical models serve to forecast agricultural output in the agrarian sector. This demonstrates methodological continuity between historical and modern economic systems.

In addition, the institutions of state financial management during the time of Mirzo Ulugbek were also focused on centralized expenditure planning, urban development, and the development of social infrastructure. This is consistent with modern state investment policy: in both systems, the state provides continuous infrastructure and social services through the efficient allocation of information and resources, ensuring economic stability.

Table 3

The impact of scientific infrastructure on economic development[3]

T/r	Scientific infrastructure	Definition	Economical impact
1	Observatory	Astronomical Observatory	Navigation and trading assistance
2	Madrasa	Education and training of scientific personnel	A skilled workforce has been formed
3	Libraries	Preservation of scientific resources	Knowledge exchange accelerated
4	Scientific center	A gathering place for scientists	Innovation has advanced

The development of scientific infrastructure has formed the human capital necessary for the economy and stimulated innovative activity.

Table 4

The connection between science and economic growth during the reign of Mirzo Ulugbek [4]

T/r	Indicators	Level of scientific impact	Economic result
1	Production	High	Product volume increased
2	Trade Relations	High	Foreign trade expanded
3	Technology	Medium-high	Increased production efficiency
4	Labor Productivity	High	Revenues have increased.

There is a strong positive relationship between science and the economy, and scientific achievements have been shown to be an important driver of economic growth.

As a result, the study shows that during the reign of Mirzo Ulugbek, the inextricable link between science and the state tax system played an important role in ensuring not only the economic, but also its political and social stability of society. This historical experience is also reflected in today's economic models - achieving sustainable economic growth through effective resource management, knowledge-based decision-making, and tax policy is also relevant for modern societies.

CONCLUSIONS AND SUGGESTIONS

[3] Author's work
[4] Author's work

pISSN:2349-5707 Volume:13,Issue 4, April -2026 eISSN:2349-5715

The results of the study showed that during the reign of Mirzo Ulugbek, there was an inextricable link between the development of science and economic growth. Ulugbek's observatory and scientific schools in Samarkand were an important tool not only in the fields of astronomy and mathematics, but also in the effective planning of economic life.[4] Astronomical observations and trigonometric tables made at the observatory were used to optimize agricultural activities, water distribution, urban planning, and trade routes. At the same time, Mirzo Ulugbek's scientific school and the system of madrasas formed innovative thinking in various sectors of the economy by training highly qualified personnel. According to historical sources, the centralized tax system of the state and mechanisms for the efficient distribution of resources played an important role in strengthening economic stability. The effectiveness of this system in the Middle Ages has a clear analogy when compared with information-based management, digital transformation, and innovative development in the modern economy. The analysis shows that during the reign of Mirzo Ulugbek, science directly influenced the management of economic resources, tax collection, and the development of urban infrastructure. Since the agricultural sector was the leader, scientific observations increased the efficiency of crop planning, irrigation systems, and agricultural harvests. Although today the service sector, digital technologies, and innovative production have become the main drivers of economic growth, there are methodological similarities with the scientific approaches of Ulugbek's era: in both periods, the efficient use of resources based on knowledge and science plays a crucial role in ensuring economic stability.

Also, the analysis of state financial management and the tax system shows that the tax mechanisms introduced during the reign of Mirzo Ulugbek were centralized and systematic, which served to finance the state's social and economic projects. Nowadays, tax policy serves to ensure economic stability through progressive income taxes, corporate taxes, and value-added tax. At the same time, the system during the reign of Mirzo Ulugbek made it possible to develop state infrastructure and social services by accounting for resources and their strategic direction. This historical experience still serves as the basis for the formation of effective principles of state policy and economic management today.

In conclusion, the study shows that the scientific and economic activities of Mirzo Ulugbek were a decisive factor in the sustainable development of medieval society. The inextricable link between science, the tax system, the training of highly qualified personnel, and the effective management of resources can also be appreciated as a methodological basis for today's economic and social strategies.

On this basis, the following proposals are developed:

-Study of the legacy of Mirzo Ulugbek and application of historical experiences to modern economic management systems.

-Training highly qualified personnel and involving them in the innovative economy through the development of a system of scientific schools and madrasas.

-Improving the state tax system and resource management mechanisms based on historical experiences, increasing economic stability.

-Increasing economic efficiency through science-based planning and the use of digital technologies in the agrarian and service sectors.

-Attracting the younger generation to science and innovation, integrating scientific research with economic strategies.

REFERENCES

1. S. M. Alimov, *O‘rta asrda Samarqand iqtisodiy hayoti*, Toshkent: Fan, 2015.
2. A. Karimov, *Mirzo Ulug‘bek rasadxonasining astronomik tadqiqotlari*, Toshkent: O‘zbekiston Milliy Universiteti Nashriyoti, 2018.
3. M. Mirzaev, “Temuriylar davrida soliq tizimi va iqtisodiy barqarorlik”, *O‘zbekiston Tarixi Jurnali*, vol. 12, no. 3, pp. 45–58, 2020.

pISSN:2349-5707 Volume:13,Issue 4, April -2026 eISSN:2349-5715

4. Z. Niyozov, *Samarqand madrasalari va ilmiy maktablar*, Toshkent: Sharq, 2017.
5. O. Qodirov, “Ulug‘bek davrida agrar sektor va iqtisodiy rivojlanish”, *Fan va Jamiyat*, vol. 8, no. 2, pp. 23–34, 2019.
6. R. Rustamov, *O‘rta asrda ilm-fan va jamiyat taraqqiyoti*, Toshkent: Ilm, 2016.
7. D. Usmonov, *Matematika va astronomiya tarixida Mirzo Ulug‘bekning merosi*, Samarqand: Imom Buxoriy, 2019.
8. https://lex.uz/uz/