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INTERNATIONAL CONFERENCE ON ADVANCE SCIENCE AND TECHNOLOGY

Volume 03, Issue 01, 2026 (27-FEBRUARY)

SEMENT **SANOATIDA ISHLAB CHIQARISH CHANGINING XODIMLAR SALOMATLIGIGA TA‘SIRI VA UNI KAMAYTIRISHNING ZAMONAVIY USULLARI**

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Annotatsiya: Mazkur tezisda sement sanoatida ishlab chiqarish jarayonida hosil bo‘ladigan changning ishchi-xodimlar salomatligiga salbiy ta’siri tahlil qilingan. Sement changining tarkibi, uning nafas yo‘llari orqali inson organizmiga ta’siri hamda kasalliklar kelib chiqishidagi o‘rni yoritib berilgan. Shuningdek, ishlab chiqarish changini kamaytirishning zamonaviy texnologik usullari, jumladan, aspiratsiya tizimlari, baghouse filtrlari, elektrofiltrlar va raqamli monitoring tizimlarining ahamiyati ko‘rsatib o‘tilgan.
***Kalit so‘zlar*:** sement sanoati, ishlab chiqarish changi, mehnat muhofazasi, ishchi salomatligi, aspiratsiya tizimi, baghouse filtr, elektrofiltr, ekologik xavfsizlik.

Sement sanoati qurilish materiallari ishlab chiqarishning yetakchi tarmoqlaridan biri bo‘lib, yuqori unumdorlik bilan bir qatorda, ekologik va sanitariya-gigiyenik muammolarni ham keltirib chiqaradi. Xususan, sement ishlab chiqarish jarayonida hosil bo‘ladigan chang ishchi-xodimlar salomatligiga salbiy ta’sir ko‘rsatuvchi asosiy omillardan biri hisoblanadi. Chang asosan xomashyoni maydalash, quritish, klinker pishirish, sementni sovitish, qadoqlash va tashish jarayonlarida ajralib chiqadi.
Sement changi tarkibida kalsiy oksidi (CaO), kremniy oksidi (SiO_2), alyuminiy oksidi (Al_2O_3) va temir oksidi (Fe_2O_3) kabi moddalar mavjud bo‘lib, ularning mayda zarrachalari havoda uzoq vaqt saqlanib qoladi. Ushbu zarrachalar nafas yo‘llari orqali inson organizmiga kirib, o‘pka faoliyatiga salbiy ta’sir ko‘rsatadi. Ilmiy tadqiqotlar shuni ko‘rsatadiki, sement changiga uzoq muddat ta’sir qilish respirator kasalliklar, surunkali bronxit, allergik holatlar, teri va ko‘z kasalliklarining rivojlanishiga olib keladi. Ayniqsa, kremniy oksidi miqdori yuqori bo‘lgan chang silikoz kabi kasalliklarning paydo bo‘lishiga sabab bo‘lishi mumkin.
Ishlab chiqarish sharoitida changning yuqori konsentratsiyasi xodimlarning mehnat unumdorligini pasaytiradi, kasallanish darajasini oshiradi va mehnat muhofazasi talablarining buzilishiga olib keladi. Shu sababli sement sanoatida ishchi salomatligini muhofaza qilish masalasi dolzarb bo‘lib, changni kamaytirishning samarali texnologik usullarini joriy etishni talab etadi. Hozirgi kunda sement zavodlarida chang miqdorini kamaytirish uchun turli xil texnik va texnologik yechimlar qo‘llanilmoqda. Jumladan, aspiratsiya tizimlari ishlab chiqarish jarayonida ajralib chiqadigan changni manba joyida ushlab qolishga xizmat qiladi. Baghouse (sumka) filtrlari havodagi mayda chang zarralarini yuqori samaradorlik bilan ajratib, atmosferaga chiqadigan chiqindilar miqdorini sezilarli darajada kamaytiradi. Elektrofiltrlar esa elektr maydon yordamida juda mayda zarrachalarni ham samarali tutib qolish imkonini beradi. So‘nggi yillarda changni tozalash tizimlarini takomillashtirish maqsadida gibrid filtr tizimlari keng joriy etilmoqda. Ushbu tizimlar siklon va baghouse filtrlarining kombinatsiyasi asosida ishlaydi va turli o‘lchamdagi chang zarralarini yuqori darajada ushlab qolishga imkon yaratadi. Bundan tashqari, raqamli monitoring tizimlari va sensor texnologiyalaridan foydalanish chang miqdorini real vaqt rejimida nazorat qilish, texnologik jarayonlarni optimallashtirish va xavfli holatlarning oldini olishga xizmat qiladi.

Xulosa qilib aytganda, sement sanoatida ishlab chiqarish changining xodimlar salomatligiga salbiy ta’sirini kamaytirish uchun zamonaviy texnologik usullarni joriy etish muhim ahamiyatga ega. Changni samarali nazorat qilish tizimlari nafaqat ishchi-xodimlarning sog‘lig‘ini himoya qiladi, balki ishlab chiqarish jarayonining ekologik xavfsizligini oshirish va xalqaro standartlarga moslashishga ham xizmat qiladi.

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METHODOLOGY OF MODERN PEDAGOGY

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Annotation.

Keywords: Scaling Access and Impact The Adolescent Community of Engagement (ACE) Framework Behaviorism and Cognitivism Constructivism Blended Learning Frameworks Teaching Strategies Student-Centered Learning Approaches Project-Based Learning (PBL) Active Learning Inquiry-Based Learning Collaborative Learning Innovative Teaching Techniques Socratic Seminars Interactive Presentations Reflective Journaling Differentiated Instruction Choice-Based Learning Assessment Methods Formative Assessment Alternative Assessment Methods Constructivist Assessment Strategies Technology-Enhanced Assessment Technology in Modern Pedagogy Benefits of Technology Integration Challenges and Considerations Implementation Strategies Inclusive Pedagogy Fostering a Positive Classroom Climate Strategies for Inclusive Teaching Addressing Bias and Equity.

Summary. The methodology of modern pedagogy refers to the evolving principles and practices that shape contemporary educational approaches, emphasizing learner-centered strategies and the integration of technology in the classroom. This field of study is notable for its transformative impact on how educators engage with students, adapting to the diverse needs of learners and the demands of an increasingly digital world. Through various theoretical frameworks, such as constructivism, behaviorism, and blended learning models, modern pedagogy seeks to foster critical thinking, collaboration, and a deeper understanding of content among students, thereby preparing them for real-world challenges.[1][2][3]

Key frameworks within modern pedagogy include the Scaling Access and Impact model, which aims to enhance the effective use of educational technology, and the Adolescent Community of Engagement (ACE) framework, which emphasizes the importance of a supportive learning community for adolescents.[1]

Additionally, pedagogical strategies like project-based learning, active learning, and inquiry-based learning exemplify the shift toward student-centered approaches that prioritize engagement and autonomy [6].

As these methodologies continue to evolve, they respond to the growing need for inclusivity and equity within educational settings, addressing the diverse cultural and socio-economic backgrounds of learners.

The integration of technology is a prominent aspect of modern pedagogy, offering numerous advantages such as personalized learning experiences and enhanced student engagement. However, challenges persist, including issues of access, privacy, and the potential for screen fatigue, which educators must navigate to create balanced and effective learning environments.

The debate surrounding the implementation of technology in education raises important questions about how best to leverage digital tools while maintaining the essence of traditional teaching practices.

Overall, the methodology of modern pedagogy reflects a commitment to creating equitable and dynamic learning experiences that empower all students. By embracing innovative strategies and addressing the complexities of the contemporary educational landscape, educators aim to cultivate environments where learners can thrive academically and personally.

Theoretical Frameworks

Modern pedagogy encompasses a variety of theoretical frameworks that guide educational practices and inform the development of learning environments. These frameworks help educators and stakeholders understand the complexities of teaching and learning, providing a foundation for effective educational strategies.

Key Frameworks in Education

Scaling Access and Impact

The Scaling Access and Impact model serves as an ecosystem approach for government stakeholders, such as ministries of education and philanthropic capital providers. This framework aims to enhance the understanding of how to support access to and utilization of educational technology (EdTech) effectively [1].

The Adolescent Community of Engagement (ACE) Framework

The ACE Framework focuses on the design and creation of online learning environments specifically for adolescents. It is built around four key constructs: student engagement, teacher engagement, peer engagement, and parent engagement, emphasizing the importance of a supportive community in the learning process [1].

Behaviorism and Cognitivism

Behaviorism and cognitivism are foundational theories that have significantly influenced modern educational practices. Behaviorism is centered around the idea of observable behaviors and reinforcement, positing that knowledge is an external construct that learners acquire through interaction with stimuli [2]. In contrast, cognitivism emphasizes the internal processes of learning, suggesting that students actively process information, leading to behavior changes that reflect deeper understanding [2].

Constructivism

Constructivism posits that learners construct their own understanding and knowledge of the world through experiences and reflection. This theory encompasses various types, including cognitive constructivism, which focuses on individual exploration, and social constructivism, which emphasizes collaboration and cultural context in learning [3]. This approach places students at the center of the learning process, promoting active engagement and ownership of their educational journeys.

Blended Learning Frameworks

Blended learning frameworks, such as the CABLS framework, focus on the dynamic interplay between content, learners, technology, and other components of the educational system. This systems approach aids educators in creating effective blended learning environments by considering how these elements interact [4]. Additionally, the Community of Inquiry framework provides a structure for inquiry-based teaching and learning in online or blended settings, emphasizing the importance of social, cognitive, and teaching presence in fostering a rich educational experience [4].

Teaching Strategies

Teaching strategies in modern pedagogy focus on student-centered approaches that promote active engagement and independent learning. These strategies are designed to cultivate critical thinking, collaboration, and problem-solving skills among students, preparing them for real-world challenges.

Student-Centered Learning Approaches

Project-Based Learning (PBL)

Project-Based Learning involves students working on real-world problems or projects that require them to apply their knowledge in practical situations. This hands-on approach encourages students to collaborate, think critically, and engage deeply with the subject matter, making the learning process more relevant and meaningful.

Active Learning

Active learning shifts the focus from passive reception of information to active participation. Techniques such as group discussions, problem-solving sessions, and role-playing are common in this approach. Students are encouraged to analyze, synthesize, and evaluate content actively, leading to a deeper understanding of the material.

Inquiry-Based Learning

In Inquiry-Based Learning, students are prompted to ask questions and explore topics through investigation rather than being given direct answers. This method encourages curiosity and critical thinking, fostering a sense of ownership over their learning process [7].

Collaborative Learning

Collaborative learning emphasizes the importance of working together. Students engage in group projects or peer teaching, allowing them to learn from one another's perspectives and build a supportive classroom community. This collaboration enhances their understanding and retention of the material.

Innovative Teaching Techniques

Socratic Seminars

Socratic Seminars promote critical thinking and dialogue among students by using open-ended questions that require thoughtful responses backed by evidence. This method develops leadership qualities and prepares students for real-life discussions and decision-making [5].

Interactive Presentations

Interactive presentations incorporate elements such as live polls and discussions, encouraging students to participate actively during lessons. This technique enhances engagement and prevents passive learning, making the classroom experience more dynamic [5].

Reflective Journaling

Reflective journaling is an exercise where students regularly write about their learning experiences, goals, and areas for improvement. This practice encourages self-reflection and personal growth, helping students to identify their learning needs and achievements [5].

Differentiated Instruction

Differentiated instruction acknowledges that students learn at different rates and through various methods. Teachers adapt their content, pace, and instructional techniques to accommodate diverse learning styles, ensuring that all students have the opportunity to succeed [7].

Choice-Based Learning

Choice-Based Learning empowers students by allowing them to select topics or projects that interest them. This autonomy fosters intrinsic motivation and engagement, leading to more personalized and meaningful learning experiences [5].

Assessment Methods

Assessment in modern pedagogy has evolved significantly, incorporating a variety of methods to cater to diverse learning needs and styles. Traditional testing methods are increasingly being supplemented or replaced by more innovative approaches that emphasize student engagement and real-time feedback.

Formative Assessment

Formative assessment is a crucial aspect of the learning process, allowing educators to gauge student understanding and adjust instruction accordingly. Tools such as Socrative enable teachers to create engaging, quiz-based assessments that provide immediate feedback on student comprehension. Similarly, platforms like Kahoot! and Google Forms facilitate interactive quizzes and exit tickets, offering insights into student learning in real-time.

Alternative Assessment Methods

Modern educators are encouraged to consider alternative assessment options beyond traditional paper-based tests. These alternatives include oral presentations, visual art representations, and the use of student notes during assessments [6]. Such diverse assessments recognize the varied abilities and preferences of learners, ensuring a more inclusive evaluation process [5].

Constructivist Assessment Strategies

Constructivist classrooms prioritize assessment methods that foster critical thinking and problem-solving skills. Approaches such as project-based assessments, peer reviews, and self-assessments allow students to reflect on their learning processes and outcomes [3]. This shift towards authentic tasks not only enhances student engagement but also provides teachers with a comprehensive understanding of student progress and needs.

Technology-Enhanced Assessment

The integration of technology in assessment practices has further transformed the landscape of education. Teachers are encouraged to select technology tools that align with specific learning objectives, allowing for a purposeful integration of digital resources in the classroom. This can include the use of digital portfolios to track student growth over time or analytics tools that provide insights into student engagement with digital content. By incorporating these technologies, educators can better differentiate instruction and support varied learning paths within their classrooms.

Technology in Modern Pedagogy

Modern pedagogy increasingly incorporates technology to enhance the learning experience and cater to individual student needs. The integration of digital tools and data analytics allows educators to tailor instruction, making learning more engaging and personalized for students. Digital pedagogy focuses on the effective use of digital technologies in teaching, encouraging educators to reflect on their approaches and design instructional methods that leverage these tools effectively.

Benefits of Technology Integration

Integrating technology in the classroom offers several significant advantages. These include increased student engagement, personalized learning opportunities, and improved collaboration among students.

Digital tools, such as learning management systems, educational apps, and video conferencing platforms, support diverse teaching methods and facilitate interactive learning experiences through multimedia content.

This interactivity not only enhances understanding but also fosters a more dynamic and engaging classroom environment, transforming students from passive recipients to active participants in their learning journey.

Challenges and Considerations

While the benefits of technology are substantial, there are challenges to consider. Issues such as equitable access to technology, privacy concerns, and potential screen fatigue must be addressed to ensure a balanced approach to learning[7].

Moreover, educators need to critically evaluate new technologies to determine their effectiveness in meeting educational goals and supporting desired outcomes. Cybersecurity is another critical concern, as schools face risks of cyberattacks that can compromise sensitive student data.

Implementation Strategies

Successful integration of technology in modern pedagogy requires careful planning and ongoing professional development for teachers. Strategies such as blended learning—combining traditional and online learning—can create a more flexible educational experience that accommodates diverse learning preferences.

Additionally, starting with a few digital tools and gradually expanding their use can help educators and students acclimate to new technologies without feeling overwhelmed. Ultimately, technology should serve as a bridge to learning, enhancing instructional practices while still valuing traditional, hands-on educational experiences.

Inclusive Pedagogy

Inclusive pedagogy aims to create equitable learning environments by recognizing and addressing the diverse needs of all students. It emphasizes the importance of understanding cultural differences and implementing strategies that promote a sense of belonging and engagement among learners from varied backgrounds.

Fostering a Positive Classroom Climate

A key component of inclusive pedagogy is fostering a positive classroom climate. According to the Center for Teaching and Learning at Columbia University, the classroom environment can be categorized into four types, including explicitly marginalizing spaces, where students from marginalized backgrounds may feel excluded due to negative interactions or microaggressions.

In contrast, inclusive classrooms prioritize open dialogue, respect, and the recognition of each student as an agent in their own learning process. As Paulo Freire argues in "Pedagogy of the Oppressed," education should empower marginalized communities to challenge and liberate themselves from systemic oppression.

Strategies for Inclusive Teaching

To support inclusive teaching practices, educators can implement several strategies, such as:

- **Integrating Diverse Content:** Curriculum should reflect the diversity of the student body and the wider world. This approach allows learners to see themselves represented in the material, fostering engagement and cultural competence.
- **Creating Safe Learning Environments:** Teachers must strive to establish classrooms where open discussions are encouraged, enabling students to express their thoughts and experiences without fear of judgment .
- **Culturally Responsive Practices:** Gay (2002) outlines four strategies for culturally responsive pedagogy, which include developing knowledge about cultural diversity, designing culturally relevant curricula, honing cross-cultural communication skills, and demonstrating care for students' well-being [8].

Addressing Bias and Equity

Critical pedagogy serves as a theoretical foundation for inclusive teaching by examining issues of power and bias within educational settings. By acknowledging and addressing these biases, educators can develop more equitable practices that enhance student engagement and learning outcomes [8]. Additionally, integrating discussions on diversity and equity throughout the curriculum ensures these topics are treated authentically, rather than as mere addendums to the primary content [8]. Ultimately, inclusive pedagogy seeks to transform educational spaces into inclusive environments where all learners can thrive, encouraging not only academic success but also personal growth and empowerment [8].

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18.

PSYCHOLOGICAL FACTORS THAT INFLUENCE THE FORMATION OF DESTRUCTIVE BEHAVIOR

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Annotation.
Destructive behavior, characterized by actions that cause harm to oneself or others, is influenced by a myriad of psychological factors that shape individual responses and interactions within various contexts. Understanding these factors is crucial as destructive behavior poses significant challenges to mental health, social relationships, and community well-being. The interplay between emotional regulation, cognitive distortions, social identity, and environmental influences creates a complex landscape that contributes to the emergence and persistence of such behaviors. Psychodynamic theories emphasize the role of unconscious processes and emotional regulation in shaping behavior, suggesting that unresolved emotions and defenses may lead to destructive actions. Conversely, cognitive-behavioral approaches focus on how distorted thought patterns can perpetuate negative behaviors, advocating for cognitive restructuring as a means of fostering healthier responses. Additionally, social identity theory highlights the impact of group dynamics, where individuals may adopt harmful behaviors in alignment with group norms, thereby illustrating how social contexts can exacerbate personal tendencies towards destruction. The influence of individual factors, such as emotional dysregulation, childhood adversities, and genetic predispositions, further complicates the understanding of destructive behavior. For example, individuals with a history of adverse childhood experiences (ACEs) are at heightened risk for engaging in self-destructive actions, as these experiences often disrupt emotional regulation and lead to maladaptive coping mechanisms. Meanwhile, contextual factors—including environmental stressors and social influences—also play a critical role, as factors like poverty, community violence, and family dynamics significantly shape behavioral outcomes. Controversies surrounding the topic often revolve around the balance between nature and nurture in the development of destructive behavior, as well as the effectiveness of various intervention strategies. While some argue for the predominance of genetic factors, others highlight the critical role of environmental influences and trauma. Addressing these multifaceted factors through comprehensive prevention and intervention strategies is essential for mitigating destructive behavior and promoting healthier coping mechanisms across diverse populations.
Keywords: education, effectiveness, development, intervention strategies, intervention strategies, environmental influences, psychodynamic, cognitive, individual factors, emotional dysregulation.

Theoretical Frameworks

Psychodynamic Theories

Psychodynamic theories provide a foundational understanding of the emotional undercurrents that contribute to destructive behavior. In this framework, the concept of Experiential-Dynamic Emotion Regulation (EDER) is particularly significant. EDER emphasizes the importance of experiencing and processing emotions rather than suppressing them through cognitive strategies. According to psychodynamic therapists, patients are encouraged to confront their feelings, which can often lead to excessive anxiety or dysregulated defenses that manifest as symptoms (Davanloo, 1990; Coughlin della Selva, 1996). This approach posits that unconscious defenses are at the root of psychological symptoms, and by facing these feelings, individuals can begin to integrate their cognitive and affective experiences (Hartmann, 1964; Abbass, 2006; 2015).

Cognitive-Behavioral Approaches

Cognitive-behavioral theories also play a crucial role in understanding destructive behaviors. Cognitive restructuring is a key method within this framework, focusing on identifying and challenging distorted thoughts that contribute to negative actions. The process involves several steps: self-monitoring thoughts, questioning assumptions, gathering evidence, and performing a cost-benefit analysis of maintaining negative thought patterns. These techniques help individuals reshape their perspectives and reduce harmful behaviors rooted in cognitive distortions (Fassbinder et al., 2016). By addressing the interplay between thoughts, emotions, and behaviors, cognitive-behavioral approaches facilitate the development of healthier coping mechanisms.

Social Identity Theory

Social identity theory offers additional insight into the factors that influence behavior within group contexts. Developed by Henri Tajfel and John Turner in the 1970s, this theory suggests that individuals derive part of their identity from the groups they belong to. The dynamics of group identification can significantly affect individual behavior, potentially leading to destructive actions when group norms prioritize aggression or hostility (Le Bon, 1895). Modern research indicates that individuals can be influenced to behave in ways that are inconsistent with their character under certain circumstances, highlighting the psychological forces at play in group settings (Goodnight et al., 2007).

Behavioral Theories

Behavioral theories, including operant conditioning, focus on the reinforcement of behaviors and the strategies employed to modify them. These approaches emphasize the importance of rewards in strengthening desirable behaviors while minimizing negative behaviors through lack of reinforcement. Techniques such as habit reversal therapy (HRT) have been used to address specific maladaptive behaviors, providing structured interventions that facilitate behavioral change (Robertson et al., 2004). Understanding these behavioral patterns is essential for developing effective interventions aimed at curbing destructive behavior in various contexts, including clinical and educational settings. Through these theoretical frameworks, a comprehensive understanding of the psychological factors influencing destructive

behavior emerges, illustrating the complex interplay between emotions, cognition, social identity, and behavior.

Individual Factors

Individual factors play a significant role in the formation of destructive behavior, influenced by a complex interplay of genetic, psychological, and emotional components.

Emotional Dysregulation

Emotional dysregulation is a core feature contributing to various destructive behaviors. It refers to the difficulties individuals face in managing their emotional responses, which can lead to impulsivity and mood instability. For instance, individuals with attention-deficit/hyperactivity disorder (ADHD) often experience heightened emotional intensity and global difficulty in adapting their emotional state to situational demands[1]. Mood swings and impulsivity are hallmark signs of emotional dysregulation, where individuals may act without considering the consequences, engaging in behaviors such as substance abuse or self-harm[2].

Childhood Adversities

The impact of childhood adversities on adult behavior is well-documented. Research indicates that a significant proportion of adults have experienced adverse childhood experiences (ACEs), including various forms of abuse and neglect. These experiences are linked to an increased risk of engaging in risky behaviors and the development of mental health disorders such as depression and anxiety[3]. For example, individuals with a history of four or more ACEs are at a greater risk for conditions like alcoholism and suicidal behavior[3]. The emotional consequences of these adversities can lead to profound challenges in emotion regulation throughout life.

Genetic and Environmental Influences

Genetic predispositions also contribute to emotional dysregulation. Specific genetic variations, such as those in the 5-HTTLPR gene polymorphism, have been associated with traits that heighten the risk of emotional dysregulation[2]. However, genetics alone do not dictate behavior; environmental factors, including familial relationships and learned coping strategies, play a crucial role in shaping emotional responses. The psychological climate within families, for example, can significantly influence an individual's behavioral outcomes, making supportive environments critical for healthy emotional development[4].

Personality Traits and Relationships

Personality traits and interpersonal relationships further contribute to the propensity for destructive behaviors. Factors such as insecure attachment styles and difficulties in maintaining relationships are closely linked to emotional dysregulation and aggression[5].

Individuals who struggle with these aspects may react with aggression in response to stress, frustration, or feelings of being unheard[6]. Moreover, exposure to violence during formative years can reinforce aggressive behavior patterns, as individuals may emulate the aggressive responses observed in their environments[6].

Trauma and PTSD

For individuals with a history of trauma, particularly childhood trauma, the effects can manifest in complex post-traumatic stress disorder (PTSD). In such cases, emotional responses may be disconnected from the traumatic narrative, leading to challenges in identifying triggers and potentially misinterpreting emotional flashbacks as panic attacks[7]. This dissociation can create a further barrier to effective emotional regulation, resulting in maladaptive coping mechanisms and the continuation of a cycle of destructive behavior[7].

Environmental Factors

Environmental factors play a crucial role in shaping individual behavior and psychological well-being, particularly during childhood. Adverse environmental conditions, including exposure to violence, poverty, and neglect, can significantly contribute to the development of destructive behaviors later in life.

Toxic Stress

Toxic stress, which arises from prolonged exposure to adverse childhood experiences (ACEs), can severely impact brain development and emotional regulation. Children subjected to toxic stress may encounter challenges in forming healthy relationships, experiencing job stability, and managing financial responsibilities as adults[8]. This stress can also lead to mental health issues such as anxiety and depression, affecting their overall quality of life[3][9].

Family Dynamics

Family environments marked by conflict, instability, or neglect can exacerbate the risks associated with ACEs. Factors such as single parenthood, maternal depression, and food insecurity can place additional strains on children, compounding the effects of adversity[3]. Moreover, exposure to violent crime or gang activity within a community can further undermine a child's sense of safety, leading to heightened stress responses and maladaptive coping mechanisms[3][10].

Neighborhood Context

Living in under-resourced neighborhoods can also contribute to toxic stress, as limited access to educational and economic opportunities often correlates with higher rates of crime and instability[8].

This environment not only impacts immediate psychological health but can also create intergenerational cycles of adversity, as children raised in such settings may replicate the patterns of behavior and emotional dysregulation they observed in their upbringing[11].

Psychological Legacy

The interplay between early environmental experiences and adult behavior underscores the importance of addressing environmental factors in psychological interventions. Recognizing the psychological legacies of childhood experiences can empower individuals to break free from harmful cycles and promote resilience through therapeutic approaches and supportive community structures[11][12]. Thus, understanding the environmental influences on behavior is vital for developing effective prevention strategies and interventions for destructive behaviors.

Developmental Factors

Developmental factors play a crucial role in shaping behavior patterns and mental health outcomes throughout an individual's life. Early childhood experiences, including both positive and negative influences, significantly impact a person's social, emotional, and cognitive development, which can lead to destructive behaviors in adulthood if not addressed properly.

Impact of Early Experiences

The formative years of a child are vital in establishing emotional foundations and behavioral patterns. Children exposed to adverse experiences, such as physical or emotional abuse, neglect, or household dysfunction, may develop emotional dysregulation and maladaptive coping strategies[13][10]. Studies indicate that these adverse childhood experiences (ACEs) can lead to toxic levels of stress that harm brain development, influencing lifelong health and behavioral outcomes[14][15]. Moreover, children who face such challenges may struggle with forming secure attachments, which can affect their future relationships and overall emotional resilience[11].

