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PROBLEMS AND SOLUTIONS OF FOOD WASTE REDUCTION

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Abstract: This article analyzes one of the global issues—food waste—and explores the problems and solutions associated with it. The primary causes of food waste include improper storage, low consumer awareness, wastage in restaurants and retail chains, and losses in agriculture. To address these issues, it is essential to increase consumer awareness, ensure proper food storage, implement effective management systems in supermarkets, improve legislation, and utilize modern technologies. This article provides recommendations aimed at achieving economic efficiency and ensuring environmental sustainability by reducing food waste.

Keywords: waste, consumer culture, food storage, agricultural losses, restaurants and supermarkets, environmental sustainability, economic efficiency, food security, anti-waste measures, technological solutions.

Food Waste: Problems and Solutions

Food waste is a significant global issue that results in severe economic, environmental, and social losses. According to the United Nations (UN), approximately 30-40% of food produced worldwide is wasted annually. This waste not only leads to the unnecessary depletion of natural resources but also exacerbates hunger and food shortages. In Uzbekistan, a substantial portion of food products is also lost, negatively impacting economic efficiency. This article examines the key challenges of food waste and proposes solutions to mitigate them.

Major Problems of Food Waste Economic Losses

Food waste contributes to economic losses. Despite substantial investments in production, transportation, and storage, a significant portion of food products is lost before reaching consumers. This reduces economic efficiency and imposes additional financial burdens on both producers and consumers.

Environmental Problems

Food waste contributes to environmental degradation. Decomposing food waste releases harmful gases, such as methane, which intensifies the greenhouse effect and accelerates global warming. Additionally, the unnecessary use of water and land resources negatively impacts environmental sustainability.

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Hunger and Food Shortages

While millions of tons of food are wasted, millions of people suffer from hunger. The imbalance in food distribution exacerbates global social issues and deepens poverty.

Storage and Logistics Challenges

A considerable portion of food is lost during the supply chain due to poor storage conditions, inefficiencies in transportation, and delays in delivery, leading to spoilage and wastage.

Consumer Culture and Habits

Poor consumer habits also contribute to food waste. Excessive purchasing, ignoring expiration dates, improper storage, and discarding leftovers all worsen the issue.

Solutions to Reduce Food Waste Legislation and Policy Measures

Governments should develop legal frameworks to combat food waste. Producers and retailers should establish systems to distribute surplus food to underprivileged communities.

Enhancing Food Storage and Processing Technologies

To prevent spoilage, it is crucial to adopt modern storage techniques such as refrigeration, drying, fermentation, and vacuum packaging, which extend the shelf life of food products.

Improving Consumer Awareness

Raising public awareness about food conservation and proper storage methods is essential. Encouraging planned shopping, assessing expiration dates accurately, and reducing leftover waste should become a societal norm.

Waste Management and Recycling

Recycling food waste into animal feed, compost, or biofuel can help reduce environmental damage and convert waste into valuable resources.

Food Waste Reduction Strategies in Uzbekistan

Food waste is a serious global concern. In 2019, approximately 31% of the food produced worldwide—equivalent to 1.64 billion tons—was wasted. In Uzbekistan, food waste per capita has increased from 0.7% to 10.6%.

Scientists are proposing various approaches to address this issue. For example, Vish Prakash, President of the International Union of Food Science and Technology (IUFoST), highlights the importance of food science, technology, and nutrition in ensuring a sustainable global food system. Uzbek researchers are also working on improving the management mechanisms of the food industry.

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Additionally, food security is being studied in the context of modern challenges such as climate change, population growth, and economic instability.

Food Security in Uzbekistan

Uzbekistan has made significant progress in ensuring food security. From 2019 to 2022, the country climbed 12 positions in the Global Food Security Index, ranking 73rd.

Local Initiatives

Various scientific and practical conferences are held in Uzbekistan to discuