

**THE CIVILIZATIONAL SIGNIFICANCE OF THE DEVELOPMENT OF SCIENCE IN THE TIMURID PERIOD**

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<b>ABSTRACT</b>	<b>KEYWORDS</b>
<p>This article examines the scientific, cultural, and civilizational significance of the Timurid era and analyzes its study in modern historiography. Special attention is given to the role of Amir Temur and his successors in promoting science, education, architecture, and state administration throughout Central Asia. The research highlights the development of major scientific centers such as Samarkand, Bukhara, and Herat, as well as the contributions of outstanding scholars including Mirzo Ulugbek, Qozizoda Rumi, Ghiyath al-Din al-Kashi, and Ali Qushji. The study investigates the importance of historical sources, particularly the works of Sharafuddin Ali Yazdi, Nizamiddin Shami, and Ibn Arabshah, in understanding the political, cultural, and intellectual achievements of the Timurid period. Furthermore, it evaluates the transformation of Timurid studies during the years of Uzbekistan’s independence, emphasizing new methodological approaches and the growing interest in the Timurid legacy at both national and international levels. The findings demonstrate that the Timurid era played a crucial role in preserving and advancing the traditions of the Eastern Renaissance and made a lasting contribution to world civilization.</p>	<p>Timurid era, Amir Temur, Timurids, Eastern Renaissance, Mirzo Ulugbek, Samarkand Observatory, historiography, science and education, cultural heritage, civilization, Ziji Kuragani, historical sources, Central Asia, Timurid studies, world civilization.</p>

## Introduction

The Timurid period (late 14<sup>th</sup>-15<sup>th</sup> centuries) is recognized in the history of Central Asia as a period of high development in science, culture, and enlightenment. This period is closely linked to the activities of Amir Temur and his successors, particularly Mirzo Ulugbek, and constitutes an important stage of the Eastern Renaissance. The scientific heritage created during this period had a significant impact not only on regional but also on the development of world civilization.

One of the main factors in the development of science during the Timurid period was the centralized state policy and patronage of scientists. Amir Temur sought to transform Samarkand into a scientific center by supporting representatives of science and culture. As a result, cities such as Samarkand, Bukhara, and Herat became scientific centers. The construction of madrasas, libraries, and observatories during the Timurid period formed a scientific environment. In particular, the construction of the Samarkand Observatory became an important stage in the development of astronomy. During the Timurid era, astronomy was one of the most highly developed sciences. The scientific school established in Samarkand under the leadership of Mirzo Ulugbek occupies an important place in the history of world science. His most famous work is the *Ziji Kurangani*, which contains a star catalogue and astronomical tables. In terms of accuracy, this work served as one of the primary sources in European science for a long time. Observations conducted at Ulugh Beg's observatory revealed 1,018 stellar coordinates, which were much more complete than the data from Ptolemy's time <sup>1</sup>.

## MATERIALS AND METHODS

Many great scholars worked during the Timurid era. Among them, a special place is held by Qozizoda Rumi, Ghiyath al-Din Jamshid al-Kashi, and Ali Qushji. These scientists have achieved important scientific results in the fields of mathematics, astronomy, and physics.

For example, Ghiyath al-Din al-Kashi developed the theory of decimals, while Ali Qushji contributed to the formation of astronomy as an independent science. The development of science during the Timurid era is of civilizational importance in several respects: First, the systematization and development of scientific knowledge had a strong impact on the development of world science.

Ulughbeg's astronomical tables were later widely used by European scientists. Secondly, the development of science and education has increased the intellectual potential of society. Madrasas taught not only religious but also secular sciences. Thirdly, the development of science during the Timurid period was inextricably linked to the cultural revival, which led to growth in literature, art, and architecture. Fourthly, the foundation was laid for the development of scientific ties between the East and the West. Scientific works created during the Timurid era were later translated into European languages and became part of the global scientific heritage<sup>2</sup>.

The processing of precious metals became a highly developed branch of craftsmanship. The Timurids, Timur himself, and his wives loved precious stones, pearls, and gold and silver jewelry. Jewelers specialize in making earrings, rings, bracelets, and other precious jewelry. The need for it was particularly high among the feudal nobility. Numerous authors have written about the gold and silver vessels in Timur's palace. Firstly, the items manufactured were also diverse. In addition to written sources, archaeological excavations have provided additional information on this matter.

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<sup>1</sup> Temur va ulig'bek davri tarixi O'zbekiston fanlar akademiyasi tahrir institut "Qomuslar bosh tahririyati" Toshkent:2017 B - 98.