Role of Parenting Styles

Parenting styles and the intergenerational transmission of behaviors also significantly contribute to the development of destructive behavior. Parents often replicate the methods they experienced in their own childhood, perpetuating cycles of negative behavior[11][15]. For example, physical discipline employed by parents may correlate with externalizing problems in children, leading to lower literacy and increased risk of behavioral issues over time. Conversely, supportive and sensitive parenting can mitigate the adverse effects of challenging early experiences, providing children with the emotional safety they need to thrive[13].

Emotional Regulation and Mental Health

The ability to regulate emotions is often compromised in individuals who have faced early trauma. Stressful or life-altering events can sensitize the central nervous system, leading to ongoing emotional dysregulation that may persist into adulthood[10]. This emotional instability is frequently linked to higher risks of developing mental health disorders and substance abuse issues later in life, especially in those with multiple ACEs[15].

Consequently, understanding the interplay between early experiences, emotional regulation, and mental health is critical in addressing and preventing destructive behaviors in adults.

Contextual Factors

The formation of destructive behavior is significantly influenced by various contextual factors that encompass an individual's immediate environment and past experiences. These factors include emotional regulation, social influence, and the dynamics of group settings, all of which can interplay to exacerbate or mitigate destructive tendencies.

Emotional Regulation

Emotional regulation is a dynamic and multifaceted process critical for managing one's emotional experiences and expressions. It involves both conscious strategies, such as actively calming oneself, and unconscious processes that occur automatically, such as feeling relief after taking a deep breath.

A lack of effective emotional regulation can lead to maladaptive behaviors, including substance abuse and self-harm, especially in individuals with histories of trauma.

For instance, childhood trauma can disrupt the development of brain structures involved in emotional regulation, resulting in an overactive amygdala and an underdeveloped prefrontal cortex, which together contribute to persistent emotional dysregulation into adulthood.

Group Dynamics and Social Influence

The context of social interactions plays a crucial role in shaping behavior. Group dynamics can exert considerable influence on individual actions through mechanisms such as conformity, obedience, and compliance. These influences are often intensified in high-stakes environments where there is a strong pressure to adhere to group norms or expectations.

For instance, strategies such as isolation from external support systems and manipulation of information can severely affect an individual's capacity for emotional regulation and increase vulnerability to destructive behaviors. Studies indicate that prolonged exposure to such dynamics can result in the internalization of harmful beliefs, leading to the glorification of the ingroup and vilification of outgroups, which are hallmarks of indoctrination in extreme environments.

Psychological Trauma

The impact of psychological trauma, particularly in childhood, cannot be overstated in its relation to destructive behaviors. Trauma often leads to reactive attachment disorders, where the ability to form healthy emotional connections is compromised.

As a result, individuals may struggle with emotional dysregulation, which manifests in various self-destructive behaviors. This cycle of trauma and maladaptive coping strategies is frequently exacerbated by environmental factors such as emotional neglect or abuse from caregivers, further entrenching the individual's challenges in emotional regulation and behavior control.

Understanding these contextual factors is vital for developing effective interventions aimed at reducing destructive behaviors. Recognizing the interplay between emotional regulation, social influence, and past trauma can lead to more holistic approaches in treatment and support strategies for affected individuals.

Case Studies and Real-world Examples

Psychological Abuse Strategies

The proposed classifications of psychological abuse strategies can provide valuable insights into the formation of destructive behavior. These classifications are primarily based on four viewpoints: (a) the integration stage of the subject within the group, (b) the specific type of strategy employed, (c) the degree of coercion involved, and (d) personal or situational components that the strategies target.

Understanding these classifications can aid in identifying the circumstances that lead to psychological abuse, which often correlates with destructive behaviors in individuals.

Legal Implications

In legal settings, the absence of precise concepts surrounding the distinction between legitimate influence and psychological abuse complicates matters.

A taxonomy of psychological abuse can assist legal professionals in recognizing and categorizing abusive practices, potentially impacting legal claims and the evolution of criminal law pertaining to psychological harm. This is particularly crucial for forensic experts tasked with assessing the relationship between the abusive actions and the resulting injuries through clinical evaluations.

Observational Studies

Empirical research exploring triggers and underlying drivers of destructive behavior often utilizes detailed case studies that illustrate observable behaviors in different contexts. For instance, situations characterized by ambiguity, such as witnessing a potentially threatening interaction in public, highlight how bystanders' inaction can lead to further destructive outcomes, a phenomenon known as pluralistic ignorance. Observational studies help unpack these dynamics, revealing the psychological factors that can lead to inaction or harmful group behaviors.

Historical Context

The historical examination of crowd behavior provides real-world examples of how psychological factors can contribute to destructive behavior on a large scale. Events such as the French Revolution and the Los Angeles riots demonstrate that a norm of violence can emerge within crowds under certain conditions. An identifiable precipitating event often catalyzes this shift, suggesting that psychological readiness to conform to group norms can lead to significant societal repercussions.

Contemporary Application

In contemporary settings, organizations such as the Behavior Analyst Certification Board (BACB) and the National Association of School Psychologists (NASP) provide frameworks and training modules that address disruptive behaviors in various environments. Implementing evidence-based programs, such as Parent-Child Interaction Therapy (PCIT) and Parent Management Training (PMT), demonstrates practical approaches to mitigate destructive behaviors by focusing on positive reinforcement and communication strategies. These programs highlight how understanding psychological factors can inform effective interventions in both educational and clinical settings. By analyzing these case studies and real-world examples, it becomes clear that the interplay of psychological factors significantly influences the formation and manifestation of destructive behavior across different contexts.

Prevention and Intervention

Preventing and intervening in destructive behaviors require a multifaceted approach that considers both individual and familial dynamics. Disciplinary interventions are essential to ensure the safety of young children, manage aggression, and prevent destructive behaviors. Techniques such as removing the child or the triggering object can serve immediate protective purposes. However, effective intervention strategies must extend beyond reactive measures.

Family-Based Interventions

Research indicates that interventions focusing solely on either parents or children may not adequately disrupt the feedback loop that perpetuates poor parenting styles, dysfunctional family dynamics, and children's disruptive behaviors. Family-based interventions, which involve both parents, are crucial, as both parents are often significantly affected by their children's behavioral issues. Such interventions should target the functioning of the entire family system to foster healthier interactions and improve outcomes for children.

Early Intervention Programs

Implementing early intervention programs is vital, especially for children around the age of four, who show clear impairments related to behavioral issues. Parenting programs and targeted interventions can preemptively address challenges, potentially mitigating the effects of toxic stress that may lead to developmental delays. A comprehensive public health approach, which includes universal primary prevention strategies like social-emotional learning in schools, can equip children with resilience skills to cope with adversity effectively.

Therapeutic Techniques

Therapeutic approaches, particularly Cognitive Behavioral Therapy (CBT), play a significant role in addressing destructive behaviors. CBT focuses on identifying and reshaping negative thought patterns that contribute to disruptive behaviors. This includes techniques like self-monitoring, questioning assumptions, and conducting cost-benefit analyses of maintaining harmful thought patterns. Therapists help clients recognize emotional triggers and develop healthier responses, enhancing impulse control and social problem-solving skills through practical exercises.

Emotion Regulation and Family Therapy

Developing emotion regulation skills is another critical element of therapy. Techniques such as relaxation exercises, cognitive restructuring, and problem-solving enhance individuals' abilities to manage their emotional responses. Family therapy, alongside structured behavioral interventions like Parent Management Training (PMT), promotes positive communication and consistent discipline within families, thereby reducing environmental stressors that may trigger aggression.

Long-Term Support and Recovery

For individuals who have experienced trauma or persistent behavioral issues, ongoing support through therapy can be pivotal. Trauma-informed care allows clients to process their experiences, develop coping strategies, and rebuild their sense of self. Therapies such as dialectical behavior therapy (DBT) and eye movement desensitization and reprocessing (EMDR) are effective for addressing trauma-related disorders and fostering resilience. Overall, a holistic approach that combines family involvement, early intervention, and therapeutic strategies is essential for effectively preventing and intervening in destructive behaviors.

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ONOMATOPOEIA PHENOMENON IN ENGLISH AND UZBEK FICTION

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Abstract: This study investigates the onomatopoeia phenomenon in English and Uzbek fiction. The study further explores the phonetic, semantic, and stylistic characteristics of onomatopoeic expressions in both languages. While English onomatopoeic forms tend to be concise and structurally simple, Uzbek forms often display morphological complexity and expressive variation. Despite these differences, both languages employ onomatopoeia as an effective stylistic device to engage readers, evoke sensory experiences, and reinforce the aesthetic value of fictional texts. The findings of this comparative analysis demonstrate that onomatopoeia serves not only as a means of sound imitation but also as a powerful artistic tool shaped by linguistic structure and cultural context. Understanding the similarities and differences in the use of onomatopoeia in English and Uzbek fiction contributes to broader studies in stylistics, comparative linguistics, and literary translation.
Key words: *onomatopoeia, stylistics, comparative linguistics, literary translation, onomatopoeic units, folklore, narratives.*

Onomatopoeia - i.e., imitative words - is one of such living language units, which serve as a bridge between language and culture, speech and thought. Imitative words (onomatopoeic units) appear as a form of speech expression of external real phenomena, such as sound, noise, movement, state. They are an embodiment of human speech, actively participate in the creation of images of a phonetic, stylistic and mental nature.

Speaking about the linguocultural significance of onomatopoeia, the following can be mentioned. First, national mentality and cultural images: onomatopoeia expresses a cultural feeling, mood, and worldview through language-specific sound images. For example, through words that imitate sounds heard in nature, the speaker of the language brings his environment to life in his speech. This, in turn, reflects the respect, knowledge, and imagination of the culture for nature, animals, and movements.

Onomatopoeia refers to words whose sounds resemble the sounds they describe. These may imitate:

- Sounds of nature (rain, wind, animals);
- Human sounds (laughter, crying);

- Mechanical or sudden sounds (explosions, impacts).

Example:

- English: *buzz, bang, splash;*
- Uzbek: *g‘uvillamoq, qarsillamoq.*

We will consider a comparative analysis of imitative word forms and structural features of the Uzbek language with the Ingiz language. In the Uzbek language

• Imitative words for sound: words such as “inga-inga”, “pixpix”, “vov”, “uv”, “qag‘-qag‘”, “taq”, “gurs”, “gumbur”.

• Imitative words for action and state: repetitive or rhythmic structures such as “yalt”, “lip”, “lik-lik”, “yalp-yalp”, “bij-bij”.

• Idiomatic and repetitive forms: Idiomatic forms convey the meaning of continuity or repetition (“lip-lip”, “g’ir-g’ir”).

• Location (context): In Uzbek, idiomatic words are most often found in colloquial speech, folklore, children's speech, and everyday communication.

In English

• In English, onomatopoeias are often short, local (isolated) forms: such as “pop”, “bang”.

• Stylistically, they are widely used in advertising, children's literature, cartoons, and texts that create a serious or dramatic effect.

• Morphologically, onomatopoeias in English are usually considered as interjections (closely related to the meaning of an exclamation) or as independent words.

In English fiction, onomatopoeia is widely used to create dynamic scenes. For example, *the door creaked open.*

Apart from this, onomatopoeia is used to enhance realism. In this example we can see this phenomenon: The bees buzzed in the garden.

Furthermore, onomatopoeia is used to express emotions and actions vividly. For instance, *water splashed onto the floor.*

English onomatopoeic words are often short and phonetically expressive. They are especially common in children’s literature, comics, poetry, and modern novels.

Uzbek fiction also makes rich use of onomatopoeia, particularly in:

- Folklore and oral narratives;
- Descriptions of nature;
- Emotional and dramatic scenes;

Examples from Uzbek fiction:

- *Yomg‘ir tomchilari shildir-shildir yog‘ardi.*
- *Eshik qars yopildi.*
- *Shamol g‘uvillab esardi.*

Uzbek onomatopoeia often uses repetition (reduplication) to intensify meaning, which is a distinctive stylistic feature of the language.

There a few similarities and differences between the onomatopoeia phenomenon in English and Uzbek languages. The first difference is the word structure. While onomatopoeia phenomenon is expressed in mostly simple forms in English fiction, it is often reduplicated in Uzbek language. Second difference is its usage. It is common in modern fiction in English language, but it is common in fiction and folklore in Uzbek language. Another difference is expressiveness of onomatopoeia phenomenon. On the one hand, direct sound imitation is used in English fiction, on the other hand, not only sound but also emotional coloring is used in Uzbek Fiction. Last one is cultural influence: natural sounds are described in English fiction, while nature-based imagery is used in Uzbek fiction. Despite differences, both languages use onomatopoeia to make fiction more expressive and engaging.

In both English and Uzbek fiction, onomatopoeia serves several stylistic purposes:

- Enhances imagery and realism
- Creates emotional impact
- Brings readers closer to the scene
- Adds rhythm and sound symbolism to the text

Writers use it to “make the reader hear” what is happening in the story. The phenomenon of onomatopoeia is an important expressive device in both English and Uzbek fiction. While the specific forms and phonetic patterns differ, the core function remains the same: to vividly represent sounds and enhance artistic expression. Studying onomatopoeia comparatively helps us better understand the linguistic and cultural uniqueness of each language.

