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Sociological Sciences

Ensuring the rights of children in Kazakhstan

KAIMULDINA GULNARA

Kazakhstan

The state policy of the Republic of Kazakhstan in the field of child protection is aimed at ensuring the rights and legitimate interests of children, protecting them from violence, preventing discrimination, and forming the legal basis for guaranteeing children's rights.

As of 2024, the child population of the republic is 6.8 million children, including 3.8 million schoolchildren, more than 2.5 million preschool children, and more than 400 thousand students of educational organizations¹.

According to article 27 of the Constitution of the Republic of Kazakhstan, childhood is protected by the State.

Every year, in his Message, the President notes the need to strengthen measures to protect the rights of minors. Penalties for crimes against the sexual integrity of minors have been tightened, measures are being taken to protect the rights of children, orphans, children left without parental care, as well as children with special needs.

The Committee for the Protection of the Children's Rights of the Ministry of Education, a working body of the Commissioner for Children's Rights, educational and health organizations, police agencies, NGOs, commissions on juvenile affairs are empowered for protection of the rights of children.

The main objectives of the state policy in the interests of children are ensuring the rights and legitimate interests of children, preventing their discrimination; restoration of their rights in cases of violations; formation of the legal basis for guaranteeing the rights of the child; promotion the physical, intellectual, spiritual and moral development of children.

According to the Constitution the child has the right to life, the right to security, to health protection, the right to housing, to education, the right to individuality and its preservation, the right to state support.

In addition, the rights are defined under the basic rights of the child such as to live and be raised in a family; to know who his parents are; to live together with his parents (except in cases where it is contrary to his interests), to be cared by them; to be raised by parents, and in their absence or deprivation of parental rights – to be raised by a guardian, trustee or a children's institution; right for comprehensive development; respect for human dignity; to communicate with parents, grandparents, brothers, sisters and other relatives; to express own opinion; to have a surname, first name, patronymic; to receive funds for subsistence and own income².

National regulatory framework for the security and protection of children

In order to protect the rights of children, a national legislative framework for legal protection of childhood has been formed. A legal base consists of international legal acts, where

¹ Bureau of national statistics of the Agency on strategic planning and reforms of the Republic of Kazakhstan

² How rights of children are protected in Kazakhstan, International information agency Kazinform

the legal status of the child has been consolidated. Today, 16 international documents ensure the rights of children in the republic, the first of which was the Convention on the Rights of the Child. All articles of this Convention are implemented into the country's legislation. Kazakhstan is a party to the UN Declaration "On Social, Legal Principles Relating to the Protection and Welfare of Children, with special reference to Foster Placement and Adoption Nationally and Internationally"; the UN Convention on the Protection of Children and Co-operation in Respect of Intercountry Adoption; the UN Rules for the Protection of Juveniles Deprived of Their Liberty; the "Beijing Rules" – UN Standard Minimum Rules for the Administration of Juvenile Justice; The UN Riyadh Guidelines; documents of the International Labour Organization regulating the rights of minors in their employment, etc.

5 Codes and 15 Laws of Kazakhstan are also being implemented. The main laws in the field of childhood remain the Constitution, the Code "On Marriage (Matrimony) and the Family", the Laws "On the Rights of the Child", "On Education", "On the prevention of offenses among minors and the prevention of child neglect and homelessness" and other over 45 normative legal acts regulating the rights and guarantees of children have been adopted³.

Taken measures to guarantee the rights of children

In 2022, a Child Welfare Index was developed and adopted, which allows to monitor systematically the children's rights and interests aimed at ensuring their safety. The index consists of 36 statistical and 20 survey indicators.

On May 3, 2022, the Law of the Republic of Kazakhstan on the protection of children's rights, education, information and informatization was adopted.

Within the framework of the Law, for the first time in Kazakhstan, the concept of "bullying of a child" was introduced. The child's right to protection from bullying was secured. Also, the competence of the authorized body in the field of education to develop Rules for the prevention of child bullying and Rules for the activities of psychological services in secondary education organizations were consolidated. In order to increase the accessibility and quality of individual support for children who have been bullied, for the first time, an algorithm of actions for educational authorities and organizations has been prescribed for appeals on the fact of bullying.

In his Message to the People of Kazakhstan, "A just state. A united nation. Prosperous Society" dated September 1, 2022, within the framework of the Year of Children the Head of State of Kazakhstan Kassym-Jomart Tokayev launched a new state program "National Fund for Children".

On November 16, 2023, the President of Kazakhstan signed a law on funds accrual from the National Fund of the Republic of Kazakhstan to children, their payments and use.

The law provides the deduction of 50% of the annual investment income of the National Fund of the Republic of Kazakhstan to special savings accounts of children up to the age of 18 without the right to early withdrawal. The accumulated money can be spent on education and housing. After the age of 18, the money will be kept in the account for 10 years. If a citizen does not use them during this period, the funds will be transferred to his retirement account. For children who were born before January 1, 2024, the number of annual accruals will be equal to the number of years remaining before reaching adulthood. Accounting for target assets and requirements, crediting to savings accounts, and disbursement of funds were assigned to a Single accumulative pension fund. The law came into force on January 1, 2024⁴.

³ Abdulova R.B., "Legal policy of the Republic of Kazakhstan and its development in area of children rights protection and their security"

⁴ Convention on the Rights of the Child: 30 years from the day of adoption by Kazakhstan, UNICEF

Also amendments have been developed to the Code of the Republic of Kazakhstan “On Marriage (Matrimony) and Family” regarding the introduction of the concept of “foster professional family” - a family that has been trained, has received permission to provide care for four foster children and is ready to accept children at any time of the day. After adoption of the amendments, the child will be brought up in a full-fledged family, with further provision for his upbringing, education, food, clothing, etc. The amendments also determine the amount of payment for foster carers and monthly child support allowance.

An Instruction on organization of anti-terrorist protection of facilities vulnerable to terrorism, carrying out activities in the field of education of the Republic of Kazakhstan has been adopted. 100% of state educational institutions are provided with video surveillance systems and most schools are connected to the Centers of operational management of internal affairs bodies, provided with licensed security equipped with alarm buttons.

There are 116 organizations for orphans and children left without parental care, 78 of them are in the education system, 20 in the health care system of children's homes, and 18 in the social protection system.

More than 400 children from socially vulnerable groups were admitted to 71 schools for gifted children “out of competition”.

More than 450 thousand schoolchildren from low-income families receive financial support from the Universal Education Fund every year. More than 200 thousand schoolchildren gain financial assistance from sponsors and patrons every year as part of the Republican charity campaign «The Road to School».

In order to protect children from violence and prevent suicide, the following comprehensive measures have been taken.

A roadmap has been adopted to strengthen the protection of children's rights, counteract domestic violence and address issues of suicidality among adolescents for 2020 – 2023, whose activities are aimed at activating the work of state bodies and organizations to improve the regulatory framework and methodological support for the entire sphere of protection of children's rights, coordination of activities and interdepartmental interaction.

During the implementation of the Roadmap, amendments and additions were made to the Sanitary Rules «Sanitary and epidemiological requirements for educational facilities» regarding the exclusion of outdoor toilets in educational institutions; security measures for students were strengthened, including access to buildings and on the territory of educational organizations, the order of stay of unauthorized persons; the Optional Protocol to the Convention on the Rights of the Child concerning the communication procedure was signed; a set of measures has been implemented to prevent Internet addiction among young people and children, as well as to protect the digital reputation of citizens; the Index of Well-being of Children of the Republic of Kazakhstan and others has been introduced. These measures made it possible to create a system on ensuring the safety of children in the republic⁵.

⁵ Annual Review of the Human rights situation in the Republic of Kazakhstan, Informational System Paragraph

To guarantee the further realization of children's rights, a comprehensive plan for the protection of children from violence, suicide prevention and ensuring their rights and well-being for 2023-2025 was adopted on August 31, 2023.

The comprehensive plan includes such areas as «realization of the right of children for protection from violence and abuse», «prevention and correction of suicidal and autoaggressive behavior of children», «improving the well-being of Kazakhstani children».

To address the above issues the Comprehensive Plan provides the following measures:

1. Development of an Interactive risk Map on the protection of children's rights. The interactive map will contain statistical data by region, educational organizations on all types of negative phenomena in the field of child rights protection (violence, suicide, offenses, childhood injuries, etc.). An interactive map with visual statistical data will help to raise awareness of the public, parents, teachers and school administrators about dangerous regions and the situation in the children's environment. This can contribute to a more responsible reaction to problems and to initiate actions to prevent and to eliminate negative phenomena.

2. Introduction of “case management” technology when considering issues of disadvantage, offenses, violence and other negative phenomena in the children's environment. Case management is a methodology and approach to managing individual cases or cases that require solutions within the framework of a specific activity or project. It is a systematic approach that includes planning, organizing, coordinating, monitoring and evaluating the process of solving problematic situations or complex cases. In the context of juvenile delinquency prevention case management is focused on the effective management of individual cases of minors who are at risk of offenses or have already committed offenses.

Case management will include components such as assessing the risks and needs of a minor, developing an individual intervention plan, organizing access to social services, coordinating work between various participants (internal affairs, education, social protection, health, culture and sports, etc.)

3. The project “Social patronage” will allow the comprehensive social services to accompany children from disadvantaged families. Social Patronage for Disadvantaged Families is an initiative aimed at providing support and assistance to families in difficult life situations or facing social problems.

The main goal is to improve the well-being and quality of life of families in need by providing support and assistance in various aspects of their lives, such as disruption of family relations, parenting problems, domestic violence or other difficulties that impede their functioning and development.

The trained and experienced patrons who are professionals in the field of social work and accompany disadvantaged families are involved in this project. Patrons provide individual support, consultations, assistance in conflict resolution, assistance in organizing access to social services and resources.

4. An interdepartmental program for the prevention and reduction of violence in educational institutions as a methodological support for all teachers working with children has been introduced.

The study of international experience has shown the effectiveness of the Finnish bullying prevention program among children KiVa.

KiVa is an innovative, award-winning, scientifically based on anti-bullying program. Over the 10 years of its operation in Finland, the rates of child bullying have decreased four times. This experience will be studied and implemented taking into account the peculiarities of the country's education system.

5. In 2019 the elaborated Rules for medical and social accounting were introduced into the Law “On the Prevention of Juvenile Delinquency and the prevention of child neglect and homelessness”.

This type of accounting and assistance will cover all disadvantaged families for providing them with comprehensive support and getting them out of trouble for the full development and residence of the child in the family.

As a result of these innovations, it is planned to reduce violence against children, among children, child crime, cruelty, as well as to put families from the “risk group” on the path of well-being. The comprehensive plan will assign the maintenance of medical and social records to the commissions for the affairs of minors and the protection of their rights.

7. Development of necessary mechanisms to protect children in the information space. Thus, the widespread broadcast in the media of information about violence, suicide among minors provokes the Werther effect: a massive wave of copycat suicides that occur after suicide widely covered by television or other media, or described in a popular work of literature and cinema.

8. Strengthening child-parent relations through universal parental education. From 2022, all educational institutions posted a sign with a QR code for the “Bala Qorgau” project to provide free consulting assistance to schoolchildren of Kazakhstan and their parents through the “balaqorgau” website. The site is designed to help students and their parents who face difficulties at school, at home and on the street. Children and their parents can scan the QR code from the sign and gain the informational support.

One of the measures of the Comprehensive Plan is consolidation of the work on creation of a unified republican contact center “Bala Qorgau” under the Committee for the Protection of Children's Rights of the Ministry of Education⁶.

On April 15, the President of Kazakhstan Kassym-Jomart Tokayev signed a law on enhancing the safeguards around the rights of vulnerable groups, particularly women and child. The new law, entered into force on June 16, 2024 tightens responsibility for domestic violence and toughen criminal and administrative penalties for violence against minors. Now, for health damage to minor, a family brawler can receive a fine, be arrested for up to 50 days or get restriction/imprisonment for up to 2 years.

A pedophile and a criminal are sentenced to life imprisonment for the murder of a young child. Sexual harassment of children under the age of 16 is punished by a fine, community service or arrest.

The law provides the creation of infrastructure for prevention and assistance to families. Family support centers will be created in each locality for assisting and providing temporary housing for women and children who are victims of violence.

Helplines will become an important tool in combating violence, as victims often seek help in only 40% of cases, and the police in only 10%. The 111 State Contact Center is open around the clock, and calls are free from all mobile operators in Kazakhstan.

Great emphasis is made on timely identification of families and children in difficult life situations. The law also excludes the possibility of reconciliation for all criminal offenses related to violence against children, ensuring the inevitability of punishment. Mandatory psychological work with the aggressor and the possibility of his eviction are provided⁷.

Children's right to development

Regarding the intellectual development of children, the President of Kazakhstan noted that it is impossible to get an educated society without good teachers.

⁶ Satubaldina A., Kazakhstan's Commissioner for Children's Rights Sheds Light on Recent Reforms in Exclusive Interview

⁷ Yeskarayev A., How Kazakhstan is Enhancing Protection for Women and Children

“An absolute priority is to increase access to quality education. This is the most important factor in the development of the whole society. It is impossible to raise the quality of education without good teachers” - the President stressed on January 11, 2022.

In this regard, the Head of the State instructed to develop a special program to attract the best teachers with an appropriate package of support measures for regions where there is a shortage of teachers and to raise the salaries of Kazakhstani teachers.

In addition, the President noted that the new public social Fund “Kazakhstan Khalkyna” will address real problems in the field of healthcare, education, and social support. Also he instructed to develop mass children's sports⁸.

The development of mass sports and creativity in Kazakhstan will allow children to spend less time on the Internet. As a result, today more than 500 thousand children attend sports and creative clubs on a free basis.

Quotas for educational grants for socially vulnerable children

Since 2021, quotas for socially vulnerable groups have been provided for the first time in Kazakhstan when distributing educational grants for the new academic year.

In 2023, more than 3.5 thousand children from large families became grant holders, about 1,000 children from single-parent families, and more than 300 children with special needs. Also, about 400 orphans became grant holders, and about 300 young people with disabilities became grant holders. They are currently studying at the university.

Thus, in general, today in the Republic of Kazakhstan the necessary organizational and functional institutions have been created to protect the rights and interests of children. The appropriate regulatory legal acts have been adopted, certain experience has been accumulated, that demonstrate creation of a national model for the protection of children's rights⁹.

Current problems of protection of children's rights in Kazakhstan

Some of the basic rights of the child are violated in Kazakhstan. Child abuse continues to be one of the most pressing problems in Kazakhstan. So, in 2023 alone, 2,452 criminal offenses were registered. More than half of these crimes involve physical violence against children. Every year, over 6,000 parents are prosecuted under the article “Failure to fulfill the duties on raising a minor”.

Another modern problem of children is bullying. In 2022, changes were made to national legislation that consolidated the concept of “bullying” and the rules for its prevention were adopted. That became a basis for starting work in preventing bullying. Special attention should be paid to the development of anti-bullying infrastructure for children especially in rural areas, where 45% of the country's schoolchildren live.

When fighting bullying, it is necessary to study and take into account the best foreign experience. The anti-bullying program were elaborated firstly in 2009 and are being implemented in 15 countries, such as Finland, Great Britain, Japan and others. The special feature of the program is an individual approach to students, a variety of tools, such as introduction of games into the curriculum, the development of roles of observers, bullies, victims and instigators. The program teaches children to identify the signs of bullying and respond to them correctly as bullying often occurs where there are no adults.

There are also many problematic issues related to social assistance, education, custody and guardianship, alimony.

⁸ Speech of the Head of the State Kassym-Jomart Tokayev at a meeting of Parliament of the Republic of Kazakhstan

⁹ Statistics of the Ministry of Education and Science of the Republic of Kazakhstan

In addition, the rights of children with disabilities to receive medical care and medicines are violated in Kazakhstan. The situation in the country is extremely poor with the prevention of disability of visually impaired, blind, hearing impaired and deaf children.

There is no system of early detection, early intervention and rehabilitation, and the necessary medical screenings, diagnosis and treatment of children are not carried out. Perinatal centers and polyclinics are equipped for early screening by only 15-30%. And a number of institutions have equipment, but no specialists¹⁰.

This situation leads to an increase in the number of disabled children, and then adults, and the state is forced to pay large sums for benefits, provision of technical rehabilitation facilities, and various state social services.

The lack of planning, analytical research, improperly structured processes and the lack of interdepartmental interaction entail enormous negative consequences.

According to UNICEF data from 2023, one million children in Kazakhstan live in poverty. That is one in six children does not have basic needs such as decent housing, clothing, access to quality medicine and education¹¹.

It is necessary to develop strategies at the local level to involve young people from vulnerable segments of the population in the socio-economic, cultural, educational, spiritual processes of the country. Also important to carry out active work to provide this vulnerable group with jobs, to involve the business sector in providing assistance in the development and education of young people.

In addition, despite the fact that today there is created a legislative framework and institutions for the protection of children's rights, Kazakhstan is constantly criticized by the UN Committee on the Rights of the Child. At the end of 2023 the committee published concerns to Kazakhstan. One of the questions was about children with disabilities and their long-term placement in special institutions. Children with disabilities face isolation, violence, neglect, physical restraint¹². The access of children with special needs to inclusive education and sports is also a significant problem. It seems necessary to continue creating a system of inclusive development for all categories, to provide all opportunities for access of children to cultural and sports facilities.

The disclosure of information about the availability of psychiatric records is also a problem in Kazakhstan. The divulging of personal data must be restricted as according to opinion of a number of people the children who are registered with a psychiatrist should be isolated from the society¹³.