<sup>2</sup> Temur va ulig'bek davri tarixi O'zbekiston fanlar akademiyasi tahrir institut "Qomuslar bosh tahririyati" Toshkent:2017 B - 105.

In February 1969, during excavations in the eastern part of the Samarkand Registan, the workshop of a coppersmith and jeweler was opened, and many artistic items made from the first were found. Among the 36 sheds at various stages of processing on the destroyed small shed, there were 60 primary items. They date back to the end of the 14th and the beginning of the 15th centuries and "indicate the development of craft schools in Samarkand itself and the influx of many masters from other countries." At the end of the 14th century, the construction of majestic buildings became widespread, and in connection with this, the production of window glass, including stained glass, also developed significantly. This mirror was used in the construction of Gur-e-Amir, Ishratkhana, the palace in Shahrisabz, and the Ulugbek Madrasah in Bukhara.

During the reign of Timur and the Timurids, previously lost methods of manufacturing embossed tiles from a mass rich in silica were revived, and these tiles began to be widely used in the construction of majestic structures. The volume of glazed tile production has also increased. The success of Timur's campaigns and the political power of his empire largely depended on how well his army was armed. In this regard, the manufacture of weapons in the capital of Timur's state developed significantly. In special workshops, sabers, swords, daggers, axes, armor, and helmets were manufactured; Timur attached great importance to this sphere and maintained strict control over it.

## DISCUSSION

Captive specialists and slaves also worked in such workshops. During Timur's reign, the significance of enterprises and workshops increased. In the research of historians and Orientalists, great attention was paid to determining the content of the term "enterprise," as well as the specifics and place of the type of workshops designated by this term in craft production<sup>3</sup>. Analyzing specific data from stories and documentary sources, I.P. Petrushevsky writes: "In the 10th–15th centuries, when feudal methods of production prevailed, the slave-owning system also played a certain role: in large state-owned craft workshops (enterprises), and sometimes among landowners...".

The Ulughbeg Observatory, built near Samarkand in 1428–1429, remains one of the greatest scientific monuments of the Middle Ages. His main instrument was a marble wall quadrant with a radius of 40.2 meters, which allowed for astronomical observations of unique accuracy for that time.

Most of the quadrant, with an arc length of 63 meters, was located more than 10 meters underground. It can be assumed that the second part rises to a height of 28 meters above the ground and rests on a tower that has not survived to this day. The quadrant, precisely positioned on the meridian plane, was used to measure the height of celestial bodies above the horizon and their angular distance. According to the auxiliary scale data, scientists were able to determine the coordinates of the Sun with an error of only one arcsecond - a result unattainable for most instruments of that time.

Over time, this unique scientific structure fell into ruin. By the end of the 17th century, the observatory had been demolished, and its bricks were used in the construction of other buildings. The first serious study of the remains of the observatory was carried out in 1908 and 1914 under the leadership of the Russian scientist V. L. Vyatkin. Archaeological excavations allowed for the discovery of part of the outer wall and the base of the quadrant, but they did not yield significant results. Only in 1941 did Academician M. E. Masson continue to study the observatory, and in 1948 V. A. Shishkin discovered the remains of the main instrument<sup>4</sup>. According to the testimony of Sharafuddin Ali Yazdi and Ibn

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<sup>3</sup> Temur va ulig'bek davri tarixi O'zbekiston fanlar akademiyasi tahrir institut "Qomuslar bosh tahririyati" Toshkent:2017 B - 132

<sup>4</sup> <https://caravan-info.uz/uz/culture/741060-observatoriya-ulugbeka-unikalnoe-nasledie-mirovoy-nauki.html>

Arabshah, Amir Temur brought the chief physicians Maulana Jamoliddin and Maulana Suleiman from Syria to Samarkand. His personal physician was a physician named Mavlono Fazlallah Tabrizi. Furthermore, famous physicians such as Maulana Mas'ud Shirazi and Maulana Farrukh the physician served at the court of Amir Temur. The famous physician Mansur ibn Muhammad ibn Ahmad ibn Yusuf ibn Faqih Ilyas wrote several medical works, among which the "Treatise on Human Anatomy," dedicated to Amir Temur's grandson Pir Muhammad Bahadur, holds a special place. His second work, "The Perfect Book for the Mujahideen", is dedicated to the healthy state of the human body, the causes of diseases, and healthcare issues. It provides detailed information about diseases of various body organs, methods of their treatment, as well as simple and complex medicines.