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FUTBOL SPORT TURINI O'ZBEKISTONDA RIVOJLANISHI

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ANOTATSIYA: Mazkur ilmiy maqolada futbol sport turining O'zbekiston hududida shakllanishi, rivojlanish bosqichlari va hozirgi kundagi o'rni tizimli ravishda tahlil qilinadi. Tadqiqotda futbolning XX asr boshlarida kirib kelishi, sovet davridagi rivoji, mustaqillik yillarida futbol tizimida amalga oshirilgan islohotlar, milliy chempionatlar, professional klublar faoliyati hamda O'zbekiston futbol terma jamoalarining xalqaro maydondagi ishtiroki yoritilgan. Shuningdek, futbol infratuzilmasining rivojlanishi, bolalar va o'smirlar futboliga e'tibor kuchayishi hamda davlat siyosatida sport, xususan futbolning tutgan o'rni ilmiy asosda tahlil qilinadi. Maqola sport sohasi tadqiqotchilari, mutaxassislar va talabalar uchun mo'ljallangan.

Kalit so'zlar : Futbol, sport, O'zbekiston, futbol tarixi, milliy chempionat, sport islohotlari.

Аннотация В данной научной статье проводится системный анализ становления и развития футбола в Республике Узбекистан, а также его роли в современном обществе. Рассматриваются этапы проникновения футбола на территорию страны в начале XX века, его развитие в советский период и коренные преобразования в годы независимости. Особое внимание уделяется формированию национальных чемпионатов, деятельности профессиональных футбольных клубов, участию сборных команд Узбекистана в международных соревнованиях, а также развитию спортивной инфраструктуры и детско-юношеского футбола. Анализируется значение государственной политики в развитии футбольного спорта. Статья предназначена для специалистов в области физической культуры и спорта, а также для студентов и исследователей.

Ключевые слова: футбол, спорт, Узбекистан, история футбола, национальный чемпионат, спортивные реформы.

Futbol bugungi kunda dunyodagi eng ommaviy va ijtimoiy ahamiyatga ega sport turlaridan biri hisoblanadi. Uning jismoniy tarbiya, sog'lom turmush tarzini shakllantirish, yoshlarni vatanparvarlik va jamoaviylik ruhida tarbiyalashdagi o'rni beqiyosdir. O'zbekistonda futbol sportining shakllanishi va rivojlanishi tarixiy, ijtimoiy-siyosiy hamda iqtisodiy omillar bilan chambarchas bog'liq bo'lib, mazkur jarayon bir necha bosqichlarda amalga oshgan.

Futbol O'zbekiston hududiga XX asr boshlarida kirib kelgan bo'lib, dastlab yirik shaharlarda, xususan Toshkent, Samarqand va Farg'ona vodiysi hududlarida ommalasha boshlagan. Dastlabki yillarda futbol havaskorlar darajasida rivojlangan bo'lsa-da, vaqt o'tishi bilan sport klublari, jamoalar va musobaqalar shakllana boshladi. 1920–1930-yillarda futbol jismoniy tarbiya tizimining muhim tarkibiy qismiga aylanishi natijasida respublika miqyosida musobaqalar tashkil etildi. Sovet davrida futbol O'zbekistonda tizimli ravishda rivojlandi. Sport jamiyatlari va maktablar faoliyati kengaytirildi, malakali murabbiylar tayyorlashga e'tibor kuchaydi. Aynan shu davrda "Paxtakor" futbol jamoasi tashkil etilib, u sobiq Ittifoq miqyosida yuqori natijalarga erishdi. Bu holat futbolning

ommaviylashuviga, yoshlar orasida mazkur sport turiga bo‘lgan qiziqishning ortishiga ilmiy-pedagogik asos bo‘lib xizmat qildi. O‘zbekiston mustaqillikka erishgach, futbol sporti rivojida yangi bosqich boshlandi. 1992-yilda O‘zbekiston Futbol Federatsiyasining tashkil etilishi va xalqaro futbol tashkilotlari – FIFA hamda OFKga a’zo bo‘lishi mamlakat futbolini jahon sport tizimiga integratsiya qilish imkonini berdi. Milliy terma jamoalar, professional klublar va ichki chempionatlar tizimi shakllantirildi. Bu jarayon sportni boshqarishning zamonaviy modellari, ilmiy-metodik yondashuvlar va xalqaro tajriba asosida amalga oshirildi. So‘nggi yillarda davlat siyosati darajasida futbolni rivojlantirishga alohida e’tibor qaratilmoqda. Prezident qaror va farmonlari asosida futbol infratuzilmasini modernizatsiya qilish, bolalar va o‘smirlar futbol maktablarini rivojlantirish, seleksiya tizimini takomillashtirish kabi masalalar belgilab olindi. Bu jarayon sport fiziologiyasi, pedagogika va sport psixologiyasi kabi fanlarning ilmiy yutuqlariga tayangan holda olib borilmoqda. Ayniqsa, yoshlar futboliga qaratilgan e’tibor O‘zbekistonda futbol rivojining ilmiy asoslanganligini ko‘rsatadi. Iqtidorli yoshlarni aniqlash, ularni bosqichma-bosqich tayyorlash, mashg‘ulot jarayonida individual yondashuvni qo‘llash kabi tamoyillar zamonaviy sport ilmiga asoslanadi. Natijada O‘zbekiston yoshlar va o‘smirlar terma jamoalari Osiyo va jahon miqyosida salmoqli yutuqlarga erishmoqda, futbol sport turining O‘zbekistonda rivojlanishi tarixiy tajriba, davlat qo‘llab-quvvatlovi va ilmiy-metodik yondashuvlar uyg‘unligi asosida amalga oshmoqda. Futbol nafaqat sport natijalari, balki jamiyat salomatligi, yosh avlod tarbiyasi va mamlakatning xalqaro nufuzini oshirishda muhim omil bo‘lib xizmat qilmoqda. Shu bois, O‘zbekistonda futbolni yanada rivojlantirish masalasi strategik ahamiyatga ega ilmiy-amaliy vazifa sifatida dolzarbligini saqlab qolmoqda.

Futbol sportining O‘zbekistonda rivojlanishi nafaqat tarixiy jarayon sifatida, balki murakkab ijtimoiy-pedagogik va ilmiy tizim sifatida qaralishi lozim. Zamonaviy sport nazariyasiga ko‘ra, futbolni rivojlantirish faqat musobaqa natijalari bilan emas, balki infratuzilma, sport ta’limi, ilmiy-tadqiqot ishlari va boshqaruv mexanizmlarining uyg‘unligi bilan belgilanadi. O‘zbekistonda futbol aynan mana shu kompleks yondashuv asosida rivojlanmoqda. Mamlakatda futbol infratuzilmasining rivojlanishi muhim ilmiy-amaliy ahamiyatga ega omil hisoblanadi. So‘nggi yillarda xalqaro talablarga javob beradigan stadionlar, sun’iy va tabiiy qoplamali mashg‘ulot maydonlari, reabilitatsiya va tibbiy-sport markazlari barpo etildi. Ushbu infratuzilma futbolchilarning jismoniy yuklamalarga moslashuvi, jarohatlar profilaktikasi va tiklanish jarayonlarini ilmiy asosda tashkil etish imkonini bermoqda.

Futbolchilarni tayyorlash jarayonida sport fiziologiyasi va biomexanika fanlarining yutuqlari tobora keng qo‘llanilmoqda. Mashg‘ulot jarayonida yurak-qon tomir tizimi ko‘rsatkichlari, tezkorlik, chidamlilik va kuch sifatlari maxsus testlar yordamida baholanadi. Bu esa individual tayyorgarlik rejalarini tuzish va sport natijalarini optimallashtirishga xizmat qiladi. O‘zbekistonda futbol tayyorgarligi tizimiga ilmiy monitoring joriy etilishi sportning sifat jihatdan rivojlanishiga sabab bo‘lmoqda. Bolalar va o‘smirlar futboli O‘zbekistonda futbol rivojining strategik yo‘nalishi sifatida qaralmoqda. Ilmiy tadqiqotlar shuni ko‘rsatadiki, futbolchining texnik-taktik mahorati 7–12 yosh oralig‘ida shakllanadi. Shu boisdan, futbol maktablari va akademiyalarida yoshga mos pedagogik texnologiyalar qo‘llanilmoqda. Mashg‘ulotlar o‘yin faoliyatiga yo‘naltirilgan holda tashkil etilib, bolalarning psixologik holati va motivatsiyasi inobatga olinmoqda. O‘zbekistonda ayollar futbolining rivojlanishi ham muhim ilmiy va ijtimoiy ahamiyatga ega. Gender tenglik tamoyillari asosida ayollar futbol jamoalari, ligalar va terma jamoalar faoliyati kengaymoqda. Ayollar futbolida mashg‘ulot jarayonlari fiziologik xususiyatlarni hisobga olgan holda rejalashtirilmoqda, bu esa sportchilar salomatligini saqlash va natijadorlikni oshirishda muhim rol

o‘ynaydi. Professional futbol klublarida sport menejmenti va marketing tizimlarining joriy etilishi futbolning iqtisodiy barqarorligini ta’minlamoqda. Sponsorlash, media huquqlar, muxlislar bilan ishlash va brending jarayonlari zamonaviy ilmiy konsepsiyalar asosida olib borilmoqda. Bu esa futbolni nafaqat sport, balki iqtisodiy va madaniy hodisa sifatida rivojlantirish imkonini bermoqda. Milliy terma jamoalar faoliyatida texnik-taktik tahlilning raqamli texnologiyalar yordamida amalga oshirilishi muhim yangiliklardan biridir. Videoanalitika, statistik modellar va sun’iy intellekt elementlari o‘yin jarayonini chuqur tahlil qilish, raqiblarni o‘rganish va optimal taktika ishlab chiqishga xizmat qilmoqda. Bu yondashuv futbolning ilmiy asoslangan rivojlanishiga yaqqol misol bo‘la oladi. **XULOSA:** O‘zbekistonda futbol sport turining rivojlanishi murakkab va ko‘p bosqichli jarayon bo‘lib, u tarixiy tajriba, davlat siyosati, ilmiy-metodik yondashuv hamda xalqaro sport tizimi bilan integratsiya asosida shakllanib kelmoqda. Futbolning mamlakat ijtimoiy hayotidagi o‘rni tobora mustahkamlanib, u nafaqat ommaviy sport turi, balki yosh avlodni jismonan sog‘lom, ma’naviy barkamol va raqobatbardosh etib tarbiyalash vositasiga aylanmoqda. Tadqiqot natijalari shuni ko‘rsatadiki, futbol sportining O‘zbekistonda rivojlanishi tizimli yondashuv asosida olib borilmoqda. Jumladan, infratuzilmaning modernizatsiya qilinishi, zamonaviy stadionlar va mashg‘ulot bazalarining barpo etilishi futbolchilarning tayyorgarlik jarayonini ilmiy asosda tashkil etish imkonini bermoqda. Bu holat sport fiziologiyasi, biomexanika va sport tibbiyoti fanlarining amaliyot bilan uzviy bog‘liqligini ta’minlab, futbolchilar sog‘lig‘ini muhofaza qilish va sport natijalarini oshirishga xizmat qilmoqda.

Bolalar va o‘smirlar futboliga qaratilgan e’tibor O‘zbekistonda futbol rivojining strategik yo‘nalishi ekanligi bilan ahamiyatlidir. Ilmiy tadqiqotlar asosida ishlab chiqilgan yoshga mos mashg‘ulot dasturlari, seleksiya va monitoring tizimlari iqtidorli futbolchilarni erta aniqlash va ularni bosqichma-bosqich tayyorlash imkonini yaratmoqda. Natijada, yoshlar terma jamoalarining xalqaro musobaqalardagi muvaffaqiyatlari mamlakat futboli salohiyatining oshib borayotganini tasdiqlaydi. Shuningdek, ayollar futbolining rivojlanishi sportda gender tenglik tamoyillarining amalda qo‘llanilayotganini ko‘rsatadi. Ayollar futboli jamiyatda sog‘lom turmush tarzini shakllantirish, sport orqali ijtimoiy faollikni oshirish va ayollarning sport sohasidagi o‘rnini mustahkamlashda muhim omil bo‘lib xizmat qilmoqda. Bu jarayonlar ilmiy-pedagogik yondashuvlar asosida tashkil etilayotgani bilan alohida ahamiyat kasb etadi.

Professional futbol klublari faoliyatida zamonaviy sport menejmenti va marketing tizimlarining joriy etilishi futbolning iqtisodiy barqarorligini ta’minlashga xizmat qilmoqda. Futbolni boshqarishda raqamli texnologiyalar, statistik tahlil va innovatsion usullarni qo‘llash sportning raqobatbardoshligini oshirib, xalqaro maydondagi natijalarni yaxshilash uchun mustahkam ilmiy-amaliy asos yaratmoqda.

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STUDY OF GEOMETRICAL PROPERTIES OF TWIN COCOONS

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Abstract. This article examines the geometric properties of twin cocoons. The length, diameter, degree of narrowness, and degree of constriction by shape are studied. The maximum length of twin cocoons is 35 mm with an oval shape, while the minimum length is 21.29 mm with a malformed shape. The degree of narrowness in twin cocoons is the lowest for spherical cocoons (1.30). The highest value is for oval cocoons (1.65). The degree of constriction for twin cocoons of different shapes does not exceed one.
Keywords Twin cocoons, oval cocoons, spherical cocoons, malformed cocoons, apex of the cerebral hemisphere, cerebral hemisphere swelling, interception.

