

INNOVATION SCIENCE AND TECHNOLOGY

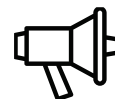


Scopus || Electronic journal specializing in Scopus

ISSUE 1



Acceptance of papers **January, 2026**



**Acceptance of
papers**

Published monthly



Topics

economics,
technology, social
sciences



EDITOR-IN-CHIEF:

Mirzaliyev Sanjar Makhmatjon ugli

DEPUTY EDITOR-IN-CHIEF:

Makhmudov Nosir Makhmudovich
DSc., Prof., Academician

DEPUTY EDITOR-IN-CHIEF:

Ochilov Bobur Bakhtiyor ugli – Senior
lecturer at TSUI

THE SCIENTIFIC-POPULAR ELECTRONIC
JOURNAL **"INNOVATION SCIENCE AND
TECHNOLOGY"** HAS BEEN REGISTERED
UNDER THE NUMBER **C-5669633** BY THE
AGENCY FOR INFORMATION AND MASS
COMMUNICATIONS (AOKA) OF THE
REPUBLIC OF UZBEKISTAN, EFFECTIVE
FROM OCTOBER 9, 2024.

CONTACTS

Phone: **+998 50 737 87 88**

Website: <https://ist-journal.uz>

Email: innovationist2025@gmail.com

The scientific electronic journal "Innovation Science and Technology" has been included in the list of scientific publications recommended for the publication of main scientific results of dissertations for the award of PhD and DSc degrees in economics and technical sciences, in accordance with the Resolution No. 370 of the Presidium of the Higher Attestation Commission of the Republic of Uzbekistan, dated May 8, 2025.

Editorial board:



Sharipov Kongiratbay Avezimbetovich,
Doctor of Technical Sciences (DSc), Professor



Abdurakhmanova Gulnora Kalandarovna, Doctor of
Economic Sciences (DSc), Professor



Cham Tat Huei,
Doctor of Philosophy (PhD), Professor (Malaysia)



Muhammad Imran Sadiq
Doctor of Philosophy in Economics (PhD), Professor,
Malaysia



Ahmed Aziz Ismail
Doctor of Technical Sciences (DSc),
Professor (Egypt)



Lee Chin
Doctor of Philosophy in Economics (PhD), (Malaysia)



Asongu Simplice
Doctor of Philosophy in Economics (PhD), Cameroon



Rui Dang
Doctor of Chemistry (DSc), Professor, China



Zahoor Ahmed
Doctor of Philosophy in Economics (PhD), Turkey



Shujaat Abbas
Doctor of Philosophy in Economics (PhD), Russia



Tina A Coffelt
Doctor of Philosophy in Educational Sciences (PhD),
USA



Abdikarimova Dinara Rustamxanovna
Doctor of Economic Sciences (DSc), Professor

Kurbonbekova Mohichehra Turobjonovna
Doctor of Economic Sciences (DSc), Professor

Alimardonov Ilkhom Muzrabshokovich
Doctor of Economic Sciences (DSc), Professor



Razakova Barno Sayfiyevna
Doctor of Philosophy in Economics (PhD)



Khasanov Sarvar Ulugbek ugli
Doctor of Philosophy in Economics (PhD)



Kholikova Rukhsora Sanjarovna
Associate Professor (PhD)

CONTENTS

BRIEF FEEDBACK ON “AGAT CREDIT” MICROFINANCE ORGANIZATION BASED ON THE REPORT OF “KAPDEPO” INVESTMENT COMPANY: CAVEATS FOR LENDERS (BONDHOLDERS)	16
Abduganiev Abdulaziz Alisher ugli	
IMPLEMENTATION OF EU BEST AGRICULTURAL TRADE PRACTICES IN UZBEKISTAN.....	20
Khulkar Karimova Rakhmanali qizi	
THE ROLE OF FOREIGN DIRECT INVESTMENT IN INCREASING SERVICE EXPORTS OF UZBEKISTAN	26
Jamshid Mirzakhmedov	
THE ROLE AND IMPORTANCE OF FINANCIAL MARKETS IN ECONOMIC DEVELOPMENT	30
Baymanova Mavlyuda Djuraevna, Abdullaeva Shohista, Ubaydullaeva Gulchehra Erkabaevna	
КЛИНИЧЕСКАЯ ОЦЕНКА СОСТОЯНИЯ МЕСТНЫХ ИММУННЫХ МЕХАНИЗМОВ ПОЛОСТИ РТА У ПАЦИЕНТОВ НА ЭТАПАХ ОРТОДОНТИЧЕСКОГО ЛЕЧЕНИЯ	36
Рахимбердыев Рустам Абдунасинович, Сайфулаева Азиза Анваровна	
INTEGRATING AI-BASED CUSTOMER ANALYTICS INTO INNOVATIVE RETAIL MARKETING STRATEGIES	40
Ostonaqulova Gulsaraxon Muhammadyoqub qizi	
FINANCIAL STIMULATION OF INNOVATIVE ACTIVITIES OF ENTERPRISES THROUGH INVESTMENTS	48
Bahriddinov Nodirbek Zamirdinovich	
DIGITAL DENTISTRY: LITERATURE REVIEW	52
Tursunov Begzod Sherzodovich, Zokirova Nodira Sobitovna	
THE LATEST ADHESIVE TECHNOLOGIES IN DENTISTRY	56
Rahimberdiyev Rustam Abdunasirovich, Chinibayeva Ibagul Sarsenbayevna	
ENSURING THE ACCEPTABILITY OF QUANTITATIVE AND QUALITATIVE INDICATORS IN THE EFFECTIVE ORGANIZATION OF HOUSING FUNDS IN KHOREZM	61
Otajonov Tohirjon Khojanazar o'g'li	
WAYS TO IMPROVE CUSTOMS ADMINISTRATION IN THE REPUBLIC OF UZBEKISTAN.....	67
Usmonova Dilfuza Ilhomovna	
CLINICAL ASSESSMENT OF THE STATE OF LOCAL IMMUNE MECHANISMS OF THE ORAL CAVITY IN PATIENTS AT DIFFERENT STAGES OF ORTHODONTIC TREATMENT	72
Rakhimberdiyev Rustam Abdunasirovich, Saifulaeva Aziza Anvarovna	
IMPROVING THE ALGORITHM FOR CONTROLLING THE CUSTOMS TRANSIT INFORMATION SYSTEM E-TRANSIT OF THE REPUBLIC OF UZBEKISTAN	76
Musayeva Shoirazimovna	
DEVELOPMENT TRENDS OF THE AUTOMOTIVE BUSINESS IN UZBEKISTAN	82
Saidov Dilshodbek Razzakovich	
INTEGRATION OF MARKETING STRATEGIES IN RETAIL TRADE ACTIVITIES.....	87
Akramov Toxir Abdiraxmanovich	
CHALLENGES OF ADOPTING ISLAMIC FINANCE WITHIN CONVENTIONAL BANKING SYSTEMS	91
Safarov Shuhrat Ismatovich	
CRM SYSTEMS AND THEIR IMPACT ON THE RESULTS OF MARKETING STRATEGY IN DISTRIBUTION COMPANIES	95
Jamoliddinov Fakhriyor Shodiyor o'g'li	
LEXICAL-SEMANTIC ARCHITECTURE OF MODERN WORDNET SYSTEMS	101
Aynura Axmedova	
METHODOLOGY FOR ANALYZING THE EFFECTIVENESS OF INNOVATIVE PROCESSES AT ENTERPRISES.....	108
Kurbanova Shakhnoza Yuldashbayevna	
COMPANY VALUATION IN MERGERS AND ACQUISITIONS: A STRATEGIC AND GOVERNANCE-BASED APPROACH	113
Lee Illarion Georgievich	