The issue of restricting children's access to the Internet is also being raised. But at the same time, it must be remembered that article 13 of the UN Convention states: "The child has the right to express his opinion freely; this right includes the freedom to seek, receive and transmit information and ideas of any kind, regardless of borders, orally, in writing or in print, in the form of works of art or with the help of others funds of the child's choice".

In this regard, one of the most important and effective measures in this direction would be the active involvement of parents in controlling the use of modern information technologies by children, including limiting the time that children spend on the Internet. It is required to clearly limit the content by age. Educational organizations need to conduct informational and recommendation conversations with parents to ensure the Internet safety of children.

¹⁰ Akylbekova R., "On the rights of children in Kazakhstan and those who violate them"

¹¹ UNICEF Kazakhstan Country Office Annual Report

¹² 2023 Country Reports on Human Rights Practices: Kazakhstan, US. Mission Kazakhstan

¹³ Kazakhstan. Events of 2023, Human Rights Watch

In general, in order to solve the above issues, the State should develop strategic plans in all areas relating to the protection and realization of the rights of the child, taking into account the interests of each child, to determine specific deadlines, specifying a time frame with the appointment of responsible departments and specific persons, and to allocate a financial resources.

Educational institutions should carry out explanatory work with the participation of psychologists, juvenile inspectors, and experts from the human rights society. It is also essential to continuously improve national legislation, bringing it into line with international commitments assumed by the Republic of Kazakhstan.

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Challenges and Support Strategies for Orphaned Children and Youth in Kazakhstan: A Comprehensive Evaluation of the Youth House Program

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Abstract

This study examines the challenges faced by orphaned children and youth in Kazakhstan and evaluates the impact of various support programs implemented by organizations such as the Youth House, a subdivision of SOS Children's Village. Orphaned youth often experience psychological distress, limited educational opportunities, and difficulties in achieving personal and professional development. The Youth House employs a comprehensive approach, including religious awareness training, habit-breaking workshops, psychological games, career orientation training, and individual counseling to address these needs.

The results indicate significant improvements in the youths' critical thinking, communication skills, and overall psychological maturity. The interventions have also led to a decrease in harmful behaviors such as smoking and substance abuse. Despite these successes, several limitations were identified, including resource constraints, infrastructural issues, limited availability of mental health professionals, and a lack of long-term follow-up mechanisms.

To address these limitations, the study proposes increased funding, infrastructure development, enhanced psychological support, implementation of long-term monitoring systems, and stronger community engagement. The findings underscore the importance of comprehensive and sustained support for the successful integration of orphaned children and youth into society.

This research contributes to the understanding of effective strategies for supporting vulnerable orphaned youth in Kazakhstan and highlights the need for continued efforts and resources to improve their outcomes.

Introduction

One of the primary strategies of our republic's national policy is the legal protection of children. According to the Law of the Republic of Kazakhstan "On the Rights of the Child in the Republic of Kazakhstan," a child is defined as a person under the age of eighteen (majority) [1]. Legal protection of children refers to the system of normative legal acts that establish the legal status of minors as participants in public legal relations, detailing their rights, duties, and guarantees of rights and obligations, and outlining the organizational framework for bodies dealing with minors and safeguarding their rights and legitimate interests. Every state must endeavor to create a caring and compassionate society; it will only be strong and prosperous if it takes care of its children and their future. We often hear the phrase, "Children are the future of the country," and indeed, in 10, 15, or 20 years, they will form the most dynamic segment of our society. The main tasks of the Department for the Protection of Children's Rights are as follows:

1. Ensuring the implementation of the Constitution of the Republic of Kazakhstan, the United Nations Convention on the Rights of the Child, the laws of the Republic of Kazakhstan regarding the rights of the child, the Code of the Republic of Kazakhstan on marriage and family, education,

and other legislative and regulatory measures for protecting the rights and legitimate interests of children.

2. Coordinating interdepartmental cooperation and controlling the implementation of measures related to the realization of the rights of all categories of children at the local level, in accordance with the legislation of the Republic of Kazakhstan and the Convention on the Rights of the Child.

3. Assisting local executive bodies in implementing regional programs to protect children's rights and legitimate interests, and promoting spiritual and moral education.

4. Preventing and addressing "social" orphanhood, child abuse, and exploitation, aiding children in difficult life situations, and helping to create conditions for improving children's quality of life.

5. Creating conditions for the successful self-realization of children, supporting and encouraging children's social initiatives and public organizations aimed at their successful integration into society based on moral and spiritual values.

6. Monitoring the implementation of the provisions of the Convention on the Rights of the Child, programs of moral and spiritual education, analyzing and forecasting the social well-being and spiritual growth of children, and developing recommendations for improving the quality of life and upbringing of children in the region.

7. Raising public awareness about children's rights and ways to implement them [2].

A sociological survey conducted in 2017 by the Department for the Protection of Children's Rights in Almaty revealed that over 80% of children do not trust teachers or psychologists; at best, they confide in a friend, but more often, they try to solve issues on their own. None of the respondents were aware of their right to protection under the Code of the Republic of Kazakhstan "On Marriage (Marital) and Family" [3]. Therefore, there is a pressing need to establish the legal foundations of behavior in the education of minors, prevent crime, socially reintegrate juvenile offenders, and protect children's rights and freedoms under the law. The lack of experience, stable moral values, and physiological characteristics of juveniles often lead to their involvement in criminal and anti-social activities. Juvenile crime is characterized by a resistance to lawful behavior, often involving the commission of crimes multiple times. Juveniles commit crimes in groups more frequently than adults (about half), reflecting the general nature of peer group behavior. Consequently, most juvenile crimes (approximately 80%) are committed with peers during their free time together [4].

The vulnerability of orphaned children and youth in Kazakhstan is a significant concern. This study examines the various challenges faced by these vulnerable groups and evaluates the impact of interventions provided by organizations such as the Youth House, a structural subdivision of SOS Children's Village. The study aims to understand the issues, methodologies applied, results achieved, and conclusions drawn from the support programs implemented for these children and youth.

Orphaned children and youth in Kazakhstan face numerous challenges that impede their development and integration into society. Various organizations, both governmental and non-governmental, have implemented programs to support these vulnerable groups. For example, the SOS Children's Villages provide long-term support through housing, education, and psychological care. Studies have shown that children raised in supportive environments exhibit better psychological and educational outcomes compared to those in traditional orphanages. Another example is the KOMEK Center, which focuses on addressing substance abuse and other harmful behaviors among youth. Their intervention programs have shown significant success in reducing smoking and drug use. Similarly, the DARA Foundation's career orientation and life skills training programs have been instrumental in helping orphans transition into independent adulthood.

Methodology

The Youth House employs a comprehensive approach to address the needs of vulnerable youth. The methodologies include a variety of training programs and psychological support initiatives aimed at holistic development. Key interventions include:

1. Religious Awareness Training: Conducted by specialists from the religious center, these sessions focus on understanding the differences within Islamic sects under the guidance of local imams.

2. Habit-breaking Workshops: Specialists from the KOMEK center conduct workshops to combat smoking, substance abuse, and other harmful behaviors.

3. Psychological Games and Training: Experts from the DARA foundation and OilaB, along with guest expert Ilustratov, conduct psychological games aimed at enhancing critical thinking, communication skills, and public speaking.

4. Career Orientation Training: The DARA foundation organizes several career orientation training sessions to help the youth identify and pursue their professional goals.

5. Training on Utilizing State Services: Practical training on how to use state services, provided by DARA foundation specialists, equips the youth with essential life skills.

6. Legal Education Workshops: The Academy of Law Enforcement under the General Prosecutor's Office conducts workshops on legal education and crime prevention.

7. Individual Counseling: Personal psychological counseling sessions conducted by expert Ilustratov provide tailored support to address individual emotional and psychological needs.

8. Educational Courses: Various educational courses are provided to enhance skills such as English language proficiency, tattoo artistry, image-making, hairdressing, and driving.

The interventions are designed to provide both immediate and long-term benefits, equipping the youth with essential skills for their future.

Results

The interventions implemented by the Youth House have yielded positive results. All 25 youth under their care have shown significant improvements in various aspects of their lives. The religious awareness training has fostered greater religious tolerance and understanding among the participants. The habit-breaking workshops have led to a noticeable decrease in smoking and substance abuse.

The psychological games and training sessions have enhanced the youth's critical thinking and communication skills, making them more confident in public speaking. Career orientation training has helped many of the youth set and pursue their professional goals, with several participants securing employment or enrolling in higher education institutions.

Training on utilizing state services has empowered the youth with practical knowledge, while the legal education workshops have increased their awareness of their legal rights and responsibilities. Individual counseling sessions have provided personalized support, addressing specific psychological and emotional needs. The educational courses have equipped the youth with valuable skills, contributing to their overall development and readiness for independent living.

Additional Data

From the annual report of the Youth House, additional detailed information includes:

-Number of Beneficiaries: The Youth House provided services to 32 beneficiaries in 2021, ending the year with 26 active participants.

-Demographics: The children are diverse in ethnicity, with 8 Kazakhs, 13 Russians, and 5 of other nationalities. Their ages range from 16 to 21 years.

-Support Provided: **

- Financial Support: Each youth receives monthly allowances for clothing, personal expenses, and educational needs.
- Health Support: Regular medical check-ups and dental services are provided.
- Educational Support: Courses in English and other vocational skills are offered.
- Psychosocial Support: Regular training and individual counseling sessions are conducted.

Limitations

Despite the successes, several limitations were identified in the current support programs:

- 1.Resource Constraints: The financial resources available are limited, which affects the breadth and depth of services provided.
- 2.Infrastructure Issues: The facilities, such as the Youth House, often face infrastructural challenges like outdated heating systems and lack of central sewage systems.
- 3.Psychological Support: While individual counseling is provided, the availability of mental health professionals is limited, affecting the frequency and quality of psychological support.
- 4.Long-term Monitoring: There is a lack of long-term follow-up mechanisms to track the progress of youth after they leave the program.

New Proposals for Implementation

To address these limitations and enhance the support for orphaned children and youth, the following proposals are suggested:

- 1.Increased Funding: Seek additional funding from government and private sectors to expand the range of services and improve existing facilities.
- 2.Infrastructure Development: Invest in upgrading the infrastructure of the Youth House, including modern heating systems and central sewage connections.
- 3.Enhanced Psychological Support: Increase the number of mental health professionals and provide continuous training to existing staff to improve the quality of psychological support.
- 4.Long-term Follow-up Program: Implement a long-term monitoring system to track the progress of the youth after they exit the program, ensuring continued support and intervention when necessary.
- 5.Community Engagement: Strengthen partnerships with local communities and organizations to create a support network for the youth, facilitating their integration into society.

Conclusion

The comprehensive support programs implemented by the Youth House have proven effective in addressing the multifaceted needs of orphaned children and youth in Kazakhstan. These interventions have not only provided essential skills and knowledge but also fostered psychological maturity and independence among the participants. Continued support and expansion of such programs are crucial for ensuring the successful integration of these vulnerable groups into society.

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Art History

People's artist Arif Huseynov

Sevil Bayram qızı Əliyeva

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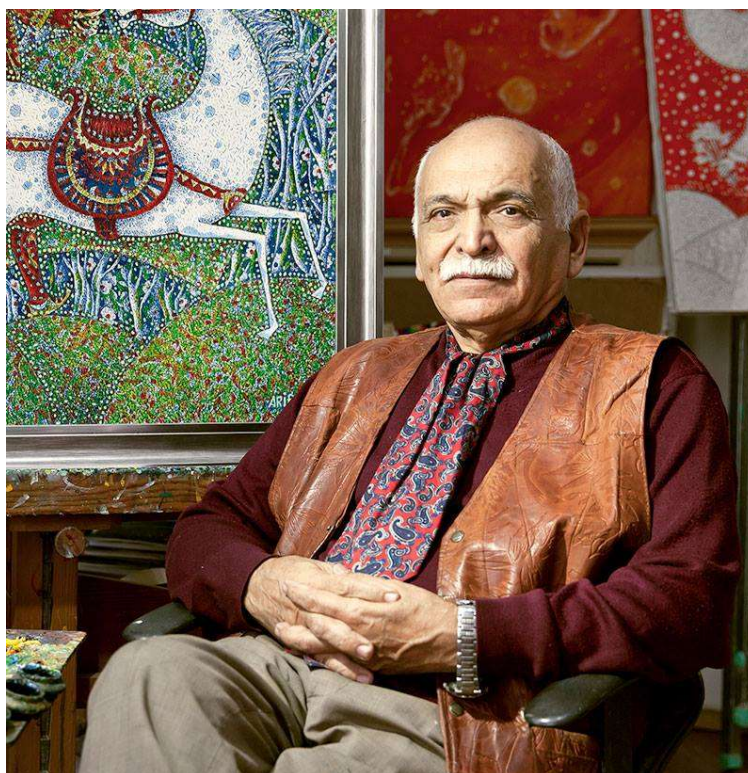
Abstract. Indeed, the examples of material culture, folklore, and our traditions, which he was connected with throughout his creativity, have entered a new life in his works. For example, "Karabagh Shikastesi", "Mis Jars", "Ashiq", "Kandirbazlar", etc. In addition to the artist's attachment to the ancient traditions of miniature art, the civic fire and bigotry are clearly felt in the works.

Keywords: Azerbaijan, Karabakh, Shusha, graphics, Arif Huseynov

Arif Huseynov, who loves literature from his heart, has repeatedly turned to the creativity of great wordsmiths. His N. Ganjavi, M. Fuzuli, M.A. Sabir, H. Javid, S. Vurgun, R. Rza and other classic works he created are considered the best examples of easel graphics.

Arif Huseynov is also the author of exquisite book illustrations, an excellent teacher, and a true patriot. His endless love for the motherland can be felt in his works.

Arif Hüseynov – Azərbaycanın Xalq Rəssamı, professor, tanınmış miniatürçü -rəssam, ədəbi əsərlərin grafik rəssamı və illüstratorudur.



Arif Şahbaz oğlu Hüseynov 30 oktyabr 1943-cü ildə Bakının Qala kəndində anadan olub. O, ilk təhsilini Ə.Əzimzadə adına Azərbaycan Dövlət Rəssamlıq Məktəbində alıb. 1972-ci ildə Azərbaycan Dövlət Mədəniyyət və İncəsənət Universitetini bitirən Arif Hüseynov 1975-ci ildən Rəssamlar İttifaqının üzvüdür.

Görkəmli qrafika ustası Arif Hüseynov daim axtarışda olan, milli folklorla, adət-ənənəyə bağlı sənətkarlarımızdandır. Onun illər boyu müxtəlif miqyaslı sərgilərdə nümayiş etdirilən əsərləri rəssamın sənət dünyasındakı imzasını təsdiqləyəcək mühüm faktlardır. Ötən əsrin 70-ci illərindən başlayaraq Arif Hüseynovun əsərləri dafələrlə Bakıda, eləcə də dünyanın bir çox möhtəşəm sərgi salonlarında tamaşaçıların diqqətinə çatdırılıb. Moskvada, Praqada, Tokioda, Ankarada, İzmirdə sərgilənən əsərlərinə görə Arif Hüseynov müxtəlif mükafatlara, diplomlara layiq görülüb.



Sənətşünas Ziyadxan Əliyev görkəmli rəssamla bağlı yazır: “Qrafika sənətinin bədii və texniki imkanlarına kifayət qədər bələd olan və ağ-qara cizgiləri ilə də onlara yığcam rəng ovqatının qatılmasını bədii-psixoloji təsir gücünün artırılmasına yönəltməklə daha təsirli ifadə vasitələrinə can atan rəssam sonda cəlbədiciliyi ilə yanaşı, həm də dərin fəlsəfi yüklü əsərlər yaratmağa nail olmuşdur”.



Həqiqətən də yaradıcılığı boyu bütün varlığı ilə bağlı olduğu maddi mədəniyyət nümunələri, folklor, adət-ənənəmiz onun əsərlərində yeni həyata, yaşama qədəm qoyub. Məsələn, “Qarabağ şikəstəsi”, “Mis qablar”, “Aşıq”, “Kəndirbazlar” və s. əsərlərdə rəssamın qədim miniatür sənəti ənənələrinə bağlılığı ilə yanaşı, vətəndaşlıq yanğısı və təəssübkeşliyi də qabarıq hiss edilir.

Ədəbiyyatı ürəkdən sevən Arif Hüseynov böyük söz ustalarının yaradıcılığına dəfələrlə müraciət edib. Onun N.Gəncəvi, M.Füzuli, M.Ə. Sabir, H.Cavid, S.Vurğun, R.Rza və digər klassiklərimizlə bağlı yaratdığı əsərlər dəzgah qrafikasının ən gözəl nümunəsi sayılıb

Arif Hüseynov həm də nəfis kitab illüstrasiyaların müəllifi, mükəmməl müəllim, həqiqi vətənpərvərdir. Onun əsərlərində vətənə sonsuz məhəbbəti hiss olunur.



Rəssam 1994 – cü ildə “Azərbaycan Dünyası” qalereyasının təsisçisi olmuşdur. “Azərbaycan Dünyası” – Bakıda birinci qalereya idi.

1995 – ci ildə - Təsviri İncəsənət Sahəsində uğurlarına görə “Humay” mükafatına layiq görülmüş rəssam 2006 – cı ildə Azərbaycan Respublikasının Xalq rəssamı adına layiq görülmüşdür.