Introduction. The silk industry meets the needs of the population and a number of sectors of the national economy for silk products. Its enterprises produce a wide variety of fabrics: the finest silks and heavy suit furs, decorative upholstery fabrics for radios, car and airplane interiors, parachute fabrics, surgical and insulating silks.

The future development of the silk industry envisions a significant increase in production with a sharp increase in labor productivity, renewal and expansion of the product range, improvements in quality, and the economical use of raw materials. Further technical re-equipment of the enterprise is planned by replacing obsolete equipment with new high-performance machines, as well as comprehensive mechanization and other labor-intensive work, and the use of computers for process control.

In cocoon reeling, growth in natural silk production will be achieved through both improved cocoon reeling technology and improved utilization of cocoon raw materials. Increased production capacity is achieved through the construction of new and renovation of existing facilities, particularly with the increase in cocoon harvesting in the Republic. The high cost of natural silk requires finding ways to reduce its cost. This can only be achieved through a significant improvement in cocoon quality.

Cocoons are classified as normal and defective. A normal cocoon is one containing a formed pupa within, with the shape and color characteristic of a given breed or hybrid combination, and a clean, hard, and intact shell without any defects. Defective cocoons are those that differ in the structure, shape, purity, integrity, and structure of the shells characteristic of cocoons of a given breed or hybrid. Defective cocoons include double cocoons, which are cocoons spun by two or more caterpillars. They are spherical or

oval in shape, but can also be malformed if the cocoons are spun by three or more caterpillars.

Double cocoons have a larger volume, a thick, rigid shell, and an unevenly thick and knobby thread. This is explained by the caterpillars laying the thread in different parts of the shell, independently of each other. As a result, the threads become entangled, and when unwound, they come off the shell unevenly and often break.

The main causes of double cocoons are crowding of caterpillars on the cocoon beds, the very simultaneous maturation of the caterpillars, and the simultaneous ascent of the cocoons. Double cocoons are most often spun on natural cocoon beds, less often on cellular ones. The formation of double cocoons is not a hereditary trait. However, under favorable conditions (crowding and close curling), some silkworm species tend to spin such cocoons. Double cocoons are spun by caterpillars regardless of gender. Approximately one-quarter are spun by either males or females, and only one-half are spun by both males and females.

Results and discussion. The primary measures for reducing the production of twin cocoons are the timely and abundant installation of cocoon boxes, primarily artificial honeycomb ones. Currently, twin cocoons account for approximately 2% of the annual dry cocoon harvest in the republic. Twin cocoons are sent to silk spinning mills to produce silk yarn. Due to the large quantities of waste from the sorting shop, and the significant difficulties in using it in spinning, the question of how to efficiently utilize this waste in cocoon winding mills is of great importance.

The geometric properties of cocoons are characterized by length, cross-sectional diameter, shape, volume, and shell surface area. All these cocoon properties depend on the silkworm breed, economic and zootechnical conditions during caterpillar rearing, spinning conditions, and the type and size of the cocoon boxes. The linear dimensions of cocoons are characterized by length and width. The width of the cocoon varies in different areas and depends on its shape. Cocoons can be spherical, oval, smooth, with a weak or deep constriction, elongated, cylindrical, or pointed with one or two pointed ends. Cocoon shape is expressed by the degree of narrowness and the degree of constriction. The degree of narrowness (C_u) is the ratio of the length to the average diameter of the cocoon hemispheres, and the degree of constriction (C_p) is the ratio of the average diameter of the hemispheres to the diameter of the constriction.

This research study examined the length, diameter, degree of narrowness, and degree of constriction of oval, spherical, and malformed cocoons.

Table .

Geometric characteristics of twin cocoons

№	Cocoon shape	Length of cocoons, mm	Intercept diameter, mm	Hemisphere diameter, mm		C_u	C_p
				head part	abdominal part		
Maximum	Oval	41.0	23.4	23.5	22.6	1,65	1,30
Minimum		32.0	18.5	18.6	18,5		
Average		35.0	21.5	21.3	20,9		
Maximum	Spherical	41.0	23.5	23.5	22,6	1,56	0,97
Minimum		32.0	18.6	18.6	18,5		
Average		35.0	21.3	21.3	20,9		
Maximum	Ugly	36.2	26.9	24.8	22,5	0,93	0,87
Minimum		29.0	19.8	20.3	15,9		
Average		32.9	23.1	22.3	20,2		

The table shows that the average length of oval-shaped twin cocoons was 35 mm, spherical-shaped twin cocoons 28.7 mm, and malformed twin cocoons 21.29 mm. After measuring the geometric parameters of the twin cocoons, the degree of narrowness and constriction were determined. Spherical cocoons had the lowest degree of narrowness for twin cocoons, at 1.30. Oval cocoons had the highest degree of narrowness, at 1.65. However, the degree of constriction for twin cocoons of different shapes did not exceed one.

Conclusion: The maximum length of oval-shaped twin cocoons is 35 mm, while the minimum length for malformed twin cocoons is 21.29 mm.

Spherical cocoons had the lowest degree of narrowness for twin cocoons, at 1.30. Oval cocoons had the highest degree of narrowness, at 1.65. Moreover, the degree of interception of cocoons-twins of different shapes does not exceed one.

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ORGANIZATION OF MANAGEMENT IN BUSINESS ENTITIES WITH STATE PARTICIPATION

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Abstract. Considering the increasing attention in recent times to improving management in business entities, we conducted research and analysis of the organization level of the management system in state-owned enterprises, management principles and methods, and their positive consequences.
Key words: Principles and methods of management, supervisory board, founder, joint-stock company (JSC), strategy, corporate relations.

The formation of effective management institutions that could significantly complement and strengthen the mechanism of market competition and contribute to the establishment of an effective institutional environment is becoming increasingly urgent. This issue is relevant in the context of deep and large-scale transformation in Uzbekistan's economy, caused by both scientific and technological progress and its systemic and structural changes, carried out in the process of forming a market environment and developing a multi-structured economy.

In Uzbekistan, during the years of independence, special attention has been paid to ensuring citizens' rights and freedoms, democratizing the state structure, deepening market reforms, and creating necessary guarantees for the protection of private property, entrepreneurship, and small and medium-sized businesses. Work in this direction consistently continues [1].

One of the important directions of the program of reforms, structural transformations, and economic diversification for 2022-2026 is ensuring reliable protection of private entrepreneurship and small business interests, increasing the role of private property, and gradually reducing the state's presence in the economy.

It should be noted that to date, significant work has already been carried out in Uzbekistan in this direction. In particular, the regulatory framework for corporate governance has been formed, corporate governance bodies have been established in all joint-stock companies, consulting organizations are functioning, and relevant government decisions have been adopted to accelerate the implementation of quality management systems in enterprises

As a result of denationalization and privatization, numerous joint-stock companies have been created and are currently functioning in Uzbekistan. According to official statistics, as of July 1, 2025, the number of joint-stock companies was 649, of which 251 had state participation.

Joint-stock companies in the republic are represented mainly by large industrial enterprises. Key players in this market include JSC “Uzbekneftegaz”, JSC “Almalyk Mining and Metallurgical Combine”, JSC “Uzbekugol”, JSC “Uzkimesanoat”, JSC “Uzavtosanoat”, and several other industrial giants.

Issues of personnel training for this sphere are of great importance in the reform process. In this context, it is worth noting the activities of the Higher School of Business and Entrepreneurship under the Ministry of Economy and Finance of the Republic of Uzbekistan, where in a short period, with the participation of leading foreign specialists, advanced training was organized for the heads of JSCs, banks, and enterprises of Uzbekistan. Many of them have completed internships at the best corporations in Europe to closely study international experience in this area [2].

Special attention is paid to widely attracting foreign investors to business entities, creating favorable conditions for their active participation in corporate governance, modernization, and technical and technological re-equipment of production.

In Uzbekistan's conditions, the most acceptable and justifiable option is a form of ownership where, along with domestic investors, foreign investors also become shareholders. More than 4 thousand such enterprises, created with the participation of foreign capital, already operate in our country. There are examples of successful operations of enterprises fully based on foreign capital and foreign corporate governance methods.

The JSC management system aims to increase the transparency of activities, create and maintain reliable and effective relationships with shareholders and investors. Ensuring a high level of transparency and completeness of information disclosure is one of the most important priorities for JSCs.

Speaking about the importance of implementing new management principles and methods, in our opinion, the following positive consequences can be cited:

1. Increasing the attractiveness of JSCs and the interest of shareholders (investors);

2. Increase in share value;
3. Increase in the volume of attracted capital per unit of nominal share value;
4. Improving operational efficiency and capital use efficiency in the interests of profitable and sustainable development of JSCs and their shareholders;
5. Enhancing the reputation of the company and the country.

By examining corporate governance issues, we can conclude that the state's role as a participant in enterprise management is important. This is evident in the following:

- the state invests funds in certain economic sectors or regions for the purpose of their development;
- the state ensures control over the functioning of strategic economic sectors;
- the state creates sources of income to replenish the state budget and increases job creation.

Also, the goals of the state as a shareholder are much more complex and comprehensive compared to the goals and objectives of private owners. The state can be guided by various goals not related to the company's financial results [3].

Any joint-stock company, including those with state participation in the capital, has a developed network of corporate relations. The main participants in corporate relations are entities related to the company's functioning, influencing its activities, or dependent on it in a particular form or degree. First and foremost, these are the management bodies of the joint-stock company, shareholders, personnel, including management. Each participant in corporate relations has certain interests and strives to realize them [4].

The corporate governance system, which allows for integrating the efforts of higher and executive management bodies in developing a balanced strategy for production development, mastering new product manufacturing, and implementing progressive forms of management, opens up broad prospects for successfully addressing these tasks. Therefore, in the Action Strategy for the Further Development of the Republic of Uzbekistan for 2022-2026, among the priority areas for economic development and liberalization, the need to "introduce modern international standards and methods of corporate governance, strengthen the role of shareholders in strategic management of enterprises" has been noted.

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ТИЖОРАТ БАНКЛАРИДА ЯНГИ ХИЗМАТЛАРИ ЖОРИЙ ЕТИШ ОРҚАЛИ ТИЖОРАТ БАНКЛАРИНИНГ РАҚОБАТБАРДОШЛИГИНИ ВА САМАРАДОРЛИГИНИ ОШИРИШ ИСТИҚБОЛЛАРИ.

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Мамлакатимиз тижорат банкларида илғор юқори информацион технологик воситалар ѐрдамида замонавий турдаги банк хизматларини кўрсатиш, электрон тижорат, электрон тўловлар тизими ва ҳўжалик юритувчи субъектлар ўртасида ўзаро ҳисоб китоблар самарадорлигини оширишга шарт - шароит яратилиб келинмоқда. Шунингдек Республикамиздаги тижорат банк тизимида «Банк-мижоз» хамда интернет-банкинг дастурларини татбиқ этиш юридик шахслар учун қўлланибгина қолмай, балки жисмоний шахсларга ҳам ушбу хизмат туридан фойдаланиш учун бир хил имкониятлар яратилмоқда.

Шунинг учун бугунги кунда мижозлар банк хизматларидан фойдаланиш жараѐнида 24/7 режимда фойдалана олиш имкониятини яратиб беришда интернет-банкинг дастури устуворлик касб этмоқда.

Шу боисдан, банк карталарига хизматларини янги турларини жорий этиш ва ривожланиш тенденцияларини тадқиқ этиш иқтисодий масалаларнинг марказий элементлари бири бўлиб қолади, деб ўйлаймиз. Банк тизимида карта орқали хизматларнининг янги турларини жорий этиш орқали молия институтлари томонидан жисмоний шахсларга чакана хизматлар кўрсатиш мавқеини янада мустаҳкамла Умуман олганда, мамлакатимизда банк хизматларида тўлов амалиѐтини ташкил этиш ва уни банк карталари орқали таъминлаш Ўзбекистон Республикасининг 2019 йил 1 ноябрдаги “Тўловлар ва тўлов тизими тўғрисида”ги Қонуни, Ўзбекистон Республикаси Адлия вазирлиги томонидан 2021 -йил 3 апрелда 3294-сон билан рўйхатга олинган “Ўзбекистон Республикаси ҳудудида банк карталарининг чиқарилиши ва муомалада бўлиши қоидалари тўғрисида”ги Низом асосида ташкил этилади. ш имкониятини яратади, деб ҳисоблаймиз.[1]

Бугунги кунда талаб ошиб бораётган оммабоп банк хизматларидан масофадан туриб фойдаланишнинг осон ва қулай йечими бу “Digital banking”рақамли банкинг регулятор тизими хизматлари ҳисобланади. Бу хизмат турларидан,

[1] Ўзбекистон Республикасининг 2019 йил 1 ноябрдаги “Тўловлар ва тўлов тизими тўғрисида”ги Қонуни,

нафақат, жисмоний шахслар учун балки тадбиркорлик субйектлари ўз ҳисоб-китобларини куну-тун амалга ошириш имкониятига ега бўлишади ҳамда банк муассасасига бориб келишларидаги ортиқча вақт ва харажатларни тежаш имконини ҳам бериши билан алоҳида еътиборга моликдир.

Фикримизча, “Дигитал банк” рақамли банкинг регулятор тизими масофавий банк хизматларини кўрсатишда ахборот ҳавфсизлигини таъминлаш ва бу борада халқаро тажрибаларни ўрганиш орқали ахборот хавфсизлигини таъминлашнинг янги инновацион шаклларини қўллаш лозим деб ҳисоблаймиз. Ўзбекистонда банк тизимида сўнгги йилларда банк хизматларининг сифати ва кўламини ошириш бўйича қатор ишлар амалга оширилди. Лекин жаҳонда бўлаётган ўзгаришлар, глобаллашув жараёни, рақобатбардошликни ҳаддан зиёд ривожланиши, тижорат банкларининг трансформация жараёнини янада фаоллаштириш, мижозларга кўрса тилаётган банк хизматларини янги босқичга олиб чиқиш заруратини юзага келтиради

Хулоса қилиб айтганда, “Digital banking“ рақамли банкинг регулятор тизимини жорий қилиш ва ривожлантириш орқали, тадбиркорлик субйектлари фаолиятидаги ортиқча қоғозбозлик, навбатларда туриб, ортиқча вақт сарфлаш ва банк хизмат кўрсатиш соҳасидаги коррупсияга барҳам беришга олиб келади ҳамда бунинг натижасида уларнинг фаолиятларини янада яхшилашга еришишимиз мумкин деб ҳисоблаймиз.

Янги Ўзбекистоннинг тараққиёт стратегиясида “Рақамли иқтисодиётни асосий “Digital banking” сохасини драйверга айлантириб, унинг хажмини камида 2,5 баравар оширишга қаратилган ишларни олиб борилиш” мақсади қўйилган. Банк тизимини ривожлантиришнинг асосий драйвери рақамлаштириш 2022-2026 йилларга мўлжалланган банк ва мижоз оьртасида оьзаро ишонч ва шаффофликни ошириш мижозларига хизмат кўрсатиши учун банк биносига шахсан ташриф буюришлари хамда хар хил қоғозбозликларни бартараф етиш, мижозлар банк биносига таъшриф буюрмасдан ҳам банк хизматларидан фойдаланиши белгилаб ўтилганлигини такидлаб ўтсак муболаға бўлмайди[2].

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[2] Ўзбекистон Республикаси Президентининг 2022 йил 28 январдаги “2022 — 2026 йилларга мўлжалланган Янги Ўзбекистоннинг тараққиёт стратегияси ўғрисида”ги ПФ-60-сонли Фармони

IMPROVING THE MECHANISM FOR FORMING LOCAL BUDGET REVENUES IN UZBEKISTAN

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Abstract: this article examines the current state of Uzbekistan's shadow economy, its influencing factors, and the role of electronic services in tax administration to mitigate its effects on local budget revenues. It analyzes existing challenges in tax collection through digital platforms and proposes enhancements to electronic tax services as a means to reduce informal activities, thereby broadening the tax base and increasing fiscal inflows to regional budgets. Furthermore, the study develops recommendations for perfecting the formation of local budget incomes by integrating advanced information technologies, fostering voluntary compliance among taxpayers, and ensuring seamless interagency data exchange to support sustainable regional economic development.

Keywords: local budget revenues, tax administration, shadow economy, electronic services, fiscal decentralization, digital transformation, property tax, land tax, non-tax revenues, intergovernmental transfers, budget sustainability

INTRODUCTION

Contemporary global economic challenges underscore the importance of robust mechanisms for generating local budget revenues, particularly in transitioning economies like Uzbekistan where decentralization efforts aim to empower regional authorities with greater financial autonomy. The structure of local budgets in Uzbekistan primarily relies on a combination of own-source revenues, such as property and land taxes, alongside shared national taxes including value-added tax and personal income tax allocations that are distributed based on predefined formulas to ensure equitable resource distribution across regions. Recent reforms under the New Uzbekistan Development Strategy for 2022-2026 have emphasized the need to strengthen these mechanisms by reducing dependency on central transfers and enhancing local revenue mobilization through improved tax administration and economic formalization. Factors such as the persistent shadow economy, estimated at around 33-48% of GDP, erode potential revenues by evading formal taxation channels, thus limiting funds available for essential regional infrastructure and social services. Policymakers have increasingly turned to digital tools to address these gaps, recognizing that electronic platforms can streamline compliance and detect undeclared

activities more effectively than traditional methods. [1] This approach not only boosts transparency but also aligns with international best practices observed in countries like Estonia and Georgia, where digital tax systems have significantly curtailed informal sectors. Efforts to integrate advanced analytics into revenue forecasting further promise to refine the allocation processes, ensuring that local budgets reflect actual economic potentials rather than historical precedents.

Decentralization in Uzbekistan's fiscal framework has evolved since independence, with the Budget Code establishing clear delineations between central and local fiscal responsibilities to promote balanced regional growth. Local revenues are categorized into fixed sources, like fees from communal services and natural resource extraction royalties, and regulatory incomes that fluctuate with economic activity levels in each territory. The shadow economy exacerbates disparities by concealing substantial portions of taxable income, particularly in agriculture, trade, and construction sectors that dominate many regions, leading to underfunded public programs and heightened reliance on subsidies from the national budget. To counteract this, the government has implemented electronic invoicing and online cash registers, which facilitate real-time monitoring and reduce opportunities for evasion, ultimately channeling more funds into local coffers. Comparative analyses with neighboring Central Asian states reveal that Uzbekistan's progress in digitalizing tax services has already yielded measurable increases in revenue collection efficiency, though challenges persist in rural areas with limited internet access. Strengthening intergovernmental fiscal relations through performance-based grants encourages local authorities to prioritize revenue enhancement strategies, fostering a culture of accountability and innovation in budget management. Such measures are crucial for achieving the strategic goals of poverty reduction and inclusive development outlined in national policy documents. [2]

The interplay between economic formalization and local budget stability highlights the necessity for multifaceted reforms that address both structural and behavioral aspects of revenue generation in Uzbekistan. Informal economic activities not only deprive regions of vital tax inflows but also distort market competition, disadvantaging compliant businesses and hindering overall productivity growth. By leveraging electronic services in tax administration, authorities can automate processes like declaration filing and payment tracking, which minimizes human intervention and corruption risks while expanding the taxable base through better data accuracy. International experiences, such as those from the European Union member states, demonstrate that integrated digital ecosystems can increase revenue yields by up to 20% in the initial years of implementation, a benchmark Uzbekistan aims to approach through ongoing investments in IT infrastructure. [3] Moreover, incorporating

predictive modeling into revenue planning allows local governments to anticipate fluctuations caused by seasonal economic patterns or external shocks, thereby improving fiscal resilience. This comprehensive strategy ensures that enhancements in revenue formation mechanisms contribute directly to sustainable regional development, aligning fiscal policies with broader socioeconomic objectives.

Main Body

The fight against the shadow economy represents a critical priority for many nations worldwide, including Uzbekistan, where informal activities continue to maintain a significant scale within the national economy. Uzbekistan's shadow economy is estimated at 245 trillion soums, constituting approximately 48% of GDP, according to analyses from the State Tax Committee. This phenomenon encompasses complex socio-economic realities that escape state oversight, often driven by individuals or groups pursuing personal or collective gains through concealed operations that exploit state and non-state assets illegally. In the context of local budgets, such evasion directly undermines revenue formation by reducing collections from key sources like property taxes and shared national levies, which are essential for funding regional infrastructure and social programs. To address this, Uzbekistan has pursued policies aimed at creating a favorable business environment, reinforcing entrepreneurial rights, and providing additional incentives to diminish the informal sector's share. The President's special decree approved the New Uzbekistan Development Strategy for 2022-2026, which outlines measures to reduce informal employment, enhance public involvement in combating the shadow economy, and ensure social protection for those transitioning from informal to formal sectors. [4]

Within the tax system, the widespread adoption of modern information and communication technologies plays a pivotal role in encouraging voluntary fulfillment of obligations by taxpayers, thereby elevating overall tax collections that feed into local budgets. This strategy focuses on limiting human involvement, automating decision-making, and introducing uniform standards to streamline operations across regions. [5] Key directions include transitioning interactions between state tax authorities and taxpayers to remote formats, fully automating relationships via broad application of ICT, and expanding interactive public services. Additionally, establishing efficient electronic data exchange with other government bodies and organizations helps resolve existing bottlenecks in information sharing. In Uzbekistan, these efforts have led to noticeable improvements in revenue predictability for local budgets, as digital tools enable better tracking of economic activities that were previously hidden. For instance, regions with higher digital penetration have reported increased property tax revenues due to enhanced cadastral data integration.

The proliferation of internet networks has not only facilitated state services but also spurred the growth of social media platforms, enabling citizens to engage in communication, information exchange, broadcasting, e-commerce, online education, advertising, and service provision. However, this has simultaneously created avenues for untaxed income generation through online resources, where mechanisms for identifying and taxing such revenues remain underdeveloped in the Tax Code. Currently, only physical persons earning from social networks are required to pay income tax, but without robust enforcement, these inflows often go unreported, affecting local budget revenues derived from personal income tax shares. The absence of visibility into these transactions for tax authorities limits their ability to impose taxes, and even when detected, proving such income lacks a systematic framework. Platforms like Telegram exemplify this, where users create channels, bots, and groups for free advertising, product sales, service delivery, online tutoring, consultations, and increasingly popular delivery services, with payments routed through electronic systems like Click or Payme directly to personal bank cards. [6]

Numerous service providers operate within social networks, including those affiliated with legally registered entrepreneurs who bypass terminal payments in favor of personal card transfers under various pretexts, thereby underreporting turnover and evading taxes that would otherwise contribute to local budgets. This practice diminishes the tax base and results in untaxed profits, while tax authorities lack sufficient mechanisms to detect, analyze, and tax these hidden incomes. Similarly, in commodity trading, citizens establish small online groups with 1,000 to 2,000 subscribers for home delivery or postal shipping of goods, offering convenience that saves time for buyers who pay via bank cards through systems like Click. Assuming an average of 220 such operators per region, the republic-wide total reaches 3,080, each adding a 15% markup on daily sales of 5 million soums, where 85% covers product costs. Calculations reveal daily turnover of 15.4 billion soums, monthly at 462 billion soums, with a taxable base after deducting costs leading to approximately 2.8 billion soums in uncollected 4% taxes, directly impacting local revenue shortfalls. [7]

From these observations, analyzing inflows to citizens' plastic cards—excluding salaries—by purpose and amount could identify patterns where sums exceeding 5 million soums occur up to 10 times monthly, subjecting the excess to a 1% tax rate to curb the shadow economy and expand the tax base for local budgets. Establishing a dedicated unit within the state tax service for scrutinizing plastic card transactions would facilitate this taxation and oversight. Under the President's Decree PQ-5252 dated October 4, 2021, on improving cash register usage in retail, catering, and household services, from January 1, 2022, individuals scanning purchase receipt fiscal

marks via a special mobile app receive 1% cashback on their bank cards from the republican budget at month's end. [8] Violations such as non-use of cash registers or terminals, artificial price manipulation based on payment method, unregistered entrepreneurship, or fake marking on mandatory labeled products trigger fines, with informants receiving 20% of the penalty amount.

Proposals include ensuring full QR code affixation in all retail outlets to prevent tax violations, protect consumer rights, and enable electronic appeals via mobile apps. Additionally, installing electronic information monitors in markets to continuously display tax updates, enhance economic literacy, appeal procedures, and videos from the State Tax Committee would promote compliance. Overall, a primary driver of the shadow economy stems from consumers not demanding receipts in dealings with entrepreneurs, particularly in trade and catering, fostering unfair competition. [9] If every consumer insists on receipts, the informal share would decline, evasion cases decrease, and budget inflows rise, propelling national economic advancement and bolstering local fiscal capacities.

Fiscal decentralization in Uzbekistan involves granting regions greater control over revenue sources to stimulate local economic initiatives, yet the shadow economy poses a substantial barrier by siphoning potential taxes away from formal channels. Property and land taxes, as primary own-source revenues for local budgets, suffer when informal land use or unregistered properties evade assessment, leading to chronic underfunding in rural districts. Digital cadastral systems, integrated with tax platforms, offer a solution by automating property registrations and valuations, ensuring accurate revenue projections. Studies indicate that regions implementing such systems have seen up to 15% growth in property tax collections annually. [10] Moreover, non-tax revenues from administrative fees and asset sales can be optimized through online portals that transparently auction public resources, minimizing corruption and maximizing returns. This multifaceted approach aligns with global trends where digital governance has transformed local fiscal landscapes.

Intergovernmental transfers remain a cornerstone of local budget formation in Uzbekistan, compensating for revenue disparities across regions, but their effectiveness hinges on reducing informal activities that distort needs assessments. The Budget Code stipulates formulas for allocating shares of national taxes like VAT and excise duties, yet shadow operations in high-value sectors inflate perceived economic weaknesses, prompting excessive transfers. [11] Electronic tax filing mandates for businesses have begun to reveal hidden turnovers, allowing more precise transfer calculations based on actual taxable activities. In practice, provinces with advanced digital adoption report lower transfer dependencies, as formalized economies generate

sufficient own revenues. Enhancing data analytics in transfer mechanisms could further refine equity, ensuring funds target genuine development needs rather than compensating for evasion losses. Such refinements promote fiscal responsibility at the local level.

The role of small and medium enterprises in bolstering local revenues cannot be overstated, as their formalization directly amplifies tax inflows amid Uzbekistan's push for entrepreneurial growth. Informal SMEs, prevalent in trade and services, evade contributions to local budgets through unreported sales, but electronic invoicing requirements compel transparency. Platforms like the State Tax Committee's online portal enable seamless declaration and payment, reducing administrative burdens while capturing previously untaxed transactions. Evidence from pilot regions shows a 12-18% revenue uptick post-implementation. Furthermore, incentives such as reduced rates for digital compliers encourage shifts from shadow to formal operations, expanding the base for property and income taxes. [12] This strategy not only sustains local budgets but also fosters inclusive economic ecosystems.

Challenges in rural areas, where internet infrastructure lags, necessitate targeted investments to extend digital tax services and curb shadow activities impacting local revenues. Mobile apps for tax reporting, coupled with offline syncing capabilities, bridge connectivity gaps, allowing farmers and small traders to comply without urban travel. Such innovations have proven effective in similar contexts, yielding higher land tax collections by formalizing agricultural leases. Partnerships with telecom providers to subsidize data access further democratize these tools, ensuring equitable revenue growth across territories. Ultimately, these efforts mitigate regional imbalances, channeling more funds into essential services like education and healthcare. [13]

International benchmarks provide valuable insights for Uzbekistan's revenue enhancement strategies, particularly in combating shadow economies through integrated digital ecosystems. Countries like Kazakhstan have successfully reduced informal sectors by 10-15% via unified tax portals that link banking, customs, and fiscal data. Adapting similar models could amplify Uzbekistan's local budget inflows by automating cross-verifications of transactions. Moreover, blockchain-based tracking for supply chains minimizes evasion in trade-heavy regions, boosting VAT shares allocated locally. Collaborative forums with regional peers facilitate knowledge exchange, tailoring best practices to local contexts. This global perspective enriches domestic reforms, ensuring resilient revenue mechanisms. [14]

Economic modeling underscores the potential gains from shadow economy reduction, projecting substantial uplifts in local budget capacities through enhanced tax administration. Simulations based on current data suggest that a 10% informal sector

contraction could yield an additional 5-7% in regional revenues annually. [15] Digital audit tools, employing AI for anomaly detection, expedite this by identifying undeclared incomes swiftly. Regions piloting these technologies report improved compliance rates, translating to higher investments in public goods. Integrating such models into policy planning refines revenue forecasts, aligning budgets with dynamic economic realities.

Stakeholder engagement, including public awareness campaigns, is vital for sustaining revenue growth by fostering a culture of compliance against shadow practices. Educational initiatives via social media and community workshops demystify tax processes, encouraging voluntary declarations that bolster local funds. Feedback mechanisms in digital platforms allow users to suggest improvements, enhancing user-friendliness and adoption. Successful cases in urban centers demonstrate that informed citizens demand receipts more frequently, pressuring businesses to formalize. This bottom-up approach complements top-down reforms, creating synergistic effects on revenue formation. [16]

Aspect of Local Budget Revenue Formation	Key Challenges from Shadow Economy	Proposed Digital Enhancements	Projected Impact on Revenues
Property Tax Collection	Unregistered properties and informal land use evade assessments, leading to revenue shortfalls in rural areas.	Integration of cadastral databases with electronic tax platforms for automated valuations and registrations.	Increase of 10-15% in annual collections through better coverage and accuracy.
Land Tax Mobilization	Concealed agricultural activities reduce taxable base, affecting funds for local infrastructure.	Mobile apps for offline reporting synced with central systems to capture remote transactions.	Enhancement of 8-12% in revenue yields by formalizing leases and usages.
Shared VAT Allocations	Undeclared sales in trade sectors distort economic indicators, resulting in	Real-time electronic invoicing linked to banking data for transparent turnover tracking.	Boost of 12-18% in local shares due to expanded formal tax base.

	inequitable distributions.		
Personal Income Tax Shares	Informal employment hides wages, limiting contributions to regional social programs.	AI-driven analytics on card transactions to detect and tax excess inflows.	Growth of 5-10% in inflows from formalized personal earnings.
Non-Tax Revenues from Fees	Unmonitored administrative services lead to underreported collections.	Online portals for fee payments and auctions of public assets with blockchain security.	Rise of 7-14% through minimized corruption and maximized returns.
Excise Duty Distributions	Shadow production in manufacturing evades duties, impacting environmental and health funding.	Digital labeling and e-freight bills for supply chain monitoring.	Improvement of 9-15% in allocated funds via reduced evasion.
Resource Extraction Royalties	Informal mining and extraction activities bypass royalties, depriving resource-rich regions.	Geospatial tech integrated with tax systems for activity verification.	Augmentation of 11-16% in revenues from accurate oversight.
Administrative Fines and Penalties	Lack of reporting on violations reduces penalty inflows to budgets.	Automated notification and appeal systems via mobile apps.	Elevation of 6-11% through efficient enforcement and collections.
Intergovernmental Transfer Adjustments	Inflated informal indicators skew needs assessments, prompting excessive subsidies.	Predictive modeling using digital data for precise formula calculations.	Optimization leading to 4-8% savings redirected to own-source enhancements.

Overall Fiscal Sustainability	Cumulative evasion erodes budget stability, hindering development investments.	Comprehensive digital ecosystems linking all revenue streams.	Holistic increase of 15-20% in local budget capacities over medium term.

Conclusion

The examination of Uzbekistan's local budget revenue mechanisms reveals that persistent shadow economy activities significantly hinder fiscal inflows, but targeted digital interventions offer substantial pathways for improvement. By integrating electronic tax services, regions can automate compliance processes, reducing evasion and expanding taxable bases across key sectors like agriculture and trade. This not only elevates own-source revenues such as property and land taxes but also refines shared national allocations, ensuring more equitable resource distribution. International comparisons affirm that such reforms yield measurable gains in budget sustainability, fostering resilient economic structures. Stakeholder involvement through awareness initiatives further reinforces these gains, promoting a culture of transparency and accountability. Ultimately, these strategies align with national development goals, channeling enhanced revenues toward inclusive growth and poverty alleviation. First conclusion: Digitalization of tax administration effectively curtails informal activities, boosting local revenues by capturing previously hidden transactions. Second conclusion: Enhanced interagency data exchange minimizes revenue leakages, optimizing fiscal transfers and own-source collections. Third conclusion: Incentives for voluntary compliance, like cashback programs, encourage formalization, directly increasing budget inflows. Fourth conclusion: Comprehensive monitoring via AI and analytics refines revenue forecasting, supporting long-term fiscal planning.

Advancements in local budget formation underscore the need for ongoing reforms that address structural vulnerabilities exacerbated by informal economies. Electronic platforms have demonstrated efficacy in real-time oversight, diminishing opportunities for evasion while streamlining administrative burdens for taxpayers. This leads to heightened collections from diverse sources, bolstering regional capacities for public investments. Policy frameworks that prioritize rural digital access ensure inclusive benefits, mitigating disparities between urban and peripheral areas. Collaborative efforts with international partners enrich these mechanisms, incorporating proven methodologies for sustained impact. In essence, a holistic approach integrating

technology, education, and incentives propels Uzbekistan toward fiscal independence and economic vitality.

Recommendations

Based on the first conclusion regarding digitalization's role in curbing informal activities, implement a nationwide rollout of AI-enhanced transaction monitoring systems specifically tailored for regional tax offices, incorporating machine learning algorithms to predict and prevent evasion patterns unique to local economic profiles, thereby ensuring proactive revenue protection without overburdening small businesses.

Drawing from the second conclusion on interagency data exchange, establish a unified blockchain-based platform that securely links banking, customs, and tax databases across all regions, enabling automated cross-verification of financial flows and reducing administrative silos, which would facilitate seamless revenue allocation adjustments based on real-time economic data.

In line with the third conclusion emphasizing incentives for compliance, introduce tiered rebate programs for enterprises demonstrating consistent use of electronic receipts and declarations, scaled according to regional economic indicators, to stimulate formalization in underrepresented sectors like artisanal crafts and seasonal agriculture, fostering organic growth in local tax bases.

Stemming from the fourth conclusion on improved forecasting through analytics, develop customized simulation tools for local budget planners that incorporate scenario-based modeling of shadow economy reductions, integrated with satellite data for verifying land and property usages, allowing for dynamic adjustments in revenue strategies that anticipate external economic shocks.

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EFFECT OF HEAVY METALS (Pb, Cd and Hg) ON BIOCHEMICAL CHANGES IN PLANT CELLS

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Today, the rapid development of industry and the uncontrolled use of chemical fertilizers in agriculture have led to the contamination of soil and water with heavy metals. Metals such as Pb, Cd and Hg do not decompose in the soil and have the property of bioaccumulation (accumulation). This not only endangers the plant world, but also human health through the food chain, which determines the relevance of the topic on a global scale.

Environmental pollution is a major obstacle to sustainable agriculture. Soil and water can be contaminated with heavy metals, pesticides and excessive fertilizers, which harm soil health, reduce biodiversity needed for pest control and pollination, and pose a threat to food security. Pollution also exacerbates climate change, with extreme weather events damaging crop yields and water resources. Much of this degradation comes from point source pollution associated with mining, foundries, smelters and other metallurgical industries[1]. Heavy metals, which are characterized by a higher density than water,[2] have a significant impact on sustainable agriculture. They enter the environment through corrosion, atmospheric deposition, erosion, groundwater leaching, sediment resuspension and water evaporation[3]. Production in the plastics, textiles, microelectronics, wood preservation, and paper industries, as well as operations in nuclear power plants, power lines, coal and oil combustion, and metal processing, are major industrial sources of heavy metals[4,5].

Heavy metals such as Cd, Pb, As, Hg, Cr, and Ni pose a serious threat to plant health by disrupting physiological, biochemical, and molecular processes (Table 1). These metals are not biodegradable and persist in the environment, leading to chronic toxicity to plants when present in high concentrations.

Phytoremediation is a plant-based method used to remove, degrade, or stabilize contaminants in soil and water. The process involves plants absorbing contaminants into their tissues, sequestering them in their roots, facilitating their degradation by associated microorganisms, or rendering them harmless through mechanisms such as phytoimmobilization and phytostabilization.

Table 1

Toxic effects of heavy metals on plants.

Metal	Main effect	External signs (Symptoms)
Lead (Pb)	Inhibits enzyme activity and photosynthesis	Root growth arrest, yellowing of leaves (chlorosis)
Cadmium (Cd)	Disrupts absorption of water and minerals, damages DNA	Stunting of the plant, drying of the leaf edges (necrosis)
Mercury (Hg)	Disrupts cell membranes and metabolism	Sharp decrease in photosynthesis, rapid wilting of the plant

The selection of plant species adapted to local agroclimatic and soil conditions is one of the important factors determining the effectiveness of the phytoremediation process. In most scientific works, it is recommended to use plant species that have been studied abroad or have shown high results in laboratory experiments for phytoremediation.

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ENZYMATIC REGULATION OF PHOTOSYNTHESIS AND THE ROLE OF CHEMICAL FACTORS IN CHLOROPLAST METABOLISM

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Photosynthesis is a highly organized biochemical system that enables green plants to transform solar radiation into chemical energy. This transformation occurs inside chloroplasts and depends on coordinated enzymatic reactions. Enzymes function as biological catalysts that regulate reaction speed, substrate specificity, and metabolic balance. The stability and productivity of photosynthesis largely depend on the chemical environment within plant cells.

The photosynthetic process consists of two interconnected stages: light-dependent reactions and the Calvin cycle. In the light reactions, water molecules are oxidized, producing oxygen, electrons, and protons. The released electrons move through an electron transport chain embedded in the thylakoid membrane. This electron flow drives ATP synthesis via ATP synthase and reduces $NADP^+$ to NADPH. Both ATP and NADPH serve as essential energy carriers for carbon fixation.

The Calvin cycle, located in the stroma, involves enzymatic carbon assimilation. The key enzyme RuBisCO catalyzes the fixation of carbon dioxide to ribulose-1,5-bisphosphate. This reaction forms organic intermediates that eventually lead to glucose synthesis. The catalytic efficiency of RuBisCO strongly depends on stromal pH, magnesium ion concentration, and CO_2 availability.

Chemical factors significantly influence enzymatic activity. Enzyme conformation is sensitive to ionic balance, substrate concentration, and redox conditions. For instance, magnesium ions activate RuBisCO by stabilizing its active center, while optimal pH ensures proper enzyme folding. A decrease in essential mineral elements such as nitrogen or iron limits chlorophyll production and reduces electron transport efficiency.

Understanding enzymatic regulation has practical significance in agriculture. By optimizing mineral fertilization and maintaining soil nutrient balance, it is possible to enhance enzyme synthesis and increase photosynthetic capacity. Modern biotechnological approaches also aim to improve RuBisCO efficiency through genetic modification, potentially increasing crop yield and carbon sequestration.

Additionally, studying enzyme–chemical interactions contributes to developing stress-resistant plant varieties capable of maintaining stable photosynthesis under drought, salinity, or temperature stress.

Table 1

The relationship between enzyme activity and chemical conditions can be summarized as follows

Chemical Factor	Target Enzyme	Physiological Effect
CO_2 concentration	RuBisCO	Increases carbon fixation rate
Mg^{2+} ions	RuBisCO activation	Stabilizes enzyme structure
Nitrogen availability	Protein synthesis	Enhances enzyme production
pH level	Stromal enzymes	Maintains catalytic efficiency

When chemical homeostasis is disturbed, enzyme kinetics slow down, resulting in decreased ATP production and carbohydrate synthesis. Therefore, maintaining balanced intracellular chemistry is crucial for optimal photosynthetic performance.

In conclusion, photosynthesis is a chemically regulated enzymatic network rather than a simple light-driven process. The interaction between enzymes and chemical factors determines the overall efficiency of carbon assimilation and biomass production.

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BIOCHEMICAL ADAPTION OF PHOTOSYNTHETIC ENZYMES TO CHEMICAL AND ENVIRONMENTAL VARIATIONS.

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Photosynthesis is not only a metabolic pathway but also an adaptive biochemical mechanism. Plant survival depends on the ability of photosynthetic enzymes to adjust to fluctuations in chemical and environmental conditions. Enzyme plasticity allows plants to maintain metabolic balance despite variations in nutrient supply, temperature, and carbon dioxide concentration.The catalytic function of photosynthetic enzymes follows the principles of enzyme kinetics. Reaction velocity increases with substrate concentration until enzyme saturation occurs. However, excessive oxygen concentration may promote photorespiration, reducing carbon fixation efficiency. Thus, the balance between CO_2 and O_2 plays a critical regulatory role. Mineral nutrients contribute directly to enzyme synthesis and stability. Nitrogen is a structural component of amino acids and proteins, including RuBisCO. Iron participates in electron transfer reactions within photosystem I. Manganese is essential for water-splitting reactions in photosystem II. Deficiency of these elements disrupts enzymatic reactions and lowers photosynthetic productivity. Photosynthetic enzymes also respond to intracellular redox signals. The thioredoxin system regulates enzyme activation in response to light intensity. This reversible regulation ensures that energy production matches carbon assimilation demands.

Table 1

The adaptive biochemical responses can be summarized below.

Adaptive Mechanism	**Biochemical Basis**	**Functional Outcome**
Redox regulation	Thioredoxin activation	Synchronizes ATP production
Nutrient compensation	Increased enzyme synthesis	Restores metabolic balance
pH stabilization	Proton gradient control	Maintains ATP synthesis

Efficient enzyme regulation allows plants to optimize growth and productivity under changing environmental conditions. This understanding is particularly important in the context of climate change and sustainable agriculture. By studying enzymatic

responses to chemical factors, scientists can develop strategies to improve crop yield and stress resistance.

In summary, photosynthetic enzymes operate within a dynamic chemical framework. Their activity is modulated by substrate levels, mineral nutrients, redox balance, and environmental signals. Maintaining chemical stability ensures efficient light energy conversion and continuous organic matter production.

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THE MECHANISM BY WHICH ANTIOXIDANTS PROTECT THE BODY FROM THE EFFECTS OF FREE RADICALS

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The vital processes of the organism are inextricably linked with the formation of reactive oxygen metabolites (ROS) of radical and non-radical origin, which are intermediate products of the four-electron reduction of oxygen to water. ROS participate in two main processes: on the one hand, the implementation of the body's defense mechanisms; on the other hand, excessive formation of ROS and their secondary products leads to a state known as oxidative stress. The development of oxidative stress in the body is prevented by substances with antioxidant properties of endogenous and exogenous origin. Today, it is difficult to find a single area of medicine, biochemistry, biophysics, pharmacy or food technology that would not study free radical oxidation and the antioxidant effect. The study of the antioxidant properties of substances is interdisciplinary and is aimed at improving human health and increasing life expectancy. One of the current directions in this field is the development of approaches to determine the integral parameters of antioxidant and antiradical capacity/activity, since the effectiveness of the body's antioxidant system may not be related to the content of a particular compound, but rather reflects the properties of the entire system.

The interest in studying the antioxidant properties of various objects is due to a number of factors related to the consumption of molecular oxygen by living organisms. Approximately 90% of the molecular oxygen inhaled by humans is involved in metabolic pathways, in which the energy generated during the oxidation of nutrients is stored in the mitochondria of cells as adenosine triphosphate (ATP). This process, called oxidative phosphorylation, provides the body with energy. In addition, along with this important process, all living organisms undergo reactions that form activated oxygen metabolites (AOM) from molecular oxygen, for example, O2•-, HO•, RO•, H2O2, ROO•, 1O2, OCl-, NO•, ONOO-, NO2• [1]. In the process of evolution, all living organisms have developed entire enzymatic systems that participate in one-, two-, and four-electron reduction reactions of molecular oxygen (Fig. 1) [2, 3].

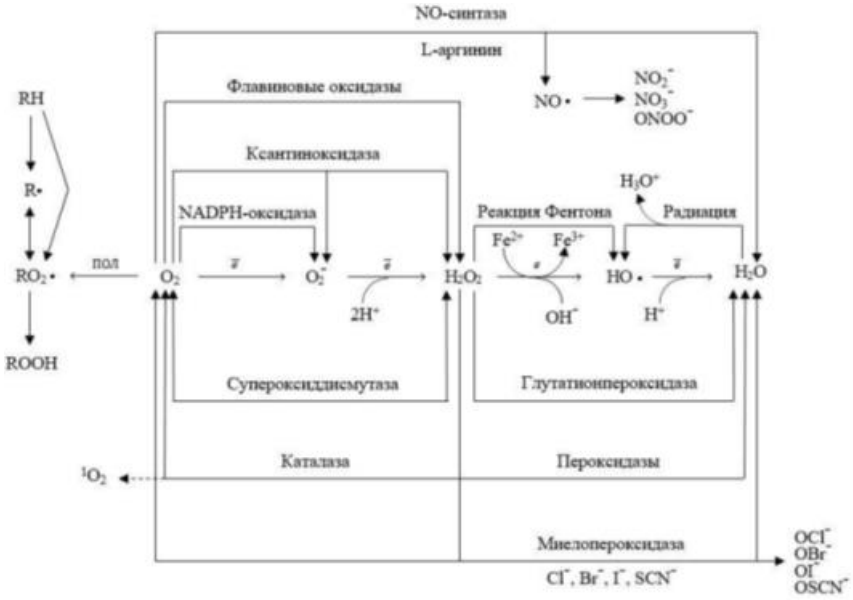

Figure 1. The main pathways of enzymatic formation of ACM in humans and animals

According to Helmut Esterbauer [4], a human consumes 17,000 kg of molecular oxygen during a 70-year lifespan, during which time 800 to 1700 kg of activated oxygen metabolites (AOM) are produced.

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STRUCTURAL FEATURES OF SIMPLE AND COMPLEX ENZYMES AND THEIR CHEMICAL COMPOSITION

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Enzymes are highly specialized biological catalysts that accelerate biochemical reactions in living cells. They are essential components of cellular metabolism and ensure the continuous and balanced progression of metabolic processes. The catalytic efficiency of enzymes is closely related to their structural organization and chemical composition.

Structurally, enzymes are protein molecules composed of amino acids linked by peptide bonds. The amino acid sequence forms the primary structure of the protein and determines higher levels of structural organization. The secondary structure is stabilized by hydrogen bonds and appears in helical or sheet forms. The tertiary structure represents the three-dimensional folding of the protein, and the active site is formed at this level.

The active site consists of specific amino acid residues arranged in a precise spatial configuration that allows selective substrate binding. Functional groups such as carboxyl, amino, hydroxyl, and sulfhydryl groups directly participate in catalytic reactions. The balance between hydrophobic and hydrophilic regions contributes to enzyme stability.

According to their composition, enzymes are classified as simple or complex. Simple enzymes consist only of protein molecules, and their catalytic activity depends entirely on the three-dimensional structure of the polypeptide chain. Even slight structural changes may reduce enzymatic activity.

Complex enzymes contain both a protein component and a non-protein component. The protein part is known as the apoenzyme, while the non-protein component is called the cofactor. When combined, they form the active holoenzyme. Cofactors may be metal ions or organic molecules. Metal ions stabilize the active site or participate in electron transfer, while organic coenzymes, often derived from vitamins, function as carriers of chemical groups during enzymatic reactions. The main differences between simple and complex enzymes are presented in Table 1.

Table 1.

Comparative Structural Features of Simple and Complex Enzymes

Criterion	Simple Enzymes	omplex Enzymes
Structural basis	Protein only	Protein + cofactor
Active Form	Functional polypeptide	holoenzyme
Catalytic mechanism	Amino acid functional groups	Protein–cofactor interaction
Metal ion presence	Usually absent	Frequently present
Functional diversity	Relatively limited	Broader and more complex

In conclusion, the structural organization and chemical composition of enzymes determine their biological function. Simple enzymes operate solely through protein structure, whereas complex enzymes achieve broader functional capacity through additional molecular components.

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ANATOMICAL DEVELOPMENTAL FEATURES OF OFFSPRING KIDNEYS UNDER THE INFLUENCE OF CHRONIC MATERNAL INTOXICATION.

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Annotation.
This article examines the anatomical developmental features of the offspring’s kidneys under the influence of chronic maternal intoxication. Prolonged exposure of the maternal organism to toxic factors during pregnancy may adversely affect the formation and differentiation of fetal organs, particularly the kidneys. The study analyzes both macroanatomical and microanatomical parameters of the offspring’s kidneys, including kidney size and weight, the ratio of cortical and medullary layers, the degree of nephron development, and the structural characteristics of tissue components.
The findings indicate that under conditions of chronic maternal intoxication, delayed anatomical development, structural alterations, and decreased morphometric parameters may be observed in the offspring’s kidneys. The results of this study are important for assessing the impact of harmful prenatal factors and for the early detection of anatomical changes in renal development.

Introduction.
The kidneys are among the vital organs responsible for maintaining water–electrolyte balance, acid–base homeostasis, elimination of metabolic waste products, and hemodynamic stability in the body. Their normal anatomical development occurs through complex stages during the embryonic and fetal periods. The process of renal ontogenesis originates from the mesoderm and proceeds through the stages of pronephros, mesonephros, and metanephros, with the permanent kidney ultimately developing from the metanephros. Any disruption in this process may lead to alterations in both the macrostructure and microstructure of the organ.
In recent years, environmental factors, industrial waste, heavy metal salts, medications, and other toxic substances have become widespread contributors to chronic exposure in humans. Chronic maternal intoxication during pregnancy, in particular, may

adversely affect the formation and differentiation of fetal organs. This condition can lead to various anatomical and morphological alterations in the offspring.

During embryonic development, the kidneys demonstrate high sensitivity to toxic influences. Exposure to harmful factors may result in a reduced number of nephrons, altered cortical and medullary layer ratios, and insufficient formation of glomerular structures. Therefore, studying the anatomical developmental features of offspring kidneys under conditions of chronic maternal intoxication represents a relevant and significant scientific issue.

The aim of this study is to determine the macroanatomical and microanatomical developmental characteristics of the offspring's kidneys under the influence of chronic maternal intoxication and to provide a scientific analysis of the observed structural changes.

Main Part.

1. Normal Anatomical Development of the Kidneys.

Embryonic development of the kidneys begins from the intermediate mesoderm and proceeds through three stages: pronephros, mesonephros, and metanephros. The pronephros is a rudimentary structure that rapidly regresses. The mesonephros functions temporarily as an excretory organ. The permanent kidney, the metanephros, begins to form during the 5th–7th weeks of embryonic development as a result of reciprocal inductive interactions between the metanephric blastema and the ureteric bud.

Normal renal development involves nephron formation (nephrogenesis), differentiation of cortical and medullary layers, and proper development of the vascular system. By the time of birth, the major structural components are formed; however, nephron maturation continues during the postnatal period.

2. Effects of Chronic Intoxication on Embryonic Development.

Chronic maternal intoxication affects the fetal organism through the placenta. Toxic substances may suppress cellular proliferation and differentiation, leading to structural abnormalities during organogenesis. Due to their high metabolic activity during development, the kidneys are particularly sensitive to harmful factors.

Toxic exposure may slow the growth of the metanephric blastema and reduce branching of the ureteric bud, resulting in a decreased number of nephrons. Consequently, this may lead to reduced kidney size and weight.

3. Anatomical Changes Observed in the Offspring's Kidneys.

In offspring born under conditions of chronic intoxication, the following anatomical features may be identified:Decreased macroscopic kidney dimensions (renal hypotrophy);

- Reduced thickness of the cortical layer;
- Incomplete development of medullary structures;
- Decreased nephron number;
- Reduced glomerular size and underdeveloped capillary networks;
- Relative increase in interstitial tissue.

At the microanatomical level, delayed differentiation of tubular epithelial cells, alterations in basement membrane thickness, and increased stromal elements may also be observed.

4. Analysis of Morphometric Parameters.

Anatomical studies typically measure kidney length, width, thickness, mass, and the cortex-to-medulla ratio. Under conditions of chronic intoxication, these parameters are often reduced. Additionally, morphometric indicators such as glomerular diameter, glomerular density, and total nephron count may also decrease.

These changes indicate structural immaturity of the kidneys and may predispose the offspring to functional impairments later in life.

Conclusion.

Chronic maternal intoxication may significantly affect fetal development, particularly the anatomical formation of the kidneys. Renal development during the embryonic period involves complex and delicate stages, and exposure to toxic factors during this time may disrupt nephron formation, cortical and medullary layer development, and vascularization processes.

The findings of the study indicate that offspring born under conditions of chronic intoxication exhibit structural alterations at both macroanatomical and microanatomical levels. Specifically, reduced kidney size, decreased cortical thickness, a lower number of nephrons, and insufficient development of glomerular structures may be observed. These anatomical changes may subsequently predispose individuals to functional impairments.

Therefore, protecting pregnant women from harmful chemical exposures and ensuring environmental and occupational safety measures are of great importance. Early detection of anatomical alterations in prenatal kidney development has significant scientific and practical value in preventing potential pathological conditions in the future.

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