A REVIEW OF THE LITERATURE ON CAD/CAM TECHNOLOGIES IN DENTAL ECTOPROSTHETICS.....	118
Tursunov Begzod Sherzodovich, Hazratqulov Asrbek Ulugbek ugli	
TRENDS AND DIFFICULTIES IN THE INTEGRATION OF DIGITAL TECHNOLOGIES IN ORTHOPEDIC DENTISTRY.....	123
Khojimurodov Burkhon Ravshanovich	
PRIORITY DIRECTIONS FOR IMPROVING THE MECHANISM OF ENHANCING THE ECONOMIC SECURITY LEVEL OF THE KASHKADARYA REGION.....	127
Tuyev Abdurahmon Yusubopvich	
THE ROLE OF PSYCHOPHYSIOLOGICAL TRAINING OF DRIVERS IN REDUCING ROAD TRAFFIC ACCIDENTS.....	132
Uralbayev Anvar Ubaydullayevich	
THE ROLE OF SUSTAINABLE DEVELOPMENT PRINCIPLES IN DEVELOPING GREEN MARKETING STRATEGIES FOR ENTERPRISES.....	135
Sapayev Akhmad Durdibayevich	
MANAGEMENT MODEL OF INFORMATION RESOURCES IN SMALL BUSINESS ENTITIES AND ITS IMPACT ON ECONOMIC EFFICIENCY.....	140
Yo'ldoshev Nodirbek Ne'matjon o'g'li	
WAYS TO DEVELOP THE INVESTMENT ACTIVITY OF COMMERCIAL BANKS THROUGH THE SECURITIES MARKET.....	145
Yuldashev Fozil Turapovich	
INTERNATIONAL EXPERIENCE IN THE USE OF CROSS-BORDER REMITTANCES IN THE DEVELOPMENT OF THE NATIONAL ECONOMY.....	152
Gimranova O. B.	
FREE ECONOMIC ZONES AND FOREIGN INVESTMENT.....	158
Sheraliyeva Saida Azatovna	
ISSUES OF FORMATION AND MANAGEMENT OF PRODUCT ASSORTMENT IN RETAIL ENTERPRISES.....	162
Safarov Baxtiyor Djurakulovich	
STATE SUPPORT IN THE REPUBLIC OF UZBEKISTAN FOR ORGANIZING SHORT-TERM SCIENTIFIC INTERSHIPS OF YOUNG SCIENTISTS ABROAD.....	167
Kabashev Tairjon	
LEGAL FOUNDATIONS OF DIVIDEND POLICY: EVIDENCE FROM DEVELOPED AND DEVELOPING COUNTRIES.....	172
Eshev Furqat A'zamovich	
IMPROVING SMART CITY GOVERNANCE BASED ON DIGITAL PLATFORMS: A HUMAN-CENTERED APPROACH.....	176
Rakhimova Madina Shukhrat qizi	
THE INVESTMENT CLIMATE AND ITS IMPACT ON THE DEVELOPMENT OF FOREIGN TRADE: A CASE STUDY OF UZBEKISTAN.....	182
Mirzamukhamedova Shakhzoda Akmaljon qizi	
CONSUMER CREDITS IN USA.....	187
Zunnunova Xulkar Muxtorovna	
INSTITUTIONAL BASES AND FUNCTIONAL MECHANISMS OF CONTROLLING IN THE EFFECTIVE MANAGEMENT OF THE RAILWAY TRANSPORT SYSTEM.....	194
Kayumov Zafarbek Odil ugli	
ANALYSIS OF CUSTOMER RELATIONSHIP MANAGEMENT PROCESSES AND PROBLEMS IN SERVICE ENTERPRISES.....	199
Ismailova Ma'mura Eldorovna	
PROBLEMS FACED BY COMMERCIAL BANKS IN BANK RISK MANAGEMENT AND WAYS TO ADDRESS THEM.....	205
Qayimova Ismigul Ilhom qizi, Tuxsanov Eldor Dilmurod o'g'li	