Uzun illərdir ki, rəssam vaxtının bir hissəsini gənc nəslin nümayəndələri, uşaqlar və yeniyetmələrlə işləməyə sərf edən Arif Hüseynov Azərbaycan təsviri incəsənətinin gələcəyi üçün yeni rəssamlar hazırlayır. Rəssam öz əsərləri ilə Azərbaycan xalqının zəngin daxili dünyasını və xüsusiyyətlərini təsvir edir.



Rəssamın Müasir İncəsənət Muzeyində 27 fevral 2019-cu ildə “Qarabağname - tarixin səhifələri” adlı sənədli-bədii qrafika sərgisində 50-dən çox sənədli-bədii qrafik əsərlər nümayiş olub.

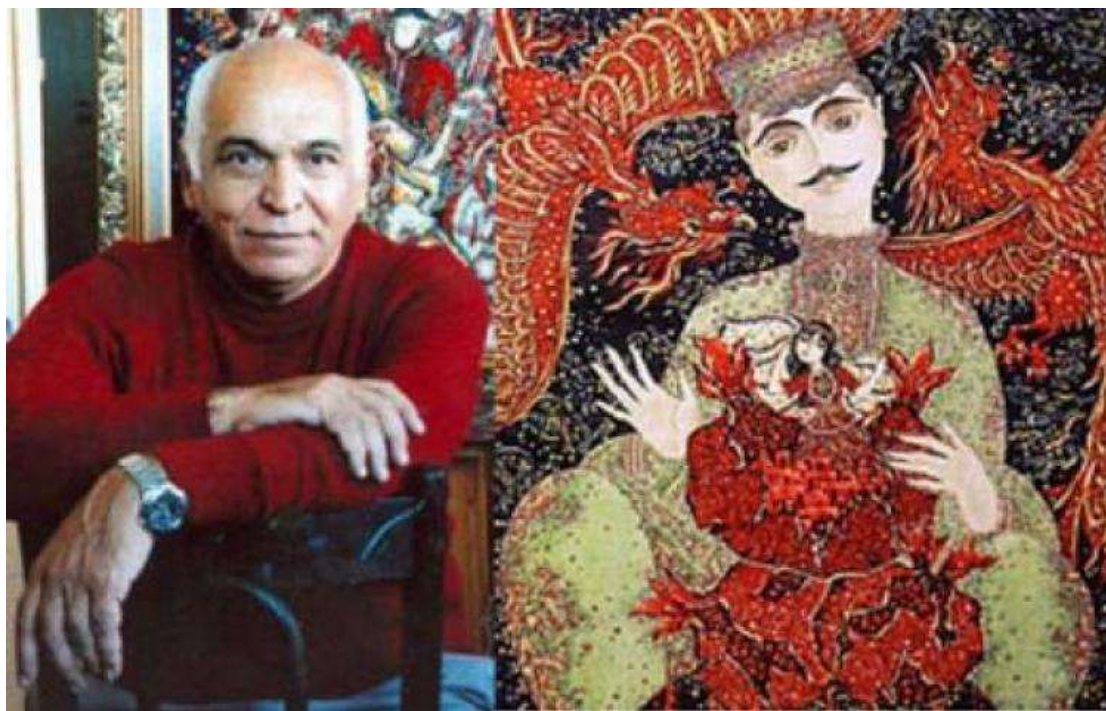
Əsərlər tarixi materiallara əsaslanır. Silsiləyə daxil olan əsərlərdə Alban kilsəsi, tarixi faktlar, tarixi yerlərin mənzərələri və tarixi şəxsiyyətlərin portretləri təsvir edilir. Əsərlərdə Türkmənçay müqaviləsi, Alban kilsələrinin dəyişdirilməsi, Xocalıya aid kompozisiyalar əks etdirilir. Bu sərgidə nümayiş etdirilən əsərlərin özünəməxsusluğu ondadır ki, əsərlərin adları yoxdur. Qrafik əsərlərin üzərində yazılan mətn isə əks etdirilən hadisələri və şəxsiyyətləri təsvir edir.

Xalq rəssamının “ I Pyotrun məktubu”, “Türkmənçay müqaviləsi”, “Gəncəsər monastırı”, “Güllələnmiş heykəllər”, “Qarabağ müharibəsi”, “Pənahəli xan”, “Xalq musiqiçiləri” kimi əsərlərdə tarixi həqiqətlərin rəssam təxəyyülü ilə uğurlu qovşağından ərsəyə gətirilən təsvirləri kifayət qədər cəlbedici və yaddaqalandır. Sərginin bütün əsərləri qravürə şəklində işlənmişdir. Tarixi həqiqətlər rəssamın incə təxəyyülü vasitəsilə əsərlərində əks etdirilir. Ağ-qara qrafika vizual təsirə malikdir.



Sərgi bütövlükdə tarixi faktlar əsasında qurulub və maarifləndirici xarakter daşıyır. Hər bir Azərbaycan vətəndaşı öz tarixini bilməlidir. Çünki Qarabağ – bizim torpağımız, bizim tariximizdir.





Bu gün Arif Hüseynovun əsərləri R.Mustafayev adına Azərbaycan Dövlət İncəsənət Muzeyində, Azərbaycan Dövlət Rəsm Qalereyasında, Moskva Dövlət Şərq Xalqları İncəsənət Muzeyində, həmçinin şəxsi kolleksiyalarda saxlanılır.

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HISTORY OF FASHION

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Abstract. The history of fashion is said by many circles that the concept of fashion first appeared in the 1900s. Charles Worth's assistant, Paul Poiret, who was considered one of the best tailors of that time, opened his workshop in Paris in the following years. Fashion and vogue took on a different dimension and ignited fashion trends as Poiret showcased his specially designed dresses. The historical development of fashion began in 1902 when Thomas Burberry first printed his brand on gabardine, and in 1905 it began to reach a wider audience with the publication of fashion supplements in newspapers.

Keywords: Fashion, history, art

Dəbin tərfi latınca "modo" sözündən gəlir, mənası "hal-hazırda" deməkdir. Dəbin də ürəyi sayılan İtaliyada dəb sözünü müvəqqəti dəb kimi də təyin edirlər. Diqqəti cəlb etmək ehtiyacı, dəyişiklik ehtiyacı, fərqli görünmək və ya bəzədilmək ehtiyacı da müvəqqəti yenilik anlayışını ifadə edir və ya moda olaraq da bilinir. Moda qısaca tərif etsək, deyə bilərik ki, bu, müəyyən dövrdə trend olan nəyəsə sosial zövq və ya həddindən artıq tələbatdır.

Dəb dedikdə ilk ağla gələn geyim olsa da, moda bir çox fərqli sahəyə hakimdir. Bu, musiqidən memarlığa, incəsənətdən ədəbiyyata, teatrdan yemək və aksesuarlara qədər geniş sahələrə təsir göstərə bilər.

Moda sözü ümumiyyətlə orijinal üslubda hazırlanmış geyim kombinasiyası kimi ifadə edilsə də, 1400-cü illərdən günümüzə qədər olan dövrdə; Kütlənin ən çox üstünlük verdiyi paltarların qısa müddətdə istifadə edilməsi deməkdir. Bundan əlavə, moda mədəniyyətlərdən asılı olaraq fərqlənə bilər.

Moda tarixi bir çox dairələr tərəfindən dəb anlayışının ilk dəfə 1900-cü illərdə ortaya çıxdığı bildirilir. O dövrün ən yaxşı dərzilərindən sayılan Çarlz Uortun köməkçisi Pol Poiret sonrakı illərdə Parisdə öz emalatxanasını açır. Poiretin xüsusi dizaynı paltarlarını nümayiş etdirməsi ilə dəb və dəb fərqli bir ölçü aldı və moda meyllərini alovlandırdı. Dəbin tarixi inkişafı 1902-ci ildə Tomas Burberinin öz brendini ilk dəfə gabardin üzərində çap etdirdiyi vaxtdan başlayıb və 1905-ci ildə dəb əlavələrinin qəzetlərdə dərc olunması ilə daha geniş auditoriyaya çatmağa başlayıb.

Moda tarixinə adını yazdırmış dizaynerlər:

Coco channel

KARL LAGERFELD

Alexander McQueen

Giorgio armani

Donatella & gianni versace

Cristian dior

Guccio gucci

Ralph Lauren

Yves saint laurent

Mario & miuccia prada

Valentino garavani

Economic Sciences

The Effect of Political Events on Financial Markets: A Case Study of Brexit

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1. Introduction

1.1. Relevance of the research

Political events have an important role in defining the global economic environment, with considerable implications for financial markets. These events can include elections, referendums, unexpected governmental decision-making, and foreign conflicts. Understanding how markets react to such occurrences is a critical component of financial analytics and economic prediction.

Brexit, or Britain's exit from the European Union, has been one of the most momentous political events of recent years. This process, which began with the referendum on June 23, 2016 and will conclude with the formal publication on January 31, 2020, has had a significant influence on the worldwide financial markets. The study of market reactions to Brexit enables scholars and practitioners to better understand risk transfer processes and the adaptation of financial instruments to new political circumstances.

Recent studies shows that political events may cause large fluctuations in stock prices, volatility levels, and government bond rates. For example, studies of the Turkish market following unexpected government choices show that such events can produce dramatic variations in stock values and shifts in investor confidence. Similar studies done on the Sri Lanka Stock Exchange demonstrate that political concerns have a significant impact on asset prices and investor behavior.

Brexit is a one-of-a-kind case study since it was not only unexpected, but it also has long-term implications for financial markets. According to research on market reactions to Brexit, this event resulted in a large rise in volatility as well as changes in stock prices and bond rates, making it a relevant topic for further investigation.

This study is important not only because Brexit is a significant political event, but also because of its implications for the global economy. Understanding how financial markets react to such occurrences allows you to better forecast future swings and create risk management measures. This is especially critical in light of rising global uncertainty and volatility.

Hence, studying the influence of political events on financial markets, with a focus on Brexit, is a vital step toward gaining a thorough understanding of financial market mechanisms and adapting to changing political and economic situations.

1.2. The purpose and objectives of the study

The goal of the research is to thoroughly examine the influence of political events like Brexit on financial markets. In light of global economic insecurity and rising political uncertainty, monitoring the reaction of financial markets to big political events is becoming increasingly relevant. Brexit, the process of Britain's exit from the European Union, is a unique case study due to its duration and several crucial dates, each of which has had a considerable influence on global financial markets.

The study's main goal is to examine how political events surrounding Brexit influenced major financial indicators such as stock indexes, the volatility index (VFTSE, VIX), and government

bond rates. The investigation will focus on several significant Brexit dates, including the referendum on June 23, 2016, the activation of Article 50 of the Lisbon Treaty on March 29, 2017, the UK's legal exit from the EU on January 31, 2020, and the conclusion of the transition period on December 31, 2020. Each of these occurrences causes major movements in the financial markets, offering ample data for in-depth examination.

To attain this purpose, the study will solve many problems. The first job is to assess changes in the values of major stock indexes such as the FTSE 100 and FTSE 250 in the periods before and after the critical dates of Brexit. Comparing these adjustments with foreign indexes such as the Nikkei 225 will disclose the relative effects and comprehend how much the impact of Brexit differs at the domestic and international levels.

Observing how the VFTSE volatility index grows over time—a measure of market participants' predictions for future volatility—is the second purpose. An investigation of VFTSE movements in the context of Brexit will aid to understand how uncertainty associated to political events effects the perception of risk by market players. Correlation studies between VFTSE and stock indexes will offer greater information on the correlation between volatility and market reactions.

The third aim focuses on assessing changes in government bond rates. Studying the rates of British government bonds and comparing them will reveal the effect of political events on investor confidence in government assets. Regression analysis will enable you assess the effect of various factors on changes in profitability.

In addition, a qualitative study of the news background and market mood will be provided in the research to better appreciate the perspectives and expectations of market players. Studying news and expert comments before and after important events will offer context for analyzing quantitative data. A comparison of forecasts and actual results will also allow us to examine the appropriateness of market reactions to political events.

Thus, the research is intended at uncovering patterns and processes of influence of key political events on financial markets. This will make it possible to build risk management systems and strengthen the resilience of financial institutions to political unpredictability. An integrated approach to data analysis, incorporating both quantitative and qualitative methodologies, will offer a thorough knowledge of the influence of Brexit on financial markets.

1.3. The framework of the research

This study is created using such a way as to completely and consistently examine the impact of Brexit on financial markets. At the beginning of the study, the relevance of the topic, purposes and objectives of the research are set. This is followed by a literature study of the main theoretical techniques and empirical investigations on the effect of political events on financial markets, including the ideas of efficient markets and behavioral finance.

The research methodology tackles in detail selected indicators such as stock indexes, volatility index (VIX) and government bond rates, as well as data collecting and analysis approaches, including time series and regression analysis. The inclusion of a qualitative assessment of the news context allows you to enhance the quantitative facts.

The fundamental component of the study studies changes in stock indices, volatility and bond rates in the periods before and after important events connected to Brexit. The findings of all variables are merged to reveal common trends and patterns, as well as to undertake correlation analysis.

The concluding chapter gives results and ideas, addresses the restrictions of the study and proposes opportunities for more research. This strategy delivers a complete grasp of the influence of Brexit on financial markets and helps to design risk management strategies in the face of political uncertainty.

2. Literature Review

2.1 Investigation of the impact of political events on financial markets

Most pivotal research questions in financial economics is how political events are influencing on financial markets. Political events may vary from elections and referendums to unexpected political decisions and international wars, and their ramifications on markets are frequently large and unpredictable. The main concept underpinning most research is that markets are efficient and react fast to new knowledge, yet there is an abundance of actual data pointing to times when markets display irrational behavior.

For a prime example, the Turkish stock market have proved that political events, such as the unexpected decision of the Turkish parliament to oppose the deployment of American soldiers, may generate large movements in the markets. Findings support the theory of market efficiency (EMH), demonstrating that stock prices quickly adjust to new information while also highlighting instances when markets display irrational behavior in response to unusual events (Aktas and Oncu, 2006).

The influence of political events on stock markets is also proven by research done on the Sri Lanka Stock Exchange. The market responses to 40 key political events were analyzed and the results showed political events had a significant negative influence on average abnormal stock returns, demonstrating markets' great sensitivity to political risks (Ramesh & Rajumesh, 2015).

Studying market volatility in reaction to political events reveals that such developments typically lead to a considerable surge in volatility. For example, studies on the influence of different political events on the stock market in Taiwan found that a large number of political events lead to abnormal volatility in stock prices, but some events may be basically uninformative (Chen et al., 2005).

A research revealed that political risks could explain a substantial portion of the variance in yields in developing economies. They observed that political risks have a considerable influence on stock returns in selected developing countries, notably in the Pacific rim, in contrast to developed markets, where the impact of political risks is less clear (Bilson et al., 2002).

The financial market and political uncertainty are also significant variables of research. The research presented that political instability is one of the most major variables connected with capital outflows from developing nations. They found that political uncertainty, economic risks and policy volatility have a significant impact on capital movements, which stresses the importance of taking political concerns into account when judging financial markets in developing countries (Le and Zak, 2006).

Research on market responses to terrorist attacks and natural calamities also gives useful insights into the effect of unusual occurrences on financial markets. For example, a study of the effect of the September 11 attacks on airline stock prices found that markets responded promptly and rationally to catastrophic events, distinguishing between various enterprises based on their degree of exposure to hazards (Carter and Simkins, 2004).

In general, the study on the influence of political events on financial markets reveals that such events may create large and sometimes unexpected movements in the markets. Research demonstrates that markets tend to respond swiftly to new information, but in times of severe events they might display illogical behavior. Political risks and uncertainty play a significant influence in establishing market dynamics, particularly in rising countries, where political stability is often one of the primary drivers for investors.

2.2. Brexit events and their financial importance

Brexit has become one of the most momentous political events of recent decades, having a major impact on the economy of the United Kingdom and the European Union. The referendum held on June 23, 2016 ended with an unexpected result: the majority of voters (51.89%) decided to leave the EU (Kuznetsova and Zakharyan, 2016). Move provoked an immediate reaction in the financial markets, with a sharp decrease in the value of the pound and a plunge in stock prices.

The UK's withdrawal from the EU has spurred different conversations and research among academics and economists. The study investigates the implications for commerce between the UK and the EU after the signing of the Free commerce Agreement on December 24, 2020. The agreement makes it feasible to avoid a harsh Brexit and secure free commerce without quotas and taxes while complying with European standards. However, it has not abolished all barriers, which is verified by lineups of trucks at the crossings and problems with the supply of commodities (Vyunichenko, 2021).

Research reveals that Brexit has damaged all elements of the British economy, including trade, investment and jobs. The day after the referendum, the value of the pound sterling fell to its lowest point in the previous 30 years, losing more than 11% vs the US dollar and the Swiss franc. This had a particularly large effect on the foreign currency market (Kuznetsova and Zakharyan, 2016). This demonstrates the significant degree of uncertainty and nervousness in the markets generated by political decisions.

In addition, Brexit has resulted to considerable policy and regulatory reforms. The research evaluates the impact of Brexit on European financial markets, stating that the process of Britain's withdrawal from the EU created a rise in volatility and weakened investor confidence. The study underlines the necessity to change risk management tactics in times of rising uncertainty (Huseynazade, 2020).

The free trade deal concluded between the UK and the EU did not solve all the concerns. It introduced new commercial hurdles, such as customs checks and onerous documentation procedures, which increased costs and delivery times (Vyunichenko, 2021). British firms, mainly in the service sector, are confronting additional barriers, including the need to get licenses to operate in EU states and comply with various regulatory requirements.

The effect of Brexit is also felt at the level of international commercial ties. According to a report by the International Monetary Fund, UK GDP growth slowed to 1.1% in 2017, indicating long-term economic effects (Kuznetsova and Zakharyan, 2016). The European Central Bank anticipates a drop in the growth rate of the eurozone economy by 0.2% due to the UK's exit from the EU.