According to Fasih Khavafi, the leading scholars and healers of that time - Mawlana Muhammad Adam and Mawlana Nizomiddin Shirazi - had great authority at the court of Shahrukh Mirza. When Shahrukh's son, Baysunqur Bahadur, fell ill in 1427, these two physicians managed to cure him within a few days. Famous healers such as Maulana Muhammad ibn Adam, Maulana Muhammad Mu'in, and Maulana Qutbiddin Muhammad Adam also worked in the palace of Sultan Husayn Bayqara. Using the patronage of Alisher Navoi, doctors not only treated patients but also engaged in teaching at Dar ash-Shifa. The great statesman, thinker and poet Alisher Navoi worked as a minister during the reign of Husayn Bayqara and carried out large-scale reforms. He built roads, bridges, canals, caravanserais, and madrasas not only at the expense of state funds but also at his own expense. His creative genius was particularly evident in literature and poetry, with works such as the Khamsa, "Hayrat ul-Abror" ("Wonder of the Righteous"), and "Sab'ai Sayyar" ("Seven Planets") being created at a high artistic level. During this period, certain Central Asian tribes transitioned from a nomadic lifestyle to a sedentary one, shifting from animal husbandry to agriculture. These processes were accompanied by continuous wars between tribes and clans, which had a negative impact on the condition of the broad masses of the people. The impoverishment of the population reached its peak due to heavy taxes.

## RESULTS

Under such difficult conditions, Amir Temur entered the historical stage and, within a short period, became the ruler of Mawarannahr, and subsequently launched victorious campaigns into the interior of Asia. The reign of Amir Temur is associated with the rise of culture and science in Central Asia. Therefore, this period is called the Renaissance in scientific literature. It is generally considered that the Renaissance began in Europe in the 14th–15th centuries, especially in Italy. However, in Central Asia, this process occurred much earlier—during the Arab Caliphate (9th–12th centuries)—and was interrupted by the Mongol-Tatar conquest. In the 14th–15th centuries, this revival was revived during the reign of Timur and the Timurids. During this period, a return to the heritage of scholars such as Al-Fergani, Ibn Sina, Al-Khwarizmi, and Al-Biruni was observed.

As the Russian historian V.O. Klyuchevsky noted, without knowing history, a person cannot understand their origin and purpose. This opinion once again confirms the relevance of studying the Timurid period. In Central Asia, specifically in the territory of Dasht-i Qipchaq, two major states—Maverannahr and Mongolia—formed on the basis of the Chagatai Ulus.

Struggles for power continued between these states. Amir Temur also took an active part in these struggles, initially serving the Mongol Khan Tughluq. He was later appointed governor of Kesh, but soon entered the service of the Emir of Balkh, Husayn, with whom he reconquered Mawarannahr. Eventually, the conflicts between them escalated into an armed conflict, and victory fell to Amir Timur,

who became the sole ruler. Having strengthened Samarkand, Amir Temur conquered the entire territory of Central Asia, Siberia, Iran, Baghdad, Damascus, Egypt, and India. He also defeated Bayezid I and took him prisoner. There were even plans to conquer China.

Amir Temur created a vast multinational state in a short period of time. This state was governed on the basis of the "Tuzuk" (or "Temur's Regulations"), which outlined the system of state and military administration. This document is considered a political testament left by Timur to his descendants. Timur's activities were aimed at developing agriculture, expanding irrigation systems, and developing urban planning and craftsmanship. This required the development of science. As a result, the role of scientists, architects, engineers, and artisans in society increased sharply. There are many sources about the life and activities of Amir Temur. Among them, Zafarnama (authored by Sharafuddin Ali Yazdi), Nizamiddin Shami's "Zafarnama," and Ajaib al-maqdur fi akhbar Timur (authored by Ibn Arabshah) are of particular importance. In particular, Ibn Arabshah's work is distinguished by its relatively critical and objective approach. Valuable information about Amir Temur has also been preserved in Russian chronicles, Western European chronicles, and travelers' records. These sources shed light not only on the military potential of the great commander, but also on his political, cultural, and organizational abilities. The entire life and activities of Amir Temur were closely linked to Mawarannahr, that is, his native land. Mawarannahr is one of the oldest cultural centers in the Central Asian region.

