

“BEHBUDIY IZDOSHLARI” ILMIY VA IJODIY ISHLAR TANLOVI

XULOSA VA MULOHAZALAR

O‘zbekistonning boy tarixiy-madaniy merosi interyer dizayn sohasida katta ilhom manbai bo‘la oladi. Milliy uslub — bu nafaqat bezak, balki madaniyatni, ruhiyatni, an’anani saqlab qolish vositasidir. Bugungi dizaynerlar oldida turgan vazifa — bu boy merosni zamonaviy shakllarda qayta talqin etish, uni funksional va estetik jihatdan yangi bosqichga olib chiqishdir.

Ushbu yo‘nalishda:

Milliy elementlar zamonaviy dizaynga moslashtirilishi zarur;

Tabiiy materiallar va ekologik yechimlarga e’tibor kuchaytirilishi lozim;

Yosh dizaynerlar milliy san’at asoslarini chuqur o‘rganishlari va uni zamonaviy ruhda ifodalashlari kerak;

Hududiy uslublarni o‘rganish orqali o‘ziga xoslik yaratilishi maqsadga muvofiq.

Milliylik – bu o‘zlikni anglash, uni zamonga mos holatda saqlab qolishdir. Interyer dizayni esa bu jarayonning ko‘zgusidir.

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ADVANCED PRINCIPLES OF MODERN RESTORATION AND CONSERVATION

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Abstract: *This article explores advanced methodologies and theoretical foundations in the field of modern architectural restoration and heritage conservation. It analyzes contemporary approaches to addressing current challenges, based on the principles outlined in the Venice Charter, the Nara Document, and the Burra Charter. Key topics include the preservation of authenticity and historical accuracy, ensuring the reversibility and adaptability of interventions,*

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and the integration of innovative digital preservation techniques and augmented reality technologies. Additionally, the article emphasizes the importance of sustainable and environmentally friendly practices, highlighting the balance between preserving traditional craftsmanship and adopting modern, eco-conscious solutions.

Аннотация: *В статье рассматриваются передовые методологии и теоретические основы в области современной архитектурной реставрации и охраны наследия. Анализируются подходы к решению современных проблем на основе принципов Венецианской хартии, Нарского документа и Буррской хартии. Ключевые темы будут включать сохранение подлинности и исторической точности, обеспечение воспроизводимости и адаптивности вмешательств, а также внедрение инновационных методов цифровой сохранности и технологий дополненной реальности. В статье также подчеркивается важность устойчивых и экологически безопасных методов и обсуждается баланс между сохранением традиционного мастерства и принятием современных экологически ответственных решений.*

Annotatsiya: *Ushbu maqolada zamonaviy arxitektura restavratsiyasi va merosni muhofaza qilish sohasidagi ilg‘or metodologiyalar va nazariy asoslar o‘rganiladi. U Venetsiya Xartiyasi, Nara Hujjati va Burra Xartiyasi tamoyillariga asoslangan holda zamonaviy muammolarni hal qilishda qanday yondashuvlar qo‘llanilayotganini tahlil qiladi. Muhim mavzular qatoriga haqiqiylik va tarixiy aniqlikni saqlash, aralashuvlarning qaytaruvchanligi va moslashuvchanligini ta‘minlash, shuningdek, innovatsion raqamli saqlash texnikalari va kengaytirilgan reallik texnologiyalarining joriy etilishi yoritiladi. Bundan tashqari, maqolada barqaror va ekologik toza amaliyotlarning ahamiyati ta‘kidlanib, an‘anaviy hunarmandchilikni saqlash bilan birga zamonaviy, atrof-muhitga mas‘uliyatli yechimlarni qo‘llash muvozanati haqida so‘z boradi.*

Keywords: *Restoration, Conservation, Cultural Heritage Preservation, Consolidation, 3D Laser Scanning, Principle of Minimal Intervention, Authenticity, Non-Invasive Diagnostics, Digital Tools*

Ключевые слова: *Реставрация , Консервация , Сохранение культурного наследия , Консолидация , 3D лазерное сканирование , Принцип минимального вмешательства , Аутентичность , Неинвазивная диагностика , Цифровые инструменты*

Kalit so‘zlar: *Restavratsiya, konservatsiya, Madaniy merosni muhofaza qilish, Konsolidatsiya, 3D lazer skanerlash, minimal aralashuv tamoyili, autentiklik, Invaziv bo‘lmagan diagnostika (non-invasive diagnostics), raqamli asboblari*

The art of restoration and conservation holds a significant place in the field of architecture, as it requires a harmonious balance between history and modernity. *Restoration* refers to the process of returning a building to its original state by repairing or reconstructing its damaged parts to preserve its historical integrity. *Conservation*, on the other hand, is aimed at

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safeguarding the current state of a building and protecting it from deterioration without altering its structure.