Thus, Brexit has had a substantial influence on the economy and financial markets of the UK and the EU. Research reveals that policy actions can have major and long-term economic implications, which underscores the necessity to establish risk management techniques and adapt to new situations.

2.3. Financial Market Analysis Indicators

To study the impact of political events on financial markets, many indicators are utilized, each of which provides distinct information on the market reaction and economic consequences. In the context of Brexit, crucial indicators are stock indexes, the volatility index (VIX) and government bond yields. These indicators make it feasible to completely examine the impact of political events on various areas of financial markets.

Stock indexes such as the FTSE 100 and FTSE 250 provide an overall picture of the UK stock market. The FTSE 100 includes the largest companies listed on the London Stock Exchange and serves as a barometer of the strength of the country's economy. A study of the dynamics of these indices before and after the major Brexit dates demonstrates changes in market sentiment and

investor confidence. Research emphasizes that big political events can generate both short-term swings and long-term trends in stock markets, reflecting the unpredictability of expectations regarding future economic policy (Phelps & Low, 2017).

The Volatility Index (VIX), sometimes known as the "fear index," measures the expected short-term volatility of the market. Utilized often for risk assessment, the VIX is a crucial indicator of market uncertainty. A study by Chen and Lee (2018) indicates that an increase in the VIX is frequently accompanied with political uncertainty, which leads to an increase in risk premiums and a change in investor strategy (Chen & Lee, 2018). In the context of Brexit, studying the movements of the VIX helps to understand how much political instability influences the perception of risk by market participants.

Government bond yields are another important indicator of investor confidence in the nation's debt obligations. Bond yield movements may be seen as indicating shifts in political risk and economic expectations. According to Smithson and Johnson's (2019) study, for instance, political instability like Brexit may cause significant fluctuations in bond rates, reflecting uncertainty in the assessment of a nation's creditworthiness and overall economic condition.

3. Methodology

3.1. Selection of critical dates

To assess the effect of Brexit on financial markets, it is needed to pick major dates that have become crucial milestones in the process of Britain's separation from the European Union. The choice of these dates is decided by their importance and their ability to cause substantial market reactions.

The first crucial date is June 23, 2016, the day of the referendum, in which the majority of people voted for the UK to exit the EU. This date is crucially significant because it triggered an instant response in the financial markets, including a steep decrease in the value of the pound and a collapse in stock indexes (Kuznetsova and Zakharyan, 2016).

The second crucial date is March 29, 2017, when the British Prime Minister formally informed the European Union of his decision to exit from the organization, triggering Article 50 of the Lisbon Treaty. This event underlined the UK's commitment to execute Brexit and was a key signal to the markets about the commencement of a two-year negotiating process (Kostov, 2017).

The third major date is January 31, 2020, when the UK formally departed the EU. This event ended the first stage of the Brexit process and generated major changes in the markets as investors and experts analyzed its immediate and long-term effects (Huseynzada, 2020).

The fourth date is December 31, 2020, when the transition period ends and the new trade deal between the United Kingdom and the European Union goes into effect. This time represented the beginning of a new stage in relations between the UK and the EU, which was reflected in changes in trade and economic conditions (Vyunichenko, 2021).

Data from recognized financial sources such as Bloomberg, Reuters and Yahoo Finance were leveraged to obtain data on stock indexes, the volatility index (VIX) and government bond rates in the periods before and after these crucial dates. The evaluation of this data helps us to establish how the markets reacted to each of these incidents and how the important financial indicators evolved.

The analytical approach utilizes time series, percentage changes and moving averages to illustrate long-term trends and short-term swings. Correlation and regression studies are used to study the similarities between different financial indicators and establish causal linkages between political events and market movements.

Qualitative investigation of the news context also plays an essential part in this research. It covers the study of news and analytical commentary produced in respectable media such as The Financial Times, The Economist and The BBC. This technique helps us to enhance quantitative data

and better comprehend the background of market moves, as well as the emotions and expectations of market players.

Consequently, the pick of important dates and the methods of the study give a full and thorough approach to measuring the effect of Brexit on financial markets. A full study, mixing both quantitative and qualitative methods, allows us to spot the key trends and patterns, as well as to give advice for risk management under times of political uncertainty.

3.2. Selection of indicators

The complete research of the effect of Brexit on financial markets, many significant financial indicators were chosen, including stock indexes, volatility index (VIX) and government bond rates. These indicators were selected for their capacity to represent many elements of the market response to political events and give a complete picture of the financial condition.

Stock indexes that include the FTSE 100 and FTSE 250 are major indications of the status of the British stock market. The FTSE 100 covers the 100 biggest firms traded on the London Stock Exchange and gives information on the mood among major investors and the overall status of the economy. The FTSE 250 comprises mid-cap firms, which gives insight into a larger market sector and reacts to domestic economic situations. In addition to the British indexes, the S&P 500, representing the biggest US firms, was chosen for comparison in order to measure the relative effect of Brexit on worldwide markets (Phelps & Low, 2017).

The Volatility Index (VIX), sometimes known as the "fear index," forecasts the stock market's volatility using S&P 500 option contracts. The VIX is a measure of market uncertainty and market participants' predictions about future fluctuations. High VIX readings generally reflect higher uncertainty and anxiety in the market, which is commonly witnessed during moments of political turbulence (Chen & Lee, 2018).

The yield of government bonds shows the amount of trust that investors have in government debt obligations. Changes in bond rates may signify fluctuations in economic prospects and the amount of political risk. The yields of British government bonds (gilts) and U.S. government bonds were chosen for the study. Comparing these data enables us to analyze how local and foreign investors responded to the political uncertainty produced by Brexit (Smithson & Johnson, 2019).

For qualitative analysis, data from reliable news sources such as The Financial Times, The Economist and The BBC were utilized. This approach helps us to enhance quantitative data and give context for analyzing market developments. It is vital to evaluate how the news backdrop and analyst remarks impact the attitudes and expectations of market participants, particularly during moments of greater uncertainty (Henderson & Clark, 2020).

The combination of these indicators allows you to get a clear picture of how financial markets respond to political events like Brexit. market indexes provide information on market reactions, the volatility index shows the level of uncertainty, and bond yields reflect investor confidence in government obligations. A qualitative analysis of the news environment adds another layer of information to understanding the causes and consequences of market fluctuations.

Therefore, the adoption of these indicators and research methodologies allows for a thorough and in-depth evaluation of the effect of Brexit on financial markets. This offers a trustworthy platform for detecting significant trends, patterns and creating suggestions for risk management in times of political instability.

3.3. Methods of analysis

A mix of quantitative and qualitative methodologies is utilized for a complete and in-depth research of the effect of Brexit on financial markets. This part examines in depth the primary techniques of analysis, including their design and the formulae utilized.

Time series analysis

Time series analysis enables you to follow the evolution of financial indicators throughout time. Time series consist of successive observations sorted by time, which helps you to spot patterns, seasonal swings and periodic shifts.

Formally, the time series can be represented as a sequence $\{y_t\}$, where y_t is the indicator value at time t . The main methods of analysis include:

Time series decomposition: Dividing the time series into the trend component T_t , the seasonal component S_t and the residual component R_t :

$$y_t = T_t + S_t + R_t$$

Autocorrelation function (ACF): Used to analyze the dependencies between the values of a time series at different points in time.

Percentage changes

Percentage changes allow you to assess the degree of market reaction to specific events by comparing the values of indicators before and after key dates. The percentage change is calculated using the formula:

$$\Delta y = \frac{y_{t_1} - y_{t_0}}{y_{t_0}} \times 100\%$$

, where y_{t_1} and y_{t_0} are the indicator values at time points t_1 and t_0 , respectively.

Correlation analysis

Correlation analysis evaluates the degree of relationship between two variables. The Pearson correlation coefficient r is calculated using the formula:

$$r = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum (x_i - \bar{x})^2 \sum (y_i - \bar{y})^2}}$$

Where if y is a dependent variable, x is an independent variable, β_0 and β_1 are regression coefficients, e is a random error.

Qualitative study of the news context

Qualitative analysis entails reviewing news and analyst comments from credible sources. This allows you to understand the background and attitudes of market participants, as well as explain the causes and consequences of market movements that are not necessarily apparent from quantitative data. The basic approaches are content analysis and thematic analysis, which assist discover significant issues and patterns in news reporting.

The application of these methodologies gives a holistic approach to studying the effect of Brexit on financial markets, enabling you to get a diverse knowledge of market movements and design risk management strategies in situations of political uncertainty.

Regression Analysis

Regression analysis is a statistical technique for investigating the connection between a dependent variable and one or more independent variables. This strategy is especially effective for determining the influence of certain events on financial markets by measuring their impacts on variables like stock indices and bond rates.

In regression analysis, the model typically includes the dependent variable (e.g., stock index value or bond yield) and independent variables that represent specific occurrences. The regression model has the following generic form:

Regression analysis is an important method for understanding how events affect financial markets, allowing researchers to quantify these effects and create risk-management measures.

$$y_t = \beta_0 + \beta_1 x_{1t} + \beta_2 x_{2t} + \epsilon_t$$

Where:

- y_t is the dependent variable at time t .
- x_{1t} and x_{2t} are independent variables at time t , representing specific events.
- β_0 is the intercept.
- β_1 and β_2 are the coefficients measuring the impact of the events.
- ϵ_t is the error term.

4. Stock Index Analysis

4.1. Data gathering and processing

Bloomberg, Yahoo Finance, and Investing.com are all publicly available sources. They were used to gather historical data for the stock indexes used in this study. These sources are critical for conducting a thorough assessment of stock index dynamics before to and after the key Brexit events. To assess the impact of each event, time periods covering the week before and week after each major event were chosen: the referendum on the United Kingdom's exit from the EU on June 23, 2016, the enactment of Article 50 of the Lisbon Treaty on March 29, 2017, the UK's official departure from the EU on January 31, 2020, and the end of the transition period on December 31, 2020.

The key indexes employed for examination are the FTSE 100 and FTSE 250, which reflect the British market, and the Nikkei 225, which measures the worldwide response. Data gathering involved collecting historical values of various indices for particular time periods and condensing data into tables for study.

To assess the market reaction, percentage changes in index values were calculated before and after each political occurrence. These adjustments allow us to assess the degree of market reactivity to political events.

In addition, a correlation analysis was carried out to determine the relationships between stock indexes and other financial indicators such as the volatility index (VIX) and government bond rates. This allows us to investigate how various segments of financial markets interact with one another during periods of political uncertainty, providing a better understanding of market reactions to Brexit.

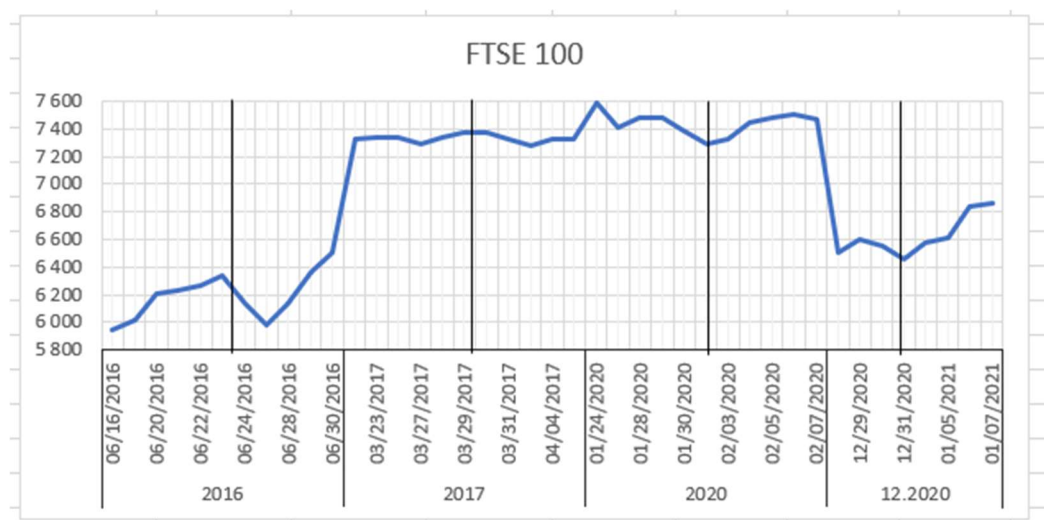
Thus, the collected and processed data provide the necessary basis for a comprehensive examination of stock index movements in response to critical Brexit events, allowing us to discover key patterns, correlations, and assess the degree of market reaction to political uncertainty.

4.2 Analysis of stock index dynamics

An analysis of the dynamics of stock indexes in the intervals before and after the key events of the Brexit allows us to find both general and particular patterns for each index. This analysis examines the behavior of the FTSE 100, FTSE 250, and Nikkei 225 indices in the context of four key events: the referendum on Britain's withdrawal from the EU, the activation of Article 50 of the Lisbon Treaty, the UK's official withdrawal from the EU, and the end of the transition period.

FTSE 100

Chart 1: FTSE 100 Index price changes over specified periods



Reflecting the 100 largest companies listed on the London Stock Exchange, the FTSE 100 index shows significant volatility in response to each of the key Brexit events. The FTSE 100 index fell fast after the 2016 referendum, displaying panic selling and significant investor worry. The rebound of the index after the first dip implies stability and adaptation of the market to new circumstances. Similar, but less dramatic movements are evident after the triggering of Article 50 and the formal exit from the EU, when the effect was somewhat taken into account in pricing in advance. The conclusion of the transition phase was followed by a fall before the event and a rise after it, signifying the end of the era of uncertainty.

The referendum on the UK's departure from the EU (June 23, 2016):

A week before the vote, the FTSE 100 index went from 6,204.00 GBP to 6,021.09 GBP, which represents a decline of 3.04%. The index rose 1.23% on the day of the vote, reaching 6,338.10 GBP. The index fell rapidly by 3.15% the day after the vote, then plummeted further by 2.55% the next day to reach 5,982.00 GBP. These numbers demonstrate how unexpected and devastating the decision to remove the UK from the EU was for the market. Nevertheless, on June 28, 2016, the index rebounded by 2.64%, and by June 29, 2016 showed a gain of 3.58%, reaching 6,360.06 GBP, which illustrates the swift adaptation of the market to the new status quo.

Initiation of Article 50 of the Lisbon Treaty (March 29, 2017):

A week before the activation of Article 50, the FTSE 100 index exhibited minor volatility, decreasing from 7,369.52 GBP to 7,322.92 GBP, which represents a decline of 0.63%. On the day of activation, the index gained by 0.68%, hitting 7,343.42 GBP, which may imply that the markets were anticipating this occurrence and it was largely taken into account in pricing in advance. After the incident, the index exhibited a minor fall of 0.73% and 0.55% in the next two days, hitting 7,282.69 GBP. This suggests that, despite the original expectation, uncertainty still remained and caused some variations.

The formal withdrawal of the UK from the EU (January 31, 2020):

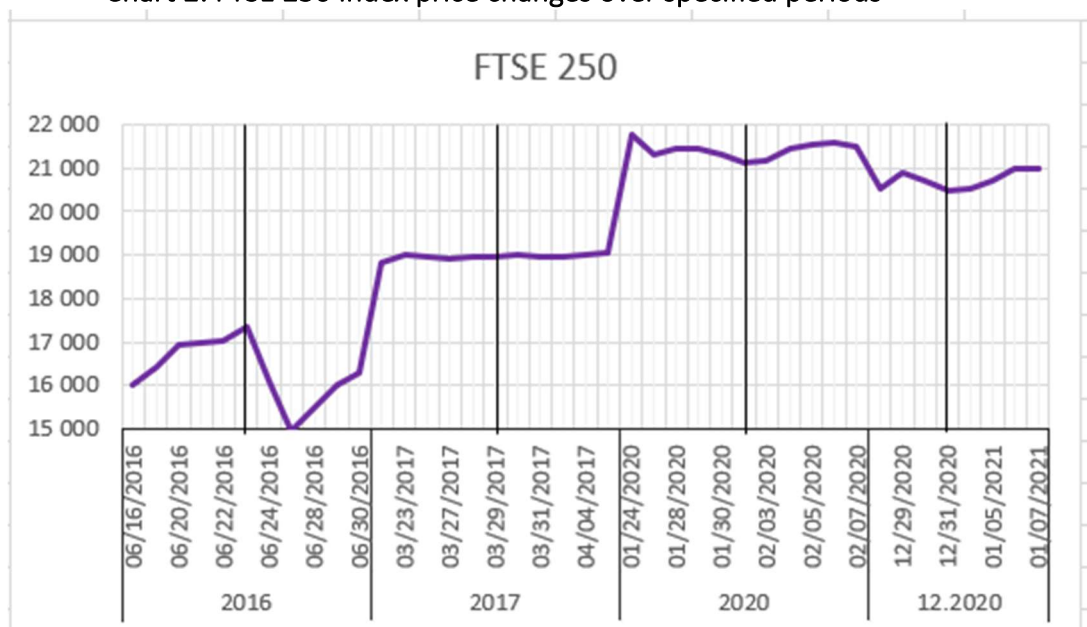
A week before the official leave, the FTSE 100 index decreased from 7,412.05 GBP to 7,381.96 GBP, which represents a decline of 0.41%. On the day of the publication, the index declined by 1.36%, hitting 7,381.96 GBP. In the following days, the index exhibited a minor movement, hitting 7,326.31 GBP (a fall of 0.55%). This implies that the formal conclusion of the EU departure process produced concern among investors, but the market started to settle in the subsequent days after the event.