A rich and unique culture has been formed in this region for thousands of years, based on irrigated agriculture and centuries-old ties between the sedentary and nomadic worlds. The artisans of Transoxiana were skilled jewelers who knew how to process gold, silver, tin, and lead. They mastered metallurgical technology, thoroughly mastered clay firing methods, and prepared ceramic vessels decorated with various geometric patterns. Modern science possesses sufficient information regarding the socio-cultural, domestic, and lifestyle of the population of this region, confirming their high level of development. The scholars of Transoxiana made a great contribution to the development of many fields of science, especially astronomy, mathematics, medicine, history, and literature. At the beginning of the 10th century, the first higher educational institutions—madrasas—began to appear in this region. The works of the scholars of Transoxiana played an important role in the formation and development of natural sciences in Central Asia. Among them, Muhammad ibn Musa al-Khwarizmi holds a special place. It is difficult to imagine modern mathematics, astronomy, and geography without the name of this scientist. The civilizational significance of the Timurid era lies in ensuring the continuity of the Eastern Renaissance, reviving ancient scientific traditions, and adapting them to new historical conditions. This process encompassed not only science and culture but also all spheres of public administration, architecture, and social life. One of the main factors in the development of science during the Timurid period was the centralized state policy and patronage of scientists. Amir Temur sought to transform Samarkand into a scientific center by supporting representatives of science and culture. As a result, cities such as Samarkand, Bukhara, and Herat became scientific centers. The construction of madrasas, libraries, and observatories during the Timurid period formed a scientific environment. The scientific school established in Samarkand under the leadership of Mirzo Ulugbek holds an important place in the history of world science.

The Timurid era holds a special place in the history of Central Asia not only from a political and military perspective but also from the perspective of scientific, cultural, and civilizational development. As discussed in the course work, an analysis of the theoretical and historiographical foundations of this period shows that the Timurid Empire was a complex and multi-layered historical process. In

particular, the system of state administration, socio-economic relations, and cultural environment formed starting from the era of Amir Temur served as a solid foundation for the development of science during the subsequent Timurid period.

Historical sources relating to the Timurid era and the issue of their scientific classification were analyzed. Among these sources, works belonging to the tradition of Eastern historiography are of particular importance, particularly the works of authors such as Sharafuddin Ali Yazdi, Nizomiddin Shami, and Ibn Arabshah. While these sources played an important role in illuminating the political realities of the Timurid era, their critical analysis also served the development of historiographical methodology. Also, during the period of independence, the issue of the transformation of the paradigm of historiography was considered as an important scientific direction. In modern historiography, ideological approaches to evaluating the Timurid era have been abandoned, and a new methodology based on scientific objectivity and source analysis has been formed. This process is clearly manifested in the research of B.A. Akhmedov, T.N. Qori-Niyoziy, and other scholars.

During the years of independence, priority directions for studying the Timurid period were analyzed. Among these areas, a special place is occupied by the development of science and enlightenment, the activities of madrasas, the establishment of observatories, and the restoration of the heritage of great scholars. In particular, the scientific school created by Mirzo Ulugbek and his famous work *Ziji Kurangani* are considered a significant turning point in the history of world science. During the Timurid era, the development of science was of civilizational importance, a process that directly influenced not only regional development but also the formation of global scientific heritage. The scientific traditions created by scholars such as Muhammad ibn Musa al-Khwarizmi, Al-Biruni, and Ibn Sina reached a new level during the Timurid era. The formation of scientific centers such as Samarkand, Bukhara, and Herat during this period strengthened the institutional foundations for the development of science.

The civilizational significance of the Timurid era lies in ensuring the continuity of the Eastern Renaissance, reviving ancient scientific traditions, and adapting them to new historical conditions. This process encompassed not only science and culture but also all spheres of public administration, architecture, and social life. In conclusion, the study of the Timurid period is of great importance for modern historiography in both theoretical and practical terms. The scientific heritage of this period serves as a vital source for the development of modern science. The sources and scientific literature analyzed in the course work confirm that the Timurid era is not only a phenomenon of the past but also a scientific and cultural phenomenon that has not lost its relevance today.

## CONCLUSION

Although Soviet historiography was formed within the framework of ideological restrictions, important scientific foundations were created in the direction of studying the history of the era of Amir Temur and the Timurids. In this process, G.A. Pugachenkova, I. Muminov, R. Mukminova, B.V. Lunin, E.V. Rtveladze, P. Zokhidov, L.I. Rempel, A. Urinboev, B. Akhmedov, D. Yusupova, U. The research of prominent scholars such as Alimov, T. Fayziev, and O. Buriev is of fundamental importance in the formation and development of Timur studies. As a result of their scientific research, the history of Amir Temur's reign began to be widely studied not only within the framework of local historiography but also in the international scientific community. Especially in the large scientific works and monographs published during the years of independence, the contribution of these scientists was clearly manifested,

which made it possible to objectively, systematically and comprehensively cover the personality of Amir Temur and his historical heritage.

Therefore, it should be noted that these studies conducted in the field of Timur studies enriched the methodological foundations of historical science and served as an important stage in the scientifically deep and comprehensive study of the history of the era of Amir Temur. research carried out by Uzbek historians and source scholars contributed to the high recognition of the legacy of the Timurids not only within the framework of national historiography, but also in the international scientific arena.