DESIGN OF ENGINEERING STRUCTURES AND CONSTRUCTION OF A REGIONALLY BRANCHED HIGHWAY COMPLEX.....	209
Yakubov Maqsadkhon Sultaniyazovich, Norinov Muhammadyunus Usibjonovich, Zikraev Akmaljon Alimovich	
THE ROLE OF COOPERATIVE RELATIONS IN THE SUSTAINABLE DEVELOPMENT OF THE REGIONAL TOURISM MARKET	216
Mirzabayev Jamshid Irkinovich	
THE ROLE OF FREE ECONOMIC ZONES IN IMPROVING THE INVESTMENT CLIMATE OF THE KHOREZM REGION.....	221
Masharipov Sardorbek Farxadovich	
ANALYSIS OF ORGANIZATIONAL AND ECONOMIC INDICATORS OF INNOVATIVE POTENTIAL MANAGEMENT IN TEXTILE INDUSTRY ENTERPRISES	228
Khosilov Shavkat Bekmurodovich	
MAIN WAYS TO DEVELOP INTEREST RATE RISK MANAGEMENT PRACTICES IN COMMERCIAL BANKS OF UZBEKISTAN	234
Seytnazarov Daniyar Baxadirovich	
THEORETICAL AND METHODOLOGICAL ASPECTS OF ESG STRATEGY IMPLEMENTATION.....	239
Xusenova Mexrangiz	
ADVANTAGES OF USING TRADITIONAL CONSTRUCTION MATERIALS IN THE CONSTRUCTION OF LOW-RISE RESIDENTIAL BUILDINGS.....	244
Otabek Hakimovich Toshniyozov	
THE METHODOLOGY FOR SELECTING AND INTEGRATING DATA SOURCES AND USING OFFICIAL STATISTICAL ENTERPRISE DATA, QUESTIONNAIRES, AND PROXY INDICATORS IN FORMING THE EMPIRICAL BASIS OF THE STUDY.....	247
Usmonov Maxsud Tulqin o'g'li, Qodirov Farrux Ergash o'g'li	
PRACTICAL SOLUTIONS FOR THE PLACEMENT OF MULTI-STOREY GREENHOUSES IN INDUSTRIAL AREAS	254
Abdujabbarova Maktuba To'xtasinovna, Salayeva Ma'rifat Yashin qizi	
INNOVATIONS IN DENTISTRY: DIGITAL SOLUTIONS FOR MODERN PRACTICE	258
Sadriyev Nizom Najmiddinovich, Usarov Nuriddin	

INNOVATIONS IN DENTISTRY: DIGITAL SOLUTIONS FOR MODERN PRACTICE

Sadriyev Nizom Najmiddinovich

Assistant of Faculty of Postgraduate Education

Samarkand State Medical University

ORCID: 0009-0008-9729-0986

E-mail: nizomsadriyev008@gmail.com

Usarov Nuriddin

Clinic resident of Faculty of Postgraduate Education

Samarkand State Medical University

Abstract: In modern dentistry, computer-based modeling and the digital manufacture of prosthetic restorations are becoming increasingly widespread. This rapid adoption is primarily driven by the ability of these technologies to reduce the number of clinical and laboratory stages while enabling the use of advanced materials with high aesthetic qualities and long-term durability. Any computer-aided design and manufacturing (CAD/CAM) system consists of three core functional components: a scanning module, a design module, and an automated manufacturing module.

The process of creating dental restorations follows several sequential stages. Initially, a digital impression of the tooth is obtained and processed to reconstruct the tooth surface on a computer screen. Subsequently, a virtual model of the future restoration is designed, after which automated manufacturing is performed. The diversity of CAD/CAM systems and 3D-printing technologies used in dentistry is determined by three key factors: scanning methods for acquiring three-dimensional models of the oral cavity, the variety of prosthetic designs and materials, and differences in clinical and business implementation models. The development of these technologies is closely associated with the transition from two-dimensional visualization to three-dimensional isometric modeling, allowing precise control and management of the restoration process in a digital environment. In addition, innovative construction materials combining the aesthetic properties of ceramics with the mechanical reliability of metals play a crucial role in the advancement of digital dentistry.

Key words: digital dentistry, 3D modeling, CAD/CAM, CEREC 2.

Annotatsiya: Zamonaviy stomatologiyada kompyuter modellashirish va protez konstruksiyalarini raqamli ishlab chiqarish texnologiyalari tobora keng qo'llanilmoqda. Ushbu texnologiyalarning jadal rivojlanishi klinik va laboratoriya bosqichlari sonini qisqartirish, shuningdek, yuqori estetik ko'rsatkichlar va uzoq muddatli mustahkamlikka ega innovatsion materiallardan foydalanish imkoniyati bilan izohlanadi. Har qanday CAD/CAM tizimi uchta asosiy funksional moduldan iborat: skanerlash moduli, loyihalash moduli va avtomatlashtirilgan ishlab chiqarish moduli.

Tish restavratsiyalarini yaratish jarayoni ketma-ket bosqichlarda amalga oshiriladi. Dastlab, tishning raqamli qolipi olinadi va kompyuter ekranida uning sirtini qayta tiklash uchun qayta ishlanadi. Keyinchalik, bo'lajak restavratsiyaning virtual modeli yaratiladi va yakuniy bosqichda uning avtomatlashtirilgan ishlab chiqarilishi amalga oshiriladi. Stomatologiyada qo'llanilayotgan CAD/CAM va 3D-printer tizimlarining xilma-xilligi uchta asosiy omil bilan belgilanadi: og'iz bo'shlig'ining uch o'lchamli modelini olish usullari, protez turlari va materiallarining rang-barangligi hamda klinik amaliyotga joriy etishning turli biznes modellari. Ushbu texnologiyalarning rivoji ikki o'lchamli tasvirlardan uch o'lchamli izometrik modellashirishga o'tish bilan chambarchas bog'liq bo'lib, bu restavratsiya jarayonini raqamli muhitda aniq boshqarish imkonini beradi. Shuningdek, keramikaning estetik xususiyatlarini metallning mexanik ishonchligi bilan uyg'unlashtiruvchi yangi konstruksion materiallar raqamli stomatologiyaning rivojida muhim o'rin tutadi.

Kalit so'zlar: raqamli stomatologiya, 3D modellashirish, CAD/CAM, CEREC 2.

Аннотация: В современной стоматологии технологии компьютерного моделирования и цифрового изготовления ортопедических конструкций получают все более широкое распространение. Их активное внедрение обусловлено возможностью сокращения количества клиничко-лабораторных этапов, а также применением инновационных материалов, отличающихся высокой эстетичностью и долговечностью. Любая система автоматизированного проектирования и производства (CAD/CAM) включает три основных функциональных компонента: модуль сканирования, модуль проектирования и модуль автоматизированного изготовления.

Процесс создания стоматологических реставраций осуществляется поэтапно. На первом этапе формируется цифровой отпечаток зуба, который затем обрабатывается для реконструкции поверхности зуба на экране компьютера. Далее разрабатывается виртуальная модель будущей реставрации, после чего выполняется ее автоматизированное изготовление. Многообразие CAD/CAM-систем и технологий 3D-печати в стоматологии определяется тремя ключевыми факторами: методами сканирования для получения трехмерной модели полости рта, разнообразием видов протезов и материалов, а также различиями в клинических и бизнес-моделях внедрения. Развитие данных технологий тесно связано с переходом от двухмерных изображений к трехмерной изометрической визуализации, что обеспечивает высокую точность моделирования и управления процессом реставрации в цифровой среде. Существенную роль также играют инновационные конструкционные материалы, сочетающие эстетические свойства керамики с механической надежностью металлов.

Ключевые слова: цифровая стоматология, 3D-моделирование, CAD/CAM, CEREC 2.

INTRODUCTION

Conventional analog techniques are increasingly giving way to a fully integrated digital environment in contemporary dental practice. The growing adoption of computer modeling and automated manufacturing is driven by the need to use advanced materials that offer improved durability and aesthetics, as well as by the objective of minimizing the number of prosthetic procedures. By reducing human error and enhancing patient comfort, CAD/CAM technologies provide unprecedented control over the restorative process, facilitating the transition from two-dimensional representations to three-dimensional isometric visualization. In the context of the rapid expansion of chairside dentistry and the integration of artificial intelligence (AI) into diagnostic workflows, analyzing the effectiveness and application of these digital methods is essential for establishing new benchmarks in clinical outcomes and professional excellence.

LITERATURE REVIEW

Recent studies in dentistry emphasize the growing importance of advanced diagnostic and treatment approaches aimed at improving clinical accuracy and patient safety. Makhmudovna T. M. et al., in their 2023 research, highlighted the need for precise diagnostic assessment and controlled clinical interventions in complex pathological conditions, underlining the broader relevance of digital technologies for enhancing treatment predictability. Similarly, the study by Shoxrux S., Shoxrux I., and Faxriddin C. published in 2022 demonstrated that effective prevention and management of oral infections in denture wearers require systematic monitoring and improved clinical protocols, which can be significantly supported by digital diagnostic and documentation tools.

In the field of orthopedic and prosthetic dentistry, several authors have focused on evaluating treatment outcomes and material performance. Qobilovna B. Z. and Nodirovich E. A. reported in 2023 that removable dental prostheses remain a critical component of orthopedic treatment, particularly in patients with combined pathologies, where treatment success depends on accurate planning and prosthesis adaptation. Complementing these findings, Bakhtiyorovna M. U. in 2022 analyzed the causes of removable denture fractures and allergic reactions, emphasizing that technological precision and material quality play a decisive role in reducing complications, thereby supporting the integration of digitally guided fabrication methods.

Periodontal and restorative aspects of dental treatment have also been extensively investigated. Anvarovich E. S. and Qobilovna B. Z., in their 2023 study, examined the influence of different retraction threads on gingival recession, highlighting the importance of controlled clinical techniques to preserve soft tissue health. Furthermore, Tohirovna M. L. and Qobilovna B. Z. demonstrated in 2023 that optimized complex treatment methods significantly improve outcomes in inflammatory periodontal diseases. The effectiveness of restorative techniques was further supported by the findings of Makhmudova U. B., who in 2022 confirmed the clinical value of parapulpal pins in restoring defects of the frontal teeth. Collectively, these studies form a scientific basis for the adoption of digital solutions, including CAD/CAM technologies, as tools for improving accuracy, consistency, and overall treatment quality in modern dental practice.

RESEARCH METHODOLOGY

The procedures of computer-aided design and automated dental prosthesis manufacturing (CAD/CAM systems), including their functional components—scanning modules, design software, and production hardware—constitute the subject of this study.

The research focuses on the use of advanced construction materials, such as zirconia and lithium disilicate, digital scanning techniques, three-dimensional (3D) modeling of tooth surfaces, and the development of clinical protocols for digital tooth preparation.

The purpose of this study is to examine the evolution and operating principles of dental CAD/CAM systems and to demonstrate the advantages of digital modeling and three-dimensional (3D) printing in enhancing the precision, speed, and technical efficiency of dental restorations.

The research tasks include assessing the essential functional stages of dental restoration fabrication, ranging from digital impressions to automated manufacturing; tracing the development of innovative systems such as Duret, CEREC, and Procera in order to understand the fundamental principles of modern automation; examining the influence of software-based tool-path management on restoration quality and the technical requirements of tooth preparation; investigating the potential of additive manufacturing (3D printing) and novel materials to improve surgical and orthopedic accuracy; and analyzing the prospects for integrating augmented intelligence and machine learning into the modeling and diagnostic stages of dental care.

ANALYSIS AND RESULTS

A completely integrated digital ecosystem is progressively replacing conventional analog methods in contemporary dental practice, which is undergoing a profound transformation. This body of scholarly evidence highlights the key developments shaping modern dentistry, with particular emphasis on improving patient outcomes, therapeutic effectiveness, and diagnostic accuracy.

The introduction of intraoral scanning (IOS) represents a central component of this digital transformation. According to recent studies, digital impressions have, in many clinical situations, effectively replaced conventional elastomeric impression materials. IOS technology not only improves patient comfort by eliminating the gag reflex associated with traditional trays but also enhances the accuracy of data transmission to dental laboratories. The real-time visualization provided by these scanners significantly reduces clinical errors and the need for repeat appointments by allowing clinicians to immediately evaluate tooth preparations.

Building upon data obtained from scanning technologies, CAD/CAM (Computer-Aided Design and Manufacturing) systems have fundamentally transformed restorative dentistry. The literature highlights a growing shift toward “chairside” dentistry, in which crowns, inlays, and onlays are designed and fabricated within a single clinical visit. Research indicates that materials commonly used in CAD/CAM workflows, such as monolithic zirconia and lithium disilicate, demonstrate marginal fit and mechanical properties that are comparable to, and often superior to, those of conventionally fabricated laboratory restorations. This transition not only streamlines clinical workflows but also contributes to increased economic efficiency within modern dental practices.

Additive manufacturing, or three-dimensional (3D) printing, has also emerged as a highly valuable technology, particularly in orthodontics and implantology. Scholarly studies report that the use of 3D-printed surgical guides has significantly improved the precision of dental implant placement, ensuring greater anatomical accuracy and reducing surgical trauma. Moreover, the in-house production of transparent aligners and high-resolution diagnostic models has enhanced both the accessibility and the level of customization available in orthodontic treatment.

The integration of machine learning and artificial intelligence (AI) represents the most recent frontier identified in the literature. AI-based algorithms are increasingly applied to the analysis of radiographs and cone-beam computed tomography (CBCT) scans, enabling highly sensitive automated detection of pathologies such as dental caries and alveolar bone loss. Through visualized diagnostic outputs, this form of “augmented intelligence” supports clinicians in making more objective diagnostic decisions and facilitates improved communication with patients.

Overall, the accumulated research evidence suggests that digital innovations—ranging from intraoral scanning technologies to AI-driven diagnostic systems—are establishing a new standard of care in dentistry. Although the initial financial investment and the associated learning curve remain topics of ongoing discussion, the prevailing consensus in the literature is that these technologies result in more predictable, efficient, and patient-centered dental treatments. As digital tools continue to advance, their routine integration into clinical practice is expected to become a defining benchmark of professional excellence in the field.

The application of digital technologies in dentistry encompasses all stages of treatment, from electronic medical record management to complex clinical procedures. These technologies are employed in diagnostics through radiovisiography, computed tomography, virtual articulators, and digital imaging systems. In addition, computer-based models enable the simulation of diverse clinical scenarios. Current research focuses on the development and orientation of three-dimensional (3D) computer models of individual teeth and complete dentitions, as well as on methods for measuring tooth surface parameters—such as fissure depth, cusp morphology, and slope geometry—and monitoring the tooth preparation process.

In recent years, dentistry has experienced rapid technological progress, particularly in the field of CAD/CAM systems, which enable the computer-assisted design and fabrication of dental prostheses. The origins of this technology can be traced back to the 1960s, a period characterized by the widespread introduction of automated manufacturing across multiple industries. During this time, the foundational principles for classifying automation systems were established. According to GOST standards, a CAD system (Computer-Aided Design) is defined as a complex that employs information technologies to automate the design process. The primary objectives of CAD systems include the optimization of labor resources through reduced design and production time, cost minimization, and improvements in the quality and technical efficiency of manufactured products. CAD/CAM systems represent a specialized application of this concept, integrating computer-aided design with computer-aided manufacturing. In dentistry, these systems combine digital design processes with the automated fabrication of restorative structures.

In the early 1980s, dental CAD/CAM systems were initially perceived as relatively simple to implement; however, their practical development proved to be considerably more complex. To achieve widespread clinical acceptance, these systems needed to offer solutions that were competitive in both cost and production time while surpassing traditional fabrication methods in quality. High-quality restorations required extremely precise scanning of the morphology of prepared abutment teeth, as well as adjacent and opposing dentitions. Early scanning technologies faced significant challenges in accurately capturing thin preparation margins, necessitating the development of high-precision hardware and specialized software. Dental restorations must not only fit the prepared tooth accurately but also harmonize with natural tooth morphology and restore functional occlusion. Given the brittle nature and complex geometries of ceramic materials, their processing requires delicate and precise mechanical control. This, in turn, demands advanced CAM equipment equipped with software capable of accurately regulating tool paths and feed forces. Furthermore, the physical dimensions of processing units must remain compatible with standard clinical environments. Unlike mass-produced industrial components, each dental restoration is unique, requiring substantial intellectual input and time investment. Despite these challenges, CAD/CAM technologies have continued to gain recognition and acceptance within clinical dentistry.

By the late 1970s, dental CAD/CAM systems began to emerge with the objective of standardizing restorative procedures, minimizing human error through digital modeling, and unifying dental materials via standardized blanks. Early pioneers, such as François Duret, drawing upon Altschuler's theoretical research on laser holographic optics, played a decisive role in advancing this field. Beginning in 1971, Duret conducted research aimed at producing crowns with precise occlusal morphology using laser scanning and computer numerical control (CNC) milling. In 1983, he introduced a prototype that later evolved into the Sopha Bioconcept® system. During the 1980s, Dr. W. Mörmann, in collaboration with engineer M. Brandestini, developed the CEREC® system, which introduced the concept of "chairside" dentistry by enabling the fabrication of ceramic restorations directly within the clinical setting. Subsequent system iterations, including CEREC-2 and CEREC-3, further enhanced accuracy through improved three-dimensional visualization and advanced milling strategies. Concurrently, material science advancements facilitated the development of the Procera® system by M. Andersson and B. Bergman, which introduced an outsourcing-based manufacturing model for high-strength titanium and ceramic frameworks.

CONCLUSION AND RECOMMENDATIONS

Today, CAD/CAM systems continue to evolve by incorporating both subtractive milling techniques and additive manufacturing technologies, such as three-dimensional (3D) printing and selective laser sintering. Contemporary systems integrate scanning, computer-aided design (CAD), and computer-aided manufacturing (CAM) modules to process digital impressions and fabricate highly precise dental restorations. These systems ensure high mechanical strength and optimal fit while adhering to traditional principles of tooth preparation that have been adapted to digital clinical workflows.

References:

1. Makhmudovna T. M. et al. The Course of Malformation and Corneal Erosion in Tuberculosis Patients // Open Access Repository. – 2023. – T. 4. – No. 03. – P. 60–66.

2. Qobilovna B. Z., Nodirovich E. A. Evaluation of Orthopedic Treatment with Removable Dental Prostheses for Patients with Pair Pathology // Spectrum Journal of Innovation, Reforms and Development. – 2023. – T. 11. – P. 95–101.
3. Anvarovich E. S., Qobilovna B. Z. Influence of Different Types of Retraction Threads on the Degree of Gingival Recession // Spectrum Journal of Innovation, Reforms and Development. – 2023. – T. 11. – P. 84–86.
4. Tohirovna M. L., Qobilovna B. Z. Optimization of Complex Methods of Treatment of Inflammatory Periodontal Diseases // Eurasian Research Bulletin. – 2023. – T. 17. – P. 138–143.
5. Shoxrux S., Shoxrux I., Faxriddin C. Prevention and Treatment of Oral Infections in Denture Wearers // International Journal of Early Childhood Special Education. – 2022. – T. 14. – No. 4.
6. Bakhtiyorovna M. U. Causes of Removable Denture Breaks and Allergic Reactions // Spectrum Journal of Innovation, Reforms and Development. – 2022. – T. 10. – P. 374–377.
7. Makhmudova U. B. The Effectiveness of the Use of Parapulpal Pins (PPP) When Restoring Defects in the Crown Part of the Frontal Teeth // Asian Journal of Pharmaceutical and Biological Research. – 2022. – T. 11. – No. 2.

Proofreader: Zokir ALIBEKOV

Layout and Designer: Oloviddin Sobir ugli

2026. № 1

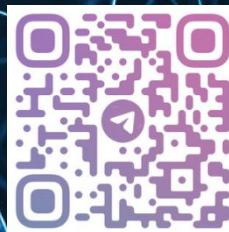
© When materials are reproduced, the INNOVATION SCIENCE AND TECHNOLOGY journal must be cited as the source. Authors are responsible for the accuracy of the information in materials and advertisements published in the journal. Editorial opinions may not always align with those of the authors. Submitted materials will not be returned to the editorial office.

To publish articles in this journal, you may submit articles, advertisements, stories, and other creative materials through the following links. Materials and advertisements are published on a paid basis.

You may subscribe to the journal at any time using the following details. Once subscribed, please send a screenshot or photo of your payment confirmation to our Telegram page @iqtisodiyot_77. Based on this, we will send the latest issue of the journal to your address each month.

“The journal “INNOVATION SCIENCE AND TECHNOLOGY” has been registered by the Agency for Information and Mass Communications under the Administration of the President of the Republic of Uzbekistan from 09.10.2024 under the registration number №390637. License number: C-5669633. PNFL: 30407832680027

Our address: Tashkent city, Yunusobod district, 19th block,
House 17.



Acceptance of articles

Published every
monthly



Directions

Social, economic, political,
technological, scientific



Scopus || Scientific electronic journal specializing in Scopus

CERTIFICATE NUMBER: №390637

**ORDER NUMBER ACCORDING TO
THE LICENSE REGISTER: C-5669633**

CONTACT:



Contact us
+998 50 737 87 88



Telegram channel
t.me/scopus_IST2100



Journal official website
<https://ist-journal.uz/index.php/IST>