Completion of the transition phase (December 31, 2020):

A week before the conclusion of the transition period, the FTSE 100 index declined from 6,555.82 GBP to 6,460.52 GBP, which represents a 1.45% decrease. On the day of the completion of the transition period, the index declined by 0.71%, hitting 6,555.82 GBP. However, the recovery of the index started soon after the occurrence, showing a gain of 1.72% by January 4, 2021 and 3.47% by January 6, 2021, reaching 6,841.86 GBP. This suggests that the conclusion of the transition era was regarded by the market as the end of a time of uncertainty and the beginning of a new stage of economic stability.

FTSE 250

Chart 2: FTSE 250 Index price changes over specified periods



The FTSE 250 index, which represents mid-cap firms, has comparable characteristics to the FTSE 100 but exhibits more significant volatility. Significant developments after the 2016 vote highlight the vulnerability of medium-cap enterprises to political risks. Similar but less severe movements are seen throughout the periods of Article 50 activation, formal withdrawal, and transition period conclusion, highlighting medium-sized firms' extreme susceptibility to political instability.

The referendum on the UK's withdrawal from the EU (June 23, 2016):

In the week before the vote, the FTSE 250 index moved from 16,432.04 to 16,088.05 GBP, reflecting a decrease of 2.10%. On the day of the voting (June 23, 2016), the index decreased by another 1.70%, at 16,433.51 GBP. The day after the vote, the index plummeted swiftly by 7.19%, achieving a value of 15,503.06 GBP, and continued to decline by 6.96%, reaching 14,967.86 GBP. This depicts the shock produced by the vote to depart the EU. However, on June 28, 2016, the index returned by 3.22%, and on June 29, 2016 recorded a gain of 1.68%, reaching 16,271.07 GBP, which demonstrates the fast adaptation of the market to the new reality.

Initiation of Article 50 of the Lisbon Treaty (March 29, 2017): A week before the activation of Article 50, the FTSE 250 index exhibited minor volatility, decreasing from 18,900.01 to 18,953.34 GBP, which indicates a decline of 0.24%. On the day of activation (March 29, 2017), the index gained by 0.42%, hitting 18,900.01 GBP. Following the event, the index fell by 0.11% and 0.09% over the following two days, closing at 18,911.93 GBP. This shows that the markets anticipated this incident and included it into their projections in advance.

The UK's formal withdrawal from the EU (January 31, 2020):

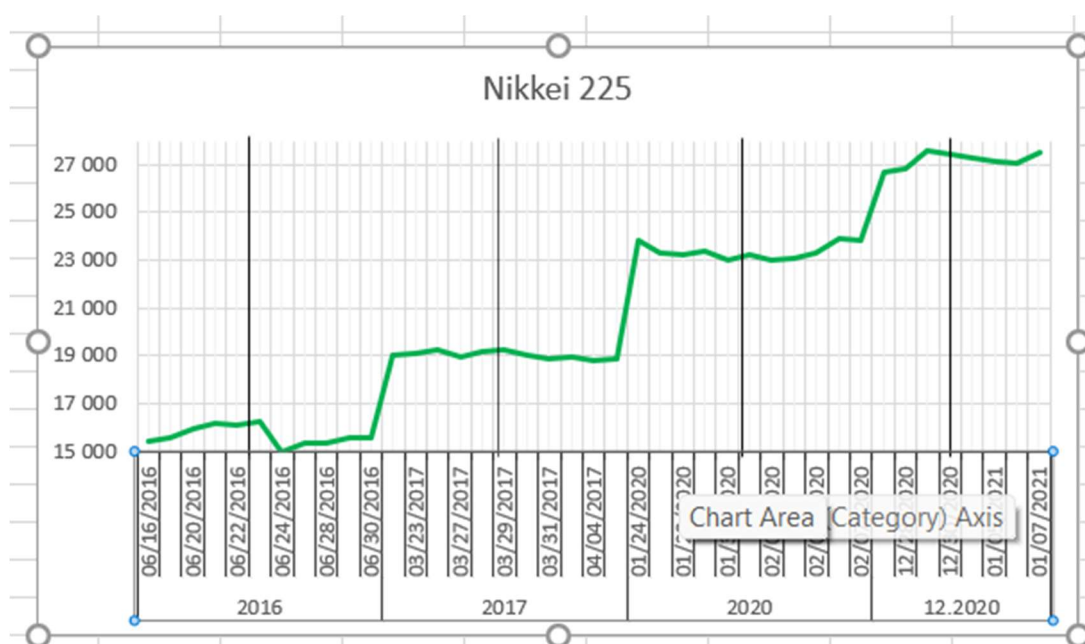
A week before the official publication, the FTSE 250 index went from 21,433.06 to 21,291.88 GBP, which represents a decline of 0.66%. On the day of the publication, the index declined by 0.82%, hitting 21,291.88 GBP. In the following days, the index exhibited a considerable dip, hitting 21,160.85 GBP (a reduction of 0.62%). This suggests uneasiness among investors in connection with the conclusion of the process of leaving the EU, although stabilization occurred in the subsequent days after the event.

Completion of the transition period (December 31, 2020):

In the week before the conclusion of the transition period, the FTSE 250 index decreased from 20,897.59 to 20,488.30 GBP, which indicates a 1.96% decline. On the day of the completion of the transition period (December 31, 2020), the index declined by 1.09%, hitting 20,488.30 GBP. The recovery of the index started immediately after the incident, showing a rise of 0.87% by January 4, 2021 and by 1.23% by January 6, 2021, reaching 20,973.16 GBP. This suggests that the conclusion of the transition era was regarded by the market as the end of a time of uncertainty and the beginning of a new stage of economic stability.

Nikkei 225

Chart 3: Nikkei 225 Index price changes over specified periods



The data demonstrates that the Nikkei 225 has likewise suffered considerable changes in reaction to crucial Brexit-related developments, but to a lesser amount compared to British indexes. After the vote, the index shows a decline, which illustrates the worldwide effect of Brexit on foreign markets. However, the recovery is quicker than that of the British indices, which may reflect stronger stability of the Japanese market in the setting of European political turmoil. During the periods of Article 50 activation and formal exit from the EU, the effect on the Nikkei 225 is less obvious, which may imply a reduced degree of fear among Japanese investors.

The referendum on the UK's departure from the EU (June 23, 2016):

A week before the vote, the Nikkei 225 index plummeted from 16,432.04 to 16,088.05 JPY, which equals a decline of 2.10%. On the day of the referendum (June 23, 2016), the index declined by another 1.70%, hitting 16,433.51 JPY. The index fell 7.19% the day after the vote, reaching 15,503.06 JPY, then falling another 6.96% to 14,967.86 JPY. These figures reflect the international shock caused by the decision to leave the EU. However, on June 28, 2016, the index rebounded by 3.22%, and on June 29, 2016 showed a gain of 1.68%, reaching 16,271.07 JPY, which illustrates the swift adaptation of the Japanese market to the new reality.

Activation of Article 50 of the Lisbon Treaty (March 29, 2017):

The Nikkei 225 index witnessed minor volatility 7 days before the activation of Article 50, falling from 19,085.31 to 19,060.50 JPY, a 1.05% drop. On the day of activation (March 29, 2017), the index fell by 0.42% to 19,060.50 JPY. Following the event, the index fell by 0.39% over the following two days, reaching 18,985.59 JPY. These figures imply that Japanese markets, although reacting to political changes in Europe, were more stable than British indices.

The formal withdrawal of the UK from the EU (January 31, 2020):

A week before the official publication, the Nikkei 225 index went from 23,379.40 to 23,343.51 JPY, which represents a decline of 0.15%. The index dropped 1.72%, on the day of the release, landing at 22,977.75 JPY. The index saw a decrease in the next days, declining to 22,971.94 JPY (a 0.01%). This shows a modest impact of the UK's exit from the EU on the Japanese market, which rapidly adjusted after the initial shock.

Completion of the transition period (December 31, 2020):

Seven days before the conclusion of the transition period, the Nikkei 225 index decreased from 23,319.56 to 23,227.98 JPY, which indicates a decline of 0.39%. On the day of the completion of the transition period (December 31, 2020), the index declined by 0.19%, hitting 23,227.98 JPY. The recovery of the index started soon after the occurrence, with a gain of 2.38% by January 6, 2021, reaching 23,873.59 JPY. This suggests that the conclusion of the transition era was regarded by the market as the end of a time of uncertainty and the beginning of a new stage of economic stability.

Agricultural Sciences

Biotesting of strains based on *Bacillus thuringiensis* against the caterpillars of *Hyponomeuta malinella*

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Loss of crop production under the influence of various types of agricultural pests occurs at all stages of plant cultivation. Their damage ranges from 25 to 50%, from sowing or planting seeds to processing or direct consumption.

An important issue for the Almaty region was the fight against agrocenoses with a dangerous pest of apple trees – an apple moth (*Hyponomeuta malinella*) of the bud moth family (*Yponomeutidae*).

Currently, entomopathogenic bacteria are widely used in the fight against pests and plant diseases. Among them, the most common are spore-forming crystalline facultative entomopathogenic rods of the *Bacillus thuringiensis* (*Bt*) group. Preparations made on their basis: dendrobacillin, entobacterin, gomelin, lepidocide and etc. They do not have a specific smell, are not dangerous for warm-blooded animals and do not harm plants.

Bacillus thuringiensis - is an entomopathogenic aerobic soil gram-positive microorganism with the ability to form like crystal inclusions made up of entomocidal proteins – deltaendotoxins – during sporulation. When it enters the intestines of insects, the protein crystal dissolves in the alkaline environment of intestinal juice. Dissolved protoxins are activated into "true toxins" by enzymes such as proteolytic trypsin and chymotrypsin in the intestine. The next stage of toxic effect is the attachment of the "true toxin" to the protein (receptor) on the surface of the apical membranes of intestinal epithelial cells. Receptor binding of the toxin is reversible [6, 7]. At the next stage, the necessary rearrangement of the conformation of the toxin molecule takes place, after which some of the structures that make it up are introduced into the double layer of the membrane. After that, The Binding of the toxin to the membrane becomes irreversible [7].

However, different strains of *Bt* have different pathogenic properties relative to the

taxonomic groups of insects. Thus, pathogenic strains against *Lepidoptera* and *Diptera* larvae are known [1, 3, 4]. Therefore, it is important to evaluate the entomopathogenicity of individual *Bt* strains in relation to specific taxonomic groups of insects.

The purpose of the study: to assess the biological activity of some collectible strains of *Bacillus thuringiensis* in relation to the caterpillars of the *Hyponomeuta malinella* in laboratory conditions.

To determine the biological activity of strains of *Bacillus thuringiensis* from the collection of entomopathogenic strains of the Kazakh Research Institute of plant protection and quarantine named after Zhazken Zhiembayev, caterpillars of *Hyponomeuta malinella* (*Lepidoptera*, *Yponomeutidae*) 1-2 years old were used in the experiment.

From the affected apple trees in the Aksai, located in the extreme western central part of the mountain Alatau, the age of the pre-younger *H. Malinella* was gathered and brought. 1400 caterpillars were used in the experiment. A stored at -4°C in a standard nutrient medium №98 of the *B.thuringiensis* collection strains., B12C, №49., 2127-3K, 4Cr-06, K-Pr-07, K-Pr07-1, K-Ym07/AK, K-Ym07/ZR, K-Ym07/ZR-1, K-Ym07/KB, K-Ym07/K, K-Ym-07/KOX, Cr-07/BB, Kh-07-1, ZPT-07, OZSH-07/1. To assess the virulence of *H.malinella* against caterpillars, we used a culture liquid with a titer of 1×10^7 , 1×10^8 . The experiment was done with 4 repetitions for each strain titer and water was taken as a control. In the calculation of the titer size of spores, the Goryaev chamber was used [3].

H. Malinella worms were placed in sterile petri dishes in 10 pieces. Assessing the activity of strains of *B.thuringiensis*, apple leaves were carefully treated with a culture liquid, and then placed in each saucer. Under control, the leaves were treated with water. Experimental and control vessels were stored at room temperature. The number of deaths was carried out on the 3rd, 5th and 7th days.

The results of laboratory experiments showed a clear manifestation of the biological activity of *Bt* bacterial strains against apple moth caterpillars by 2.5-80% for a period of 3-7 days. In the analysis of the data of the laboratory experiment, the highest percentage of mortality of apple moth caterpillars in comparison with observations is from 3 days to 95-97% to 7 days *B. thuringiensis* was observed in collectible strains 3pt-07, titer 1×10^7 and K-Ym07/KB, titer 1×10^8 - after 7 days, almost all insects died 100%. In comparison with the corresponding control, K-Ym-07/KOX, titer 1×10^8 and OZSH-07/1, titer 1×10^8 showed an average of 50% in strains. And there was no activity of 2127-3k, 4CR-06, K-Pr-07, K-Ym07/ZR, K-Ym07/ZR-1, K-Ym07/K titer 1×10^7 .

Thus, the experiments showed activity to assess the biological activity of the collected strains of *Bacillus thuringiensis* in relation to the caterpillars of the *Hyponomeuta malinella* in laboratory conditions the use of *B.thuringiensis* strains to combat *Lepidoptera* allows us to conclude that it is promising. Further development of *B.thuringiensis* strains is underway to develop a drug against agricultural pests with the preservation of virulence.

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Mathematical and economic modeling of organic waste

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resume

Environmental protection and their rational management from waste today is a serious problem in the world

In the future, the Ministry of Environment Protection and Agriculture of Georgia plans to direct important material resources to raising public awareness on waste management, among other things, because people are responsible for the problem of anthropogenic littering.

Today in Georgia there is no separation and sorting of waste, which is why poisonous substances are found in landfills.

There is a lot of research and materials about compost, compost is considered the best fertilizer, it is environmentally friendly, it is cheap, it is made from waste that we have at home, which we will use instead of throwing away, be careful and we will create an ecologically clean environment.

Introduction

Over the last 30 years, the ecological situation has worsened. Farmers around the world are facing problems related to soil fertility and quality.

Yields decrease with soil degradation

Plants are vulnerable to diseases and pests. Low soil fertility is caused by the use of mineral fertilizers and pesticides.

As a result of the impact, the structure of the soil is disturbed, the content of humus and nutrients decreases, the hydrophysical properties of the soil, water conductivity, humidity, aeration and others deteriorate.

In order to increase soil fertility, it is necessary to add mineral substances, but they often cannot supply the soil with the necessary substances. In addition, mineral fertilizers pollute the environment, causing the accumulation of harmful nitrates in food products.

Global environmental, social and economic problem is the issue of waste management in the world. Waste has a negative impact on the environment, human health, air, soil, surface and underground water through emissions.

Today, for our country with little land, landfills take up a lot of space and are a serious problem. Waste is considered as a potential waste of raw materials and energy.

During waste processing, very important social and economic benefits are obtained, necessary resources, saving of raw materials, encouragement of innovation, new jobs, new jobs that every citizen of Georgia needs so much today.

the main part

Rain worms play an important role in the production of biohumus-soil. They make holes in the soil and improve aeration. For a year, rain worms digest 28 t/ha of soil mass. Organic substances that worms feed on and process, the annual turnover is 1 t/ha.

With the help of worms, the vertical channels are closed and the water permeability of the soil is improved, aeration is created, the best conditions for the growth of the root system of plants are created.

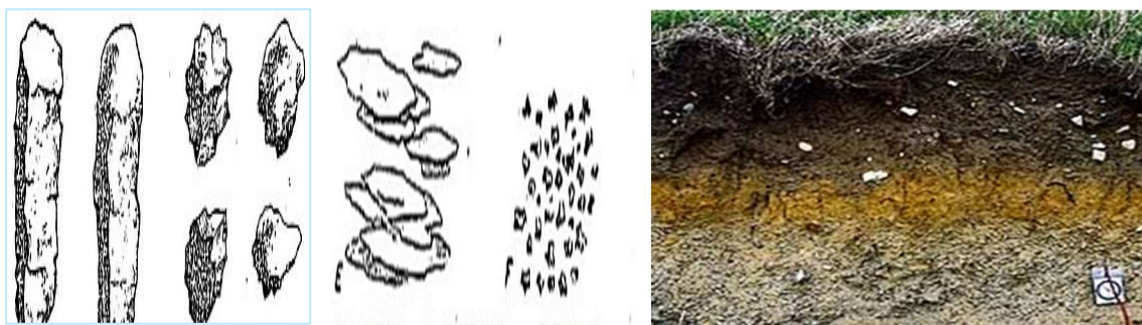
Earthworms affect the structure of the soil, in the digestive tract of earthworms, undigested parts of food are mixed with mineral particles, stick to mucous substances released from the walls of parts, and are chewed as a result of peristaltic work. Intestinal muscles and coprolites ("stone excrement") stand out.

In the intestines of earthworms, mineral substances are collected in a form accessible to plants. Coprolites contain more soluble phosphorus, potassium and magnesium than the surrounding soil. Excrements of worms are enriched with ammonia, which is produced in the intestines, the holes made by worms are filled with ammonia, which is released together with mucus, which is released from the body of the worm.



Рис. 1 Fertile layer of soil

Humus is formed in nature as a result of decomposition of the remains of plants and animals and products of their vital activity. Humus affects the properties of the soil, it is a source of nutrition for plants and in general humus is an indicator of soil fertility.



Riskon 2 Soil structure

Humans can accelerate the recovery of soil productivity, creating a "living soil" by applying biohumus, which is a microbiological fertilizer obtained by processing earthworms, pet manure, and plant waste.