As emphasized in Luigi Curini's *Preservation of Cultural Heritage* (2015), these processes are not only technical undertakings but also crucial means of preserving cultural and historical values for future generations [1]. Today, these practices have become even more relevant. With the expansion of cities and the increasing pressure of modern development, old buildings face the risk of disappearing. According to Curini, conservation practices play a vital role in protecting cultural and historical monuments by countering these threats [1].

Well-known restoration projects—such as the restoration of the Colosseum in Rome and the Notre-Dame Cathedral in Paris—serve as examples of how advanced technologies can be harmonized with historical care. In *Preserving the Colosseum* (2010), John L. Philip notes that modern technologies such as 3D laser scanning and structural consolidation were used during the restoration of the Colosseum, contributing significantly to its preservation for future generations [2] (Figure 1).



1-Figure. “The Colosseum” before and after restoration.

Similarly, the restoration of the Notre-Dame Cathedral following the fire in 2019 serves as a vivid example of the integration of modern tools and traditional methods. In *Notre-Dame: A History of the Cathedral* (2020), Andrew Saint provides a detailed account of the restoration process, analyzing the approaches taken to preserve the cathedral’s cultural significance [3].

These restoration projects not only preserve the physical structure of architectural monuments but also reinforce their cultural and historical values. Moreover, they promote sustainability by reducing the environmental impact of new construction. As Curini (2015) notes, preserving and restoring existing buildings requires significantly fewer resources than constructing entirely new structures, making restoration a crucial element of modern urban planning [1].

The preservation of architectural masterpieces ensures that the past continues to influence the future, serving as a source of inspiration for new generations of architects and visitors alike.

One of the core principles of architectural heritage conservation is *Minimal Intervention*, which aims to preserve historical structures with as little alteration as possible. This approach focuses on carrying out necessary repairs and maintenance without compromising the

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authenticity, cultural value, or structural integrity of the buildings. The principle is widely adopted in international charters, scientific research, and practical conservation work.

Minimal intervention refers to making only essential changes to preserve a historic building or monument. This principle helps prevent excessive restoration and contributes to maintaining historical authenticity. According to the *Venice Charter* (1964), conservation work should be carried out with respect for the historical and artistic significance of the structure, avoiding alterations that may compromise its authenticity [4]. The *Burra Charter* (2013) also emphasizes that any minimal changes should be based on thorough research and careful assessment [5].

Minimal intervention can be implemented through various methods, depending on the condition of the monument. These methods may include:

1. **Consolidation** – Strengthening aged materials without replacing them (e.g., applying breathable coatings to old stone walls) [7].
2. **Structural Stabilization** – Reinforcing weakened parts while minimizing impact on the original structure (e.g., using concealed steel supports within wooden beams) [8].
3. **Cleaning and Surface Treatments** – Employing non-invasive technologies, such as laser cleaning, to preserve surface details [7].
4. **Adaptive Reuse** – Reusing the building for modern purposes while preserving as much of the original structure as possible [6].

Practical Application of Minimal Intervention: Case Studies of Living Monuments

1. **The Parthenon, Greece** – Restoration efforts have focused not on reconstructing the missing parts but on reinforcing the existing ruins [9].
2. **The Tower of London, United Kingdom** – Structural reinforcement was carried out without compromising the integrity of the medieval architecture [9].
3. **Pompeii, Italy** – Modern monitoring technologies and preventive conservation methods have been used to preserve the city's heritage without excessive reconstruction [8, 9].

Scientific and Technological Approaches in Architectural Conservation

Non-invasive diagnostic tools play a crucial role in assessing the condition of historic buildings. These tools allow the detection of material weaknesses and hidden defects without causing physical damage. Advanced technologies enable conservators to effectively identify damage and structural vulnerabilities.