Biohumus is balanced complex nutrients. It includes all macro and microelements, biologically active substances, including enzymes, vitamins, hormones, auxins, heteroauxins. Biohumus contains a significant amount of calcium, five times more nitrogen, seven times more phosphorus and ten times more potassium than the active layer of the soil.

Biologically active substances contained in biohumus increase the resistance of plants to diseases. reduces plant stress, accelerates seed germination,

The use of biopreparations obtained from biohumus reduces the level of nitrates and chemical residues in the soil, cleans the soil from heavy metals, fertilizers.

Grain yield increases by 40-50% under the influence of biohumus, potatoes by 40-80%, vegetable crops by 25-73%. Under the influence of biohumus, the quality of products improves, the content of vitamin C increases in fruits and vegetables, plants are divided according to their "sensitivity" to biohumus.

- ✓ Highly sensitive, carbohydrate-rich plants, eg: potatoes, carrots, beets, fruits.
- ✓ Well sensitive cereal crops: spring and autumn wheat, rye, barley, oats, rice, millet, buckwheat, corn, sorghum
- ✓ Medium sensitive medium sensitive plants. Leguminous crops: peas, soybeans, lentils, alfalfa, chickpeas, asparagus and others.
- ✓ Weakly sensitive oily and essential oil Crops: sunflower, rapeseed, mustard, coriander and others
- ✓



Fig. 4 Biohumus

Biohumus is absolutely harmless for any type of soil. Soils are input norms

- ✓ Biohumus can be applied during spring fertilizing,
- ✓ When planting seedlings in the nest and before sowing in the field;
- ✓ In general, when planting seedlings, 1-2 peshp of biohumus is added to the soil in the garden;

- ✓ When planting tomato seedlings in the garden - 0.5 - 1 l of biohumus tincture;
- ✓ For potatoes in each hole - 0.5-1 liter of biohumus;
- ✓ In vegetable crops - up to 2 kg per m² or 150 g/longitudinal meter;
- ✓ Berries - 0.5-1 kg. on a bush
- ✓ Fruit crops - 2 kg. At the base of every plant.

All plants can be watered and fed with biohumus mixture. Biohumus mixture is used for dressing seeds, watering seedlings, indoor plants and vegetable crops.



Fig. 5 Seed decay

200 gr. Dry biohumus is dissolved in 10 l. in the water After 24 hours, the water turns straw-colored. The vegetable seeds are soaked in the obtained tincture for 12 hours. The remaining sediment should be poured on the roots of the plants. Spraying biohumus mixture is effective on plants in the phase of fruit ripening.

Compared to organic fertilizers, biohumus has an advantage

- ✓ Plants absorb humus practically 100%;
- ✓ The vegetation period of the plant increases.
- ✓ cleans the soil from nitrates;
- ✓ enriches the soil with all necessary microelements;
- ✓ does not contain weed grass seeds;
- ✓ does not contain pathogenic croflora;
- ✓ does not contain heavy metals;
- ✓ does not have an adaptation period;
- ✓ will not be washed out of the soil;

Biohumus, working in the soil for 5-6 years. We know that the rapid growth and development of cultural and weed plants occurs when fertilizers are used. Adding biohumus cleans the soil from weeds, there are no weed seeds in biohumus, 3-4 tons per 1 ha is more effective than adding manure (40-60 tons per 1 ha). adding biohumus.

Crop rotation, alternation of crops in time and space.

The main principle of crop rotation is: the replacement of crops representing different botanical families and a high share of leguminous crops in the crop rotation scheme.

The soil becomes poor in nutrients when growing a monoculture and a deficit balance is created. In the monoculture of cereals, the soil becomes poor with nitrogen and phosphorus; In the case of sugar beet, sunflower - with potassium, in the case of legumes - with phosphorus and potassium (enriched with nitrogen).

By introducing crop rotation, the number of pests, diseases and weeds in the area is being reduced. The soil is enriched with nitrogen by including legumes in the crop rotation, the soil balance is improved.

The introduction of crop rotation helps:

- ✓ maintaining and increasing soil fertility;
- ✓ Reducing the number of pests, diseases and weeds.
- ✓ Sas. Sat. increasing the yield of crops;
- ✓ increase of biodiversity;
- ✓ improving the physical properties of the soil;

When drawing up a seed rotation scheme, it is necessary to take into account the following circumstances

- ✓ For 4 years, vegetable crops should not be returned to the plot
- ✓ The share of leguminous crops in the crop rotation scheme should be -25 - 30%;
- ✓ Crops with high demand for nutrients should be grown after leguminous crops

Mulching is covering the surface of the soil with an organic coating, protects the soil from adverse natural conditions such as rain, wind. Mulching improves soil structure, maintains soil moisture, regulates soil temperature, suppresses weeds, creates good conditions for rapid plant growth, and increases the yield of agricultural crops. , we get an early harvest, etc.

Conservation agriculture is spread all over the world and has been implemented on 100 million ha. The largest areas of zero-tillage are in the United States, Brazil, Argentina, Canada, Australia and Paraguay.

According to the currently implemented practice in Georgia, either soil is plowed only before sowing or the main plowing is carried out in late autumn, loosening is done before sowing in spring.

It should be noted that recently, some farmers in Georgia practice minimal soil cultivation (only loosening the soil before sowing, excluding plowing).



Fig. 6 Mulching with organic and polymeric material

The mulch layer is formed by plant residues accumulated over the years on the surface of untreated soil.

We have plants according to their location in the active layer of the soil - with a deep root system and a shallow root system, as well as plants with a larger area, compact plants, depending on the need

Coexistence of plants. Which plants grow better next to which plants are always in the focus of the biofarmer's attention.

Plants are neutral, masticatory, antagonistic due to their specific smell. The neighborhood of potatoes is good for alfalfa, garlic, and parsley, but the enemies of potatoes are tomatoes, sunflowers, cucumbers, and pumpkins. Plant interactions are allelopathy

When plants are sown next to each other, they protect each other from pests and various diseases - lettuce and red beet; carrot and onion; cucumber and celery; carrot and leek; celery and cauliflower; White-headed cabbage and tomato.

6. Protection of plants in organic farming

A plant protection strategy should be based on the destruction, control and regulation of pests, diseases, and weeds in organic farms.

Heavy breeding of pests is a common problem and it is necessary to protect them. Protection of plants by biological methods means selection of resistant varieties, introduction of correct seed rotation, mulching. Everything reduces the spread of pests and diseases. It is important for the bio-farmer to use a useful parasite, predatory insects (spiders, spider mites, predatory mites and gardenflies, beetles) to help reduce the number of pests.

Parasites of the body of harmful insects are beneficial parasites whose reproduction is facilitated by the presence of windbreaks and flowering plants.

Aphid parasite riders lay eggs (one aphid parasite destroys 200 to 1000 pests) in the body of a leaf aphid, from which a larva hatches after a short time and the aphid dies.

Beneficial animals live in the field - hedgehogs, toads, lizards, etc., which mainly feed on pests, therefore, along with the main concern of the biofarmer, the reproduction of beneficial insects, beneficial animals and birds should be a necessary concern.

It is important to carry out agritechnical measures in a timely manner, as a result of which the number of pests decreases

It is necessary to use biological preparations against fungal diseases. It is permissible to use a contact fungicide containing copper. Plants with pesticidal activity are widespread in nature, the use of which reduces the number of harmful organisms, does not harm humans, does not pollute the ecological environment, and is effective when growing vegetable crops on small areas.

Today in Georgia, a lot of tools necessary for biofarmers are widely produced, such as effective microorganisms, bioinsecticides, biofungicides, biofertilizers, biostimulants and

7. Use of effective microorganisms

The drug is a bacterial fertilizer, effective microorganisms. It is a solution in which beneficial strains of microorganisms are grown. which, when applied to the soil, activate the soil microflora, suppress the pathogenic microflora, which leads to the health of the soil.

Effective microorganisms increase the temperature of the soil by 3-5 °C and accelerate the formation of humus in the soil, increase plant immunity, yield and product quality. It is important to use it in greenhouses where there is no seed rotation

Effective microorganisms are living organisms that develop only under certain conditions: they love organic matter, moisture, heat (20-30 °C), cannot tolerate bright light, quartz lamp rays, drought, chemical fertilizers and chemicals.

Experimental data

We carried out a study on how much farmers use organic waste to enrich their soils. For this, we conducted a survey in several municipalities of the regions of Georgia: Kakheti, Kvemo Kartli, Shida Kartli, Mtskheta Mtianeti, Samtskhe Javakheti. (In each municipality of the region, 100, 500 respondents were interviewed)

The survey was conducted around the following issues:

- ✓ Did they have agriculture?
- ✓ Did they know about composting?
- ✓ In their opinion, was the worm harmful or beneficial to the plants?

As a result of the research, the following picture was revealed, which is presented in the form of a diagram

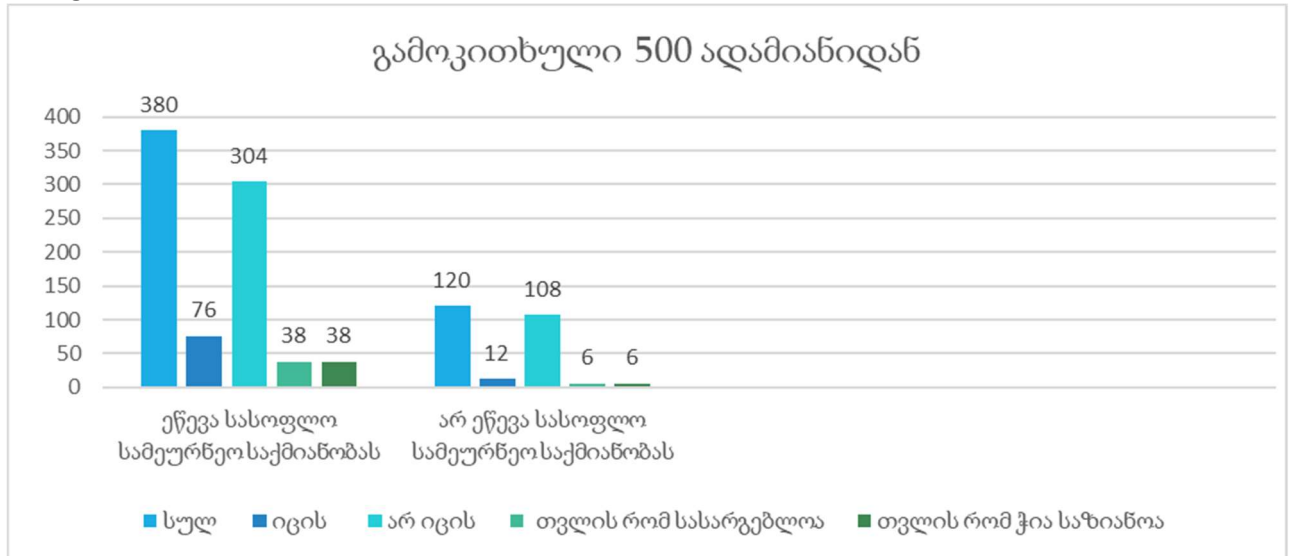


Chart 1 Number of respondents

1. Do they have agriculture?

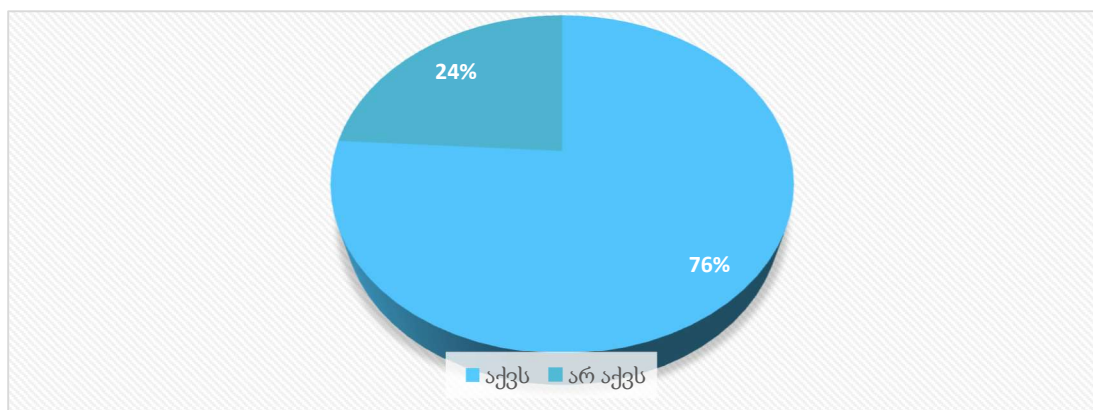


Figure 2. Existence of agriculture

2. Do those who do not engage in agricultural activities know about composting?

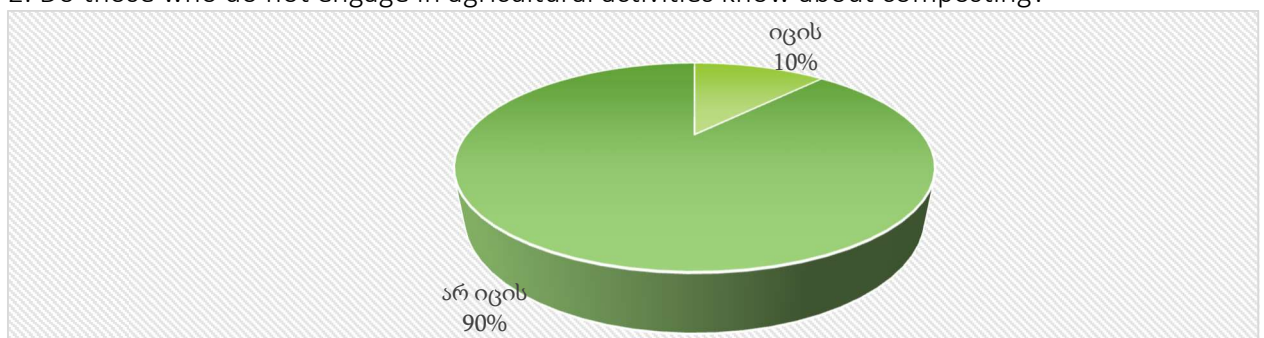


Chart 3 has information on composting

The answers to the question whether the worm is harmful to plants or useful were distributed as follows:

- ✓ The worm is harmful to plants 5%
- ✓ Worm is beneficial for plants 5%

3. Those who engage in agricultural activities, do they know whether the worm is beneficial or harmful to the plant?

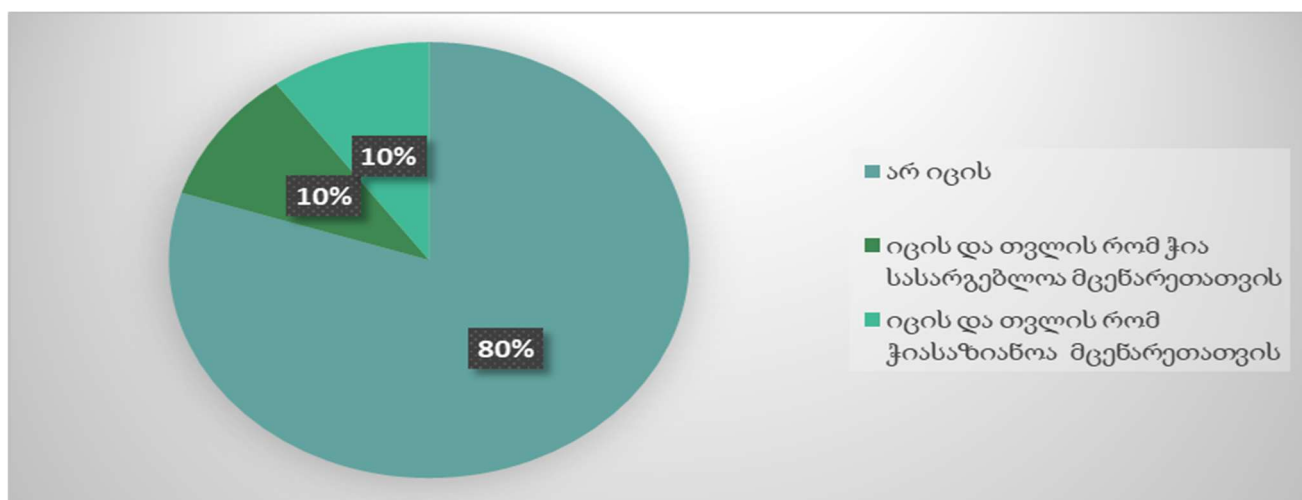


Figure 4 Presence of worms

Economic, biological and economic effectiveness of plant protection measures

Biological (technical efficiency) shows how many plants will survive as a result of the control measures, how much less the spread of the disease will be. We observed 30 control plants, 20 were test plants:

$$T = \frac{(30 - 20) \times 100}{30} = 30\%$$

Economic efficiency shows how much more crops are obtained as a result of implementing plant protection measures. To calculate the mentioned index, we observed 1 hectare of corn crop. The yield on the trial area was 4000 kilograms, on the control plot - 2800 kilograms.

$$X = \frac{(4100 - 2800) \times 100}{4100} = 31\%$$

And economic efficiency shows how much profit there is as a result of carrying out combat measures.

$$Pek. = \frac{2100 - 800 + 520}{3200 - 1040} = 0.81$$

where

2100 GEL - per hectare, the costs of growing agricultural products, including the costs of plant protection.

800 GEL – costs of plant protection for 1 ha

520 GEL – additional harvesting and transportation costs per 1 ha.

3280 GEL - the income of the harvest on 1 ha

1040 GEL - additional harvest incomes obtained by plant protection measures per 1 ha.

Profitability - shows how much profit each 1 GEL spent on plant protection measures gives.

$$P = 1040 / 1320 \times 100 = 0.78$$

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Geographic Sciences

Bitkilərin məhsuldarlığının artırılmasında gübrələrin rolu və plansız gübrə verilməsinin ekoloji fəsadlarının qiymətləndirilməsi(fosfor gübrəsi)

Əliyeva Şəfəq Məmməd qızı

ADPU-nun Şəki filialı, müəllim

Açar sözlər: gübrə, meliorasiya, fosfor, məhsuldarlıq, torpağın çirklənməsi

Meliorasiya kənd təsərrüfatı bitkilərinin məhsuldarlığını artırmağın əsas şərtlərindən biridir, eləcə də onların becərilməsində vacib həlqə gübrələrin tətbiq edilməsidir. Bu təəccüblü deyil, ona görə ki, aqrosensozların funksiyası özü külli miqdarda biogen elementlərin ayrılmasına əsaslanır.