1. **Crack Monitoring Based on 2D Imaging** – This is an effective and cost-efficient method that involves capturing images to monitor surface cracks. This technique allows specialists to analyze the stability of a structure over time [10].
2. **In-situ Non-invasive Analysis** – Techniques such as image microscopy and reflectance Fourier Transform Infrared Spectroscopy (FTIR) assist in the direct examination of wall paintings and other delicate artworks without physical contact. These methods enable the identification of materials and provide an effective assessment of conservation treatments [10].

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Nanotechnology has provided innovative solutions for cleaning, consolidating, and protecting historical materials with minimal impact.

1. **Nanostructured Materials** – Nanostructured liquids and gels improve the cleaning, strengthening, and protection of stone surfaces. These materials are designed to be chemically and aesthetically compatible with historical buildings.

2. **Advances in Colloid Science** – Recent advancements in colloid science have led to the development of multifunctional nanoparticles that counteract environmental degradation and biological growth, thereby extending the lifespan of heritage materials

In the restoration of historic buildings, it is crucial to respect the original materials, techniques, and craftsmanship. Many heritage monuments were built using traditional methods that reflect the cultural identity of their time and place. Efforts should be made to preserve or restore these methods in restoration work, as they help maintain the historical integrity of the building. For example, traditional brick-making techniques, wooden joinery, and the use of locally sourced stone or wood are vital for preserving the authenticity of the building. The craftsmanship in the original construction is an inseparable part of the site’s cultural heritage, and any restoration should honor and continue these traditions

Moreover, documenting all interventions is a critical component of the conservation process. Proper and thorough documentation ensures that all changes made to a site are recorded for future use. This includes the creation of photographic materials, technical drawings, and descriptions of the materials, techniques used, and detailed reports explaining the reasons for each intervention. Such documentation not only preserves the history of the restoration work but also ensures transparency for future conservation efforts. This transparency allows future restorations to be carried out with a full understanding of previous changes

In restoration work, the principles of authenticity and historical accuracy are not just about preserving the physical elements of a building but also about protecting the cultural and historical significance embedded in its structure. By adhering to these principles, the original craftsmanship, materials, and cultural meaning of historic buildings and sites are respected, allowing them to be fully understood and appreciated within their future context.

In conclusion, modern restoration and preservation is an interdisciplinary field where traditional conservation ethics intersect with advanced science and technology. Adopting minimal intervention ensures that the intrinsic value of historical artifacts and objects remains intact, while scientific and technological approaches provide the precise tools necessary for informed, responsible restoration. Adherence to authenticity and historical accuracy preserves the true narrative of our cultural heritage, fostering a deeper connection between the past and the present. Therefore, thoroughly studying and applying modern approaches in the field of restoration is the most crucial safeguard in preserving invaluable heritage for future generations.

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IT VA BIZNES SOXASINING JAMIYATDAGI MUHIM O'RNI

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***Annotatsiya:** ushbu ilmiy maqola IT (Axborot Texnologiyalari) va biznes sohalarining jamiyatdagi o'rnini tahlil qiladi. Maqolada IT va biznes o'rtasidagi o'zaro ta'sir va integratsiyaning iqtisodiy, ijtimoiy va madaniy sohalaridagi ta'siri ko'rib chiqiladi. Axborot texnologiyalari biznesning rivojlanishiga qanday yordam berishi, raqamli transformatsiya jarayonlari, shuningdek, yangi texnologiyalarning biznes va jamiyatga qanday imkoniyatlar yaratishi ta'riflanadi. Maqolada IT sohasining jamiyatni rivojlantirishdagi ahamiyati, yangi ish o'rinlari yaratish, ta'lim va bilim almashinuvi sohalaridagi yangiliklar ham muhokama qilinadi. Shuningdek, IT va biznes sohalarining etnik masalalari, ma'lumot xavfsizligi va shaxsiy ma'lumotlarning himoyasi masalalari ham yoritiladi. Ushbu maqola jamiyatda axborot texnologiyalari va biznesning o'zaro bog'liqligini yanada chuqurroq tushunishga yordam beradi.*

***Kalit So'zlar:** axborot texnologiyalari (it), biznes, raqamli transformatsiya, jamiyat rivoji, ma'lumot xavfsizligi, shaxsiy ma'lumotlar himoyasi, innovatsiyalar, sun'iy intellekt, etnik masalalar, internetni rivojlantirish, iqtisodiy barqarorlik, ta'lim va onlayn ta'lim.*