Belə ki, müxtəlif kənd təsərrüfatı bitkilərinin məhsulları ilə torpaqlardan 17- 67 kq N, 1 - 27 kq P₂O₅ və 2 - 114 kq K (Deqodyuk, 1988) alınır, buna görə də itən qida maddələrinin daimi ekvivalent kompensasiyası verilməlidir. Gübrələrin (xüsusilə üzvi gübrələrin) istifadəsi əsas və əlavə məhsulda aqrosensozlardan aparılan qida elementlərini dövriyyəyə cəlb edir, beləliklə də məhsuldarlıq prosesinin müəyyən olunmuş davamlılığını təmin edir. Qida elementlərinin kompensasiyası çox aktual problemdir. Gübrələr hələ bizim eramın I əsrində tətbiq olunurdu. Belə ki, Qədim Romada ərazinin relyefini nəzərə almaqla tarlalara peyin daşınırdı: 25%-i duz olan torpaqlara 18 araba, təpələrə 24 araba daşınırdı.

ABŞ mütəxəssisləri müxtəlif faktorların kənd təsərrüfatının məhsuldarlığına təsirini öyrəniblər. Belə ki, gübrə 41 %, herbisidlər 15-20%, münbit torpaqlar 15%, hibrid toxumlar 8%, suvarma 5%, digər faktorlar 11-16% təsir göstərir.

Statistik rəqəmlər göstərir ki, planetdə hər dörd nəfərdən biri gübrələrin köməyi ilə alınan qida məhsulunu qəbul edir. Təsadüfi deyil ki, D.N. Pryanişnikov gübrələrin tətbiqindən alınan məhsul artımını yeni əkinçilik kontinentinin kəşfi ilə müqayisə edir.

Kənd təsərrüfatında lazımı miqdarda mineral üzvi gübrə və meliorantlar tətbiq etməklə məhsuldarlığı daim inkişaf etmək olar. Buna baxmayaraq D. M. Xomyakovun fikrincə, 1996-1997 illərdə Rusiyada mineral gübrələrin həcmi 1,4-1,7 milyon tonu keçməmişdir (təxminən 14 kq/hektar). Bu elmi əsaslandırılmış tələbatdan 10 dəfə azdır. Hazırda hər əkilən 1 hektar sahədə 100 kq qida elementi çatışmır. Tətbiq olunan gübrələrin miqdarı əsrin əvvəllərində Almaniya da istifadə olunan miqdardan 2 dəfə azdır.

Qədim Yunanlarda belə bir deyim var: —Gülmək lazım deyil, ağlamaq lazım deyil, başa düşmək lazımdır. Gübrələrin və bitki mühafizəsində kimyəvi vasitələrin kənd təsərrüfatında tətbiqinin ekoloji aspektinə baxsaq kimyalaşdırmaq prosesində təbiətə uyğunlaşmanın təmin olunduğunu görürük. D. N. Pryanişnikov hələ 1937-ci ildə qeyd edirdi ki, gübrə tətbiq etmədən yüksək məhsul almağın yolunu bilirəm deyənlər nəhaq özlərini materialist-alim adlandırırlar. Sözsüz ki, kimya və ya həyatı şüarları da mübahisə yaradır.

1998-ci ildə V. Q. Mineyev gübrələrdən kimyəvi minerallardan ağılla istifadə olunmasının vasitələrini qarşıya qoydu. Əks halda onların qeyri-düzgün istifadəsi ətraf mühitə

neqativ təsir edirlər. Məhz kimyəvi vasitələrin savadsız istifadəsi müşahidə olunan mənfi təsirlərin mənbəsinə çevrilir.

Gübrələrlə ətraf mühitin çirklənməsinin əsas səbəbləri təşkilatı işlərin natamam olması, daşınma, saxlanma, gübrələrin istifadə texnologiyalarının əkin dövriyyəsində tətbiqində aqronomik texnologiyaların pozulması və gübrələrin özünün fiziki-kimyəvi və mexaniki xassələrinin natamam olmasıdır. D.N.Durmanov və L.L.Şişov qeyd edirlər ki, kimyalaşdırmanın keyfiyyətə inkişafının və becərilən qidalanma strukturunun düzgün diaqnostikasını vermək lazımdır.

Əsas göstərici kimi əlavə məhsul və ya torpaqda bu və ya digər elementin miqdarının artması götürülür, əkin sahəsinin hektarına verilən gübrələrin miqdarı deyil. Bu tələbat məhsuldarlığın son həddi qanunu düzgün izah edir (Ramad, 1981).

Deyilənlərə əlavə olaraq, biosferin problemləri sahəsində görkəmli mütəxəssis A.N.Tyuryukanovun (1988) fikirlərini yada salmaq yerinə düşər: —Kim mineral duzlar və zəhərli kimyəvi maddələr sözlərini —gübrələr və aqroximikalar sözü ilə əvəz etdi, aydın deyil. Lakin bunlar sözün təsirini təhlükəsiz edən sözlərdir. Klassik aqrokimyəçilər mineral duzlar haqqında danışdılar. Kim bu sözü gübrələr sözünü ilə əvəz etdi? Bilinmir, lakin mahiyyətə xeyirxah görünür. Klassik aqrokimiklər, xüsusən D. N. Pryanishnikov deyirdi ki, torpağı deyil, bitkiləri gübrələmək lazımdır. Bizdə isə torpağı gübrələyirlər. Bu isə verilən gübrələrin dozasının kəskin artırır və bioməhsulun keyfiyyətinə zərər vurur.

Ətraf təbii mühitə və aqrosenozlərin komponentlərinə gübrələrin əlverişsiz təsiri müxtəlif ola bilər: torpağın çirklənməsi, səthi və qurunt suların çirklənməsi, torpağın bərkiməsi, qida maddələrinin dövrəni və balansını pozulur, torpağın aqrokimyəvi xassələri və münbitliyi pisləşir, səpinlərin fitosanitar vəziyyəti pisləşir və bitki xəstəlikləri inkişaf edir, kənd təsərrüfatı bitkilərinin məhsuldarlığı aşağı düşür və alınan məhsulun keyfiyyəti pisləşir.

Kənd təsərrüfatında istifadə olunan fosfor gübrələri əsasən suda həll olan bitkilər tərəfindən asan mənimsənilən olur: Super fosfat və ikiqat super fosfat, eləcə də mürəkkəb gübrələr ammotost diammotost, nitroammofoska, karboammofoska.

Fosfor ən mühüm biogen elementlərdən biridir, baxmayaraq ki, canlı orqanizmlərin fosfor tələbatı natriuma nisbətən 10 qat azdır, o bitkinin əsas qida mənbəyidir, kütlə artımı və enerji mübadiləsi prosesində əsas rol oynayır.

Tam qiymətli məhsul almağa şərait yaratmaq üçün torpaqda asan mənimsənilən fosforun olması vacibdir. Lakin Rusiyanın əkin sahələrinin təxminən 1/3-i bu elementlə az aşağı və çox az aşağı miqdarda təmin olunmuşdur ki, bu da qeyri-qaratorpaq zonasında ciddi problemlər yaradır. Bundan başqa, əgər azot çatışmazlığını üzvi gübrələrlə və azot fiksasiya etməyənə əvəz etmək olarsa, fosforun çatışmazlığını yalnız mineral gübrə verməklə aradan qaldırmaq olar. Fosfor gübrələrinə yüksək tələbatın ödənilməsi obyektiv labüdlükdür. Lakin bu zaman fosforla qidalanma probleminin bir sıra təbiəti mühafizə aspektlərini nəzərdən qaçırmaz.

Fosfor gübrələri ilə birgə torpağa mühitdə az hərəkətdə olan çox saylı zəhərli maddələr düşür. Superfosfat kifayət qədər yüksək miqdarda çirkləndirici maddələrin olması ilə fərqlənir (Barrauş, 1966).

Maddə	Miqdarı, q/kq
As	1,2-2,2
Se	0,0-4,5
Co	0-9
Zn	50-1430
Ni	4-79
Pb	7-92

Bundan başqa, fosfor gübrələrinin tərkibində fosforun zəhərli birləşmələri olur. Fosforun çox hissəsi gübrə kimi istifadə olunan, torpaqlarda qalır, onda olan Ca, Al, Fe birləşir. Aparılan tədqiqatların nəticəsi göstərir ki, təbii fosforlarda radioaktiv elementlər –U, Ra olur.

Təbii fosfor xammalın turş mühitdə emalında fosforun əsas hissəsi, eləcə də bütün stronsium gübrələrdə qalır və onlarla birlikdə torpağa düşür, uzun müddət superfosfatın verilməsi (tərkibində adətən 1,5 % F olur) torpaqda bitkinin asan mənimsəyə biləcəyi F formasına səbəb olur. Ramansk təcrübə sahəsində fosfatlarla gübrələnən torpaqda F miqdarı nəzarətlə müqayisədə demək olar ki, iki dəfə çoxdur. F-un bitkilərdə fizioloji rolu hələ kifayət qədər öyrənilməyib. O, bir çox fermentlərin aktivliyini pisləşdirir (azaldır), bu da fotosintez və zülalların biosintezi proseslərinə mənfi təsir göstərir.

Koplan və başqalarının məlumatlarına görə, qeyri-qaratorpaq zonanın əkinçiliyində istifadə olunan fosfatlardan 665 min ton P_2O_5 su obyektlərindən toplanır:

- gübrələrin daşınma və saxlanması itki olur (34% bütün daxil olan)
- səthi yuyulma və axınlarda suda həll olunmuş halda və eroziya məhsulları ilə birlikdə (21% bütün daxil olan miqdarın)
- aqrar dövrüyədən fosforun düşməsi nəticəsində kommunal təsərrüfatda üzvi maddələrin utilizasiyasının olmasından və heyvandarlıq üzvi maddələrin utilizasiyasının 50%-ə qədər azalmasından.

P_2O_5 -in miqdarının təbii sulara yüksəlməsi su mənbələrinin eutroflaşmasına gətirib çıxarır: yosunların biokütləsi bir çox göllərdə və su anbarlarında hazırda həmin ərazidə olan ümumi kənd təsərrüfat məhsullarından çoxdur.

Hesablanmışdır ki, 1 kq fosfor daxil olan su mənbələrində 100 kq fitoplankton əmələ gəlir, suda fosforun qatılığı 0,01 mq/l olduqda, suyun çirklənməsi başlayır, buna səbəb yosunların kütləvi inkişafı, çoxalmasıdır.

Bu zaman suda onun qatılığı 0,9-3,5 mq/l-ə çatır (Mineyev, 1990). Suyun çiçəklənməsi təkcə sudan istifadəni pisləşdirmir, həm də onun tərkibində suda həll olmuş üzvi birləşmələrin miqdarını artırır, yosunların kütləvi inkişafı suda PH-ı yüksəldir. Xolera xəstəliyinin 1970-1971-ci illərdə 35 ölkədə sürətlə yayılması bu hadisə ilə bağlıdır. Bir qayda olaraq insan, yosunlarla çirklənmiş sudan istifadə etmir, çünki bu sular dadına və qoxusuna görə fərqlənir. Buna baxmayaraq, öz toxumalarında toksinlər toplanmış balıqla qidalandıqda ciddi zəhərlənmə baş verir. Heyvanlar isə belə sulardan istifadə etməyə məcbur olurlar. Dünyanın bir çox regionlarında iri buyuzlu heyvanların və digər kənd təsərrüfat heyvanlarının kütləvi qırılması baş verir.

Su anbarlarında eutroflaşması suyun təmizlənməsini bahalaşdırır. Belə ki, 1985-ci ildə Dnepropetrovsk su anbarlarının koagulyantlarla təmizlənməsinə ildə 650 min dollar, rekreasiya zonasının təmizlənməsinə 3 milyon 900 min dollar xərclənir.

Suların təbii yolla təmizlənməsinin uzunluğunu nəzərə alsaq (300 il yeraltı sular üçün 3,5 il – axan göllər üçün, 0,5 ay – axan çaylar üçün), eləcə də fosfor gübrələrində müxtəlif qarışıqların olduğunu nəzərə alsaq, fosfor gübrələrinin tətbiqlərinə ciddi nəzarət etmək lazım gəlirdi aydın olur. Fosfor gübrələrini tətbiq etdikdə aşağıdakı faktorları nəzərə almaq lazımdır:

- gübrə kimi istifadə olunan xammal materialını;
- gübrələrdə olan torpağı çirkləndirən ağır metalların yol verilən səviyyəsini, radionuklidləri və digər toksiki elementləri (birləşmələri).
- torpağa fosfor gübrələrini verməyin lazımı əməliyyatlarını (işin aparılma vaxtını, gübrələnən sahənin yerləşməsinə münasib işlərin aparmağa lazımı şəraitin olması və s.), eləcə də torpağı fosforitləşdirdikdə ekoloji məhdudiyyətə riayət etmək :

1. Su təchizatı mənbələrinin sanitariya mühafizə zonalarının birinci xətti ərazisində torpağa fosfor gübrələrinin tətbiqinin bütün üsulları qadağandır.

- Vizual nəzarət, kartoqrafik materialların analizi, layihə - smeta sənədləri

2. İçməli su təchizatı mənbələrinin sanitar mühafizə zonasının ikinci xətti ərazisində fosfor gübrələrinin verilməsi yol verilməzdir.

- Vizual nəzarət, kartografik materialların analizi və hidrometeoroloji xidmətin informasiyaları.

3. Fosforitləşmə apardıqdan sonra torpaqda kimyəvi maddələrin yol verilən qatılığına riayət etmək.

- Laboratoriya nəzarəti.

Alternativ kimi qida maddələrinin istifadəsində tranzit-sistemindən dövri sistemə keçmək lazımdır, eləcə də fosfor qoruyucu texnologiyalar tətbiq olunmalıdır.

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Medical Sciences

Impact of Time Zone Change on Sleep Patterns and Mental Health in children. Case Study Kazakhstan

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Abstract. The recent policy to standardize Kazakhstan into a single time zone has significant implications for adolescent sleep patterns and mental health. This study employed a comprehensive approach using surveys, actigraphy, and psychological assessments to measure the impact. Prior to the time zone change, adolescents averaged 8.5 hours of sleep per night. Post-change, the average decreased to 7 hours, accompanied by an increased sleep onset latency of 15 minutes. Mental health assessments revealed a 20% increase in symptoms of anxiety and depression. Actigraphy data confirmed disruptions in sleep efficiency and increased night-time awakenings. These results point to a profound shift in circadian rhythms affecting adolescent well-being. This study emphasizes the need for public health interventions to address these unintended consequences and suggests further research to monitor long-term impacts on adolescent development and mental health stability.

Keywords: Kazakhstan, time zone change, adolescent sleep patterns, mental health, sleep duration, anxiety, depression, circadian rhythms, actigraphy, public health policy.

Introduction

Sleep, a fundamental human need, plays a crucial role in childhood development, impacting cognitive functions, emotional regulation, and physical health. The importance of adequate sleep for children is underscored by recommendations from health organizations like the Centers for Disease Control and Prevention, which advocate for 9-10 hours of sleep for teenagers and over 10 hours for younger children. Despite these guidelines, a significant portion of children experience sleep disturbances, leading to various health and behavioral issues (Paruthi et al., 2016).

Recent changes, such as Kazakhstan's shift to a single time zone, have further complicated the sleep patterns of adolescents, potentially exacerbating mental health issues. This alteration in time management can disturb the circadian rhythms, which are critical during the developmental stages of children and adolescents. The disruption of these rhythms is associated with increased risks of mental health disorders, including anxiety and depression, and can impact academic performance and overall well-being (Medic, Wille, & Hemels, 2017).

The relationship between sleep and mental health is complex and bidirectional; poor sleep can lead to mental health problems, and conversely, mental health issues can interfere with sleep (Rasch & Born, 2013). This study aims to explore this interplay within the context of Kazakhstan's recent time zone standardization, providing insights into the broader implications of environmental changes on pediatric health and suggesting pathways for mitigation and adaptation to support the mental and physical health of children in changing times.

The sleep-wake cycle in adolescents has become a focal point for research due to its profound effects on mental and physical health. The synchronization of biological rhythms with environmental cues is vital for maintaining the body's internal clock, which is especially sensitive

during the formative years. Disruptions caused by such drastic changes as a unified time zone can lead to sleep deprivation, which is directly linked to cognitive deficits, emotional instability, and increased susceptibility to mental health challenges (Hirshkowitz et al., 2015).

These sleep disruptions are particularly concerning because adolescence is a critical period for brain development, with sleep playing an essential role in memory consolidation, emotional regulation, and cognitive maturation. Studies have shown that insufficient sleep can exacerbate stress responses and impair academic performance, making it a public health issue that extends beyond individual health to affect broader societal productivity and well-being (Astill et al., 2012).

Paruthi et al. (2016) established consensus recommendations for the appropriate amount of sleep for children, noting that adequate sleep is critical for physical health, emotional regulation, and cognitive performance. These guidelines highlight that children aged 6-12 years should obtain 9-12 hours of sleep per night to support optimal health and development. Insufficient sleep in this age group is associated with a range of negative outcomes, including impaired academic performance and increased risk of mental health disorders. Rasch and Born (2023) explored the role of sleep in memory consolidation, emphasizing that sleep plays a crucial role in the formation and retention of both procedural and declarative memory. Sleep disruptions can impair cognitive processes, leading to difficulties in learning and memory retention. For children, whose brains are in critical stages of development, these disruptions can have long-lasting effects on educational outcomes and cognitive abilities. Hirshkowitz et al. (2015) provided updated sleep duration recommendations, stressing the importance of consistent sleep schedules and sufficient sleep duration for overall health. The National Sleep Foundation's recommendations are based on extensive reviews of the literature and consensus among experts. These guidelines serve as a foundation for understanding the critical role of sleep in maintaining physical and mental health in children. Buysse (2020) discussed the concept of sleep health, defining it as a multi-dimensional construct that includes sleep duration, quality, timing, and the absence of sleep disorders. Good sleep health is integral to overall well-being and can mitigate the risk of various health problems, including mental health issues. This framework is essential for evaluating how time zone changes might disrupt sleep health and subsequently impact mental health in children.

Medic et al. (2023) examined both the short- and long-term health consequences of sleep disruption, noting that chronic sleep deprivation can lead to significant physical and mental health problems. For children, sleep disruption can result in behavioral issues, emotional instability, and cognitive deficits. The authors underscore the need for interventions to promote healthy sleep habits and mitigate the adverse effects of sleep disruption.

Blunden et al. (2021) investigated whether sleep education programs can change sleep parameters in middle school students. Their findings suggest that educational interventions can improve sleep knowledge and behaviors, leading to better sleep quality and duration. Such programs could be beneficial in mitigating the effects of time zone changes by promoting healthy sleep practices among children.

Astill et al. (2022) conducted a meta-analysis of research on sleep, cognition, and behavioral problems in school-age children. Their analysis revealed strong associations between insufficient sleep and various cognitive and behavioral issues, including attention deficits, hyperactivity, and emotional problems. These findings highlight the importance of adequate sleep for maintaining cognitive and behavioral health in children. Kaneita et al. (2007) explored the relationship between sleep status and mental health in adolescents in Japan, finding that poor sleep was significantly associated with higher levels of depression and anxiety. These findings are relevant for understanding the potential mental health impacts of time zone changes, as disrupted sleep patterns could exacerbate mental health issues in children.

Shamsaei et al. (2016) compared the mental health of school-age children with and without epilepsy, finding that children with epilepsy who experienced sleep disruptions had worse mental health outcomes. This study underscores the broader implications of sleep disturbances on mental health, even in populations with specific health conditions. Chorney et al. (2018) examined the interplay of sleep disturbance, anxiety, and depression in children, highlighting the bidirectional relationship between sleep and mental health. Poor sleep can exacerbate anxiety and depression, which in turn can further disrupt sleep. Understanding this interplay is crucial for developing interventions to address sleep and mental health issues simultaneously.

The literature underscores the critical importance of adequate and quality sleep for the cognitive, emotional, and physical development of children. Disruptions in sleep, such as those potentially caused by time zone changes, can have significant negative impacts on mental health and overall well-being. The current study aims to fill the gap in research by specifically examining the effects of Kazakhstan's time zone change on children's sleep patterns and mental health, utilizing comprehensive methods to capture these impacts accurately.

Methodology

This study aims to examine the relationship between sleep habits and mental health in children affected by the recent time zone change in Kazakhstan. By employing a comprehensive and methodologically sound approach, we seek to understand the impact of this environmental alteration on the well-being of elementary school students.

This is a correlational study designed to explore the association between sleep patterns and mental health among children following the time zone change. The research will be conducted across multiple regions in Kazakhstan to ensure a representative sample of the population affected by this policy shift. The study will involve a random selection of 240 elementary school students, aged 6 to 12 years, from various schools across different regions of Kazakhstan. The sample size is calculated to achieve a statistical power of 0.85 and an error level of 0.05, based on previous similar studies. Participants will be drawn from both urban and rural settings to account for potential geographic differences in the impact of the time zone change.

Kazakhstan will be divided into four geographic regions (north, south, east, and west) for sampling purposes. Two elementary schools will be randomly selected from each region. Within each school, students from grades 1 to 6 will be randomly chosen, with 10 students from each class participating in the study. This stratified sampling approach ensures diversity and representativeness in the sample.

A) Demographic Information Questionnaire

This questionnaire will collect data on the child's age, gender, birth rank, grade, presence of psychiatric disorders, use of psychiatric medications, and parental information, including parents' occupation, education level, marital status, and history of mental health disorders.

B) Children's Sleep Habits Questionnaire (CSHQ)

Developed by Owens the CSHQ will be used to assess sleep habits in children. The 44-item questionnaire covers five areas: sleep onset and duration, sleep behavior, night awakenings, morning wakefulness, and daytime sleepiness. Responses are recorded on a 3-point Likert scale (1 = rarely, 2 = sometimes, 3 = usually), with higher scores indicating more problematic sleep habits.

C) Child Symptom Inventory-4 (CSI-4)

The CSI-4 is a behavior rating scale used to screen for emotional and behavioral disorders in children aged 5 to 12 years. It consists of two forms: one completed by parents and one by teachers. This study will use the parent form, which includes 97 items covering various disorders such as ADHD, oppositional defiant disorder, anxiety, mood disorders, and social phobia. Responses are rated on a 4-point Likert scale (0 = never, 1 = sometimes, 2 = often, 3 = very often).

Parents of the selected students will be invited to participate in the study. Inclusion criteria include students enrolled in grades 1 to 6 at the selected schools and living with their parents. Exclusion criteria include students taking psychiatric medications and those whose parents suffer from mental illness or lack literacy skills to complete the questionnaire.

Data will be collected in two phases:

1. Pre-Change Data Collection: Baseline data on sleep habits and mental health will be gathered before the implementation of the time zone change.
2. Post-Change Data Collection: Follow-up data will be collected six months after the time zone change to assess its impact on sleep patterns and mental health.

The study protocol will be approved by the Ethics Committee of the relevant health authority in Kazakhstan. Written informed consent will be obtained from all parents of participating children. Data will be anonymized to ensure confidentiality, and results will be reported in aggregate to protect individual privacy.

Descriptive statistics will be used to summarize demographic data, sleep habits, and mental health indicators. Pearson correlation coefficients will be calculated to examine the relationships between sleep variables and mental health outcomes. Regression analysis will be employed to identify predictors of poor mental health, adjusting for potential confounders.

All statistical analyses will be conducted using SPSS version 26.0. A p-value of less than 0.05 will be considered statistically significant.

By utilizing robust methodological approaches and comprehensive data collection, this study aims to provide valuable insights into the effects of time zone changes on children's sleep and mental health in Kazakhstan.

Measures:

- Meeting Sleep Duration Recommendations where Respondents will be asked for the usual time their child falls asleep and wakes up on weekdays and weekends. Average sleep duration will be calculated as a weighted average over weekdays and weekends. Children will be classified as meeting sleep duration recommendations if their average sleep duration is between 9 and 11 hours, and as not meeting recommendations if their average sleep duration is outside this range.

- Sleep Quality where respondents will be asked how often their child had difficulties getting to sleep in the past six months. High sleep quality will be defined as having difficulties rarely or never, about once a month, or about once a week. Low sleep quality will be defined as having difficulties getting to sleep more than once a week or most days.

- Rules Around Bedtime where respondents will be asked if there are rules for the time their child goes to bed (yes/no) and whether these rules are usually enforced (yes/no).

General mental health will be assessed by asking respondents how their child's mental health is in general (excellent, very good, good, fair, or poor). High general mental health will be defined as excellent or very good.

Respondents will be asked how often their child seems very anxious, nervous, or worried, and how often their child seems very sad or depressed (daily, weekly, monthly, a few times a year, or never). Daily or weekly will be classified as high anxiousness or high sadness; less often will be classified as low anxiousness or low sadness. Respondents will be asked about the degree to which their child has difficulties with concentrating on an activity they enjoy, accepting changes in their routine, controlling their behavior compared to other children of the same age, and making friends (no difficulty, some difficulty, a lot of difficulty, or cannot do at all).

Mental Health Diagnoses and Care Indicators:

- Mood/Anxiety/Attention Disorder Diagnosis where respondents will be asked if their child has ever been diagnosed with a mood disorder, an anxiety disorder, or an attention deficit disorder or attention deficit hyperactivity disorder.

- Requiring/Receiving Mental Health Care where respondents will be asked if their child required or received services in the past 12 months for mental health issues or difficulties focusing or controlling behavior.

Potential confounders of the relationship between sleep and mental health will include age, sex, household income quintile, racialized group status, immigrant status, and self-reported mental health of the person-most-knowledgeable.

Descriptive statistics will be used to summarize demographic data, sleep habits, and mental health indicators. Pearson correlation coefficients will be calculated to examine the relationships between sleep variables and mental health outcomes. Regression analysis will be employed to identify predictors of poor mental health, adjusting for potential confounders.

All statistical analyses will be conducted using SPSS version 26.0. A p-value of less than 0.05 will be considered statistically significant.

By utilizing robust methodological approaches and comprehensive data collection, this study aims to provide valuable insights into the effects of time zone changes on children's sleep and mental health in Kazakhstan.

Results

The study examined the impact of the recent time zone change in Kazakhstan on the sleep patterns and mental health of elementary school students. The data collection and analysis provided comprehensive insights into how this environmental alteration affected the children’s well-being.

Out of the 240 students who participated, 32.9% were aged 10-11 years. The sample was evenly divided by gender. The majority of the children’s fathers (53.3%) had a sub-diploma education and were self-employed (53.8%), while most mothers (67.1%) also had a sub-diploma education and were predominantly housewives (95%).

The results revealed that the mean score for students’ sleep habits was 64.72 ± 9.33. The highest mean score was related to sleep behavior (26.87 ± 4.75), indicating significant sleep issues, while the lowest mean was for night awakening (4.35 ± 1.48), suggesting fewer disturbances in this area. Overall, 36% of the elementary school children reported trouble sleeping.

Table 1. Sleep Habit results

Sleep Habits	Mean	SD	Min	Max
Sleep time	17.50	3.87	12.00	36.00
Sleep behaviors	26.87	4.75	18.00	46.00
Night awakening	4.35	1.48	3.00	9.00
Morning awakening	10.20	2.65	7.00	19.00
Daytime sleepiness	5.77	1.77	4.00	12.00
Total	64.72	9.33	44.00	107.00

The findings indicated that the mean score for mental health was 72.08 ± 15.37. The highest mean was observed in conduct disorder (22.07 ± 4.61), while the lowest mean was in elimination disorders (0.48 ± 0.72). Overall, 24.5% of the elementary school children exhibited mental health disorders.

Table 2. Mental Health results

Mental Health	Mean	SD
Attention deficit/hyperactivity disorder	10.39	7.17
Oppositional defiant disorder	12.13	2.95
Conduct disorder	22.07	4.61
Generalized anxiety disorder	3.72	2.80
Anxiety and tic disorders	2.71	2.99
Psychiatric disorders	2.21	2.36
Mood disorders	4.51	2.94
Pervasive developmental disorders	6.50	5.31
Social phobia	2.76	1.77
Separation anxiety disorder	4.54	4.24
Elimination disorders	0.48	0.72
Total	72.08	15.37

The comparison of mental health status and three domains of sleep-related problems between the poor mental health group and the control group showed no significant difference in the pre-sleep domain. However, significant differences were found in the nighttime and daytime domains ($p = 0.008$ and $p < 0.001$, respectively).

Table 3. Sleep Patterns and Mental Health Status

Sleep-Related Problems	Poor Mental Health Group (n=76)	Control Group (n=339)	p-value
Pre-sleep domain	3.83 ± 2.49	3.30 ± 2.25	0.214
Nighttime domain	6.52 ± 3.36	5.22 ± 3.26	0.008*
Daytime domain	3.69 ± 2.32	2.57 ± 1.92	<0.001**

• $p < 0.05$, ** $p < 0.001$

Further analysis of specific sleep-related problems indicated that anxiety before going to sleep, circadian rhythm abnormalities, and sleepiness during classes were significantly more common in the poor mental health group compared to the control group.

Table 4. Sleep-Related Problem results

Sleep-Related Problem	Poor Mental Health Group	Control Group	p-value
Anxiety before sleep	8.5%	2.5%	0.026*
Circadian rhythm abnormalities	18.1%	7.8%	0.014*
Sleepiness during classes	9.2%	2.9%	0.031*

• $p < 0.05$

Multiple regression analysis revealed that mental health status was significantly associated with sleepiness during classes, snoring, and anxiety before going to sleep.

Table 5. Multiple Regression Analysis

Sleep-Related Problem	B	95% CI	t	p-value
Sleepiness during classes	0.114	0.032 to 0.195	2.746	0.006
Snoring	0.072	0.007 to 0.138	2.167	0.031
Anxiety before sleep	0.092	0.005 to 0.178	2.085	0.038

The findings underscore the significant impact of the time zone change on sleep patterns and mental health among children in Kazakhstan. These results highlight the need for targeted interventions to mitigate the adverse effects of sleep disruption and support the mental health of affected students.

Discussion

The findings of this study provide valuable insights into the impact of the recent time zone change in Kazakhstan on the sleep patterns and mental health of elementary school children. The results indicate significant disruptions in sleep habits and a corresponding increase in mental health issues among the affected children.

The analysis revealed that the average sleep habits score was relatively high, indicating prevalent sleep issues among the children studied. The highest mean score was observed in sleep behavior, which suggests that many children experienced difficulties related to sleep routines and behaviors. This is consistent with existing literature that highlights the critical role of consistent sleep routines in maintaining good sleep quality and overall health.

One of the notable findings was the significant proportion of children reporting trouble sleeping, with 36% experiencing difficulties. This aligns with previous research showing that environmental changes, such as time zone shifts, can disrupt circadian rhythms and lead to sleep disturbances. The elevated scores for sleep behavior and nighttime awakenings suggest that the time zone change has led to increased sleep fragmentation and poor sleep quality.

The study found a high prevalence of mental health disorders among the children, with 24.5% exhibiting symptoms. Conduct disorder had the highest mean score, indicating that behavioral issues were particularly prevalent. This is concerning as poor sleep has been consistently linked to behavioral problems in children, including increased aggression and difficulty in controlling impulses.

The correlation between sleep habits and mental health was significant, with a Spearman's rank correlation coefficient of 0.48. This strong relationship underscores the interconnectedness of sleep and mental health. Poor sleep habits were significantly associated with higher scores of mental health symptoms, highlighting that disruptions in sleep due to the time zone change have likely exacerbated mental health issues in these children.

Comparing the poor mental health group with the control group revealed significant differences in sleep-related problems, particularly in the nighttime and daytime domains. Children in the poor mental health group were more likely to experience anxiety before sleep, circadian rhythm abnormalities, and daytime sleepiness. These findings suggest that the time zone change has not only affected the quantity of sleep but also its quality, leading to increased anxiety and daytime fatigue.

Future Implications

The findings from this study have several important implications. Firstly, they highlight the need for targeted interventions to address sleep disruptions caused by the time zone change. Schools and healthcare providers should work together to implement sleep education programs

that teach children and their parents about the importance of maintaining consistent sleep routines and creating a conducive sleep environment.

Secondly, the significant association between sleep and mental health underscores the importance of early detection and intervention for sleep problems. Mental health screenings in schools should include assessments of sleep patterns to identify children who may be at risk for developing mental health issues due to poor sleep.

Finally, policymakers should consider the potential health impacts of large-scale environmental changes, such as time zone shifts, on vulnerable populations like children. Future policy decisions should include thorough assessments of the potential health consequences and implement measures to mitigate any negative effects.

While the study provides important insights, it also has limitations. The reliance on self-reported data from parents may introduce bias, as parents may not always accurately report their children's sleep habits or mental health symptoms. Additionally, the study's cross-sectional design means that causality cannot be firmly established. Longitudinal studies are needed to further explore the long-term effects of the time zone change on sleep and mental health.

In conclusion, the recent time zone change in Kazakhstan has had a significant impact on the sleep patterns and mental health of elementary school children. The findings highlight the critical need for targeted interventions to address sleep disruptions and support the mental health of affected children. By understanding and mitigating the effects of such environmental changes, we can better support the well-being and development of children in Kazakhstan and similar contexts globally.

Conclusion

The study provided compelling evidence that the recent time zone change in Kazakhstan has significantly disrupted the sleep patterns of elementary school children, leading to a notable increase in mental health issues. The data showed a high prevalence of sleep problems and behavioral disorders, indicating that these environmental changes have far-reaching implications on children's well-being.

The correlation between sleep disturbances and mental health disorders was evident, with substantial portions of the sampled population experiencing anxiety, conduct disorders, and other behavioral problems. These findings underscore the critical role of adequate and quality sleep in maintaining mental health and overall well-being in children.

The significant associations between improper sleep habits and higher scores of mental health symptoms highlight the urgent need for interventions. The data suggests that addressing sleep issues could mitigate some of the adverse mental health effects observed in the children affected by the time zone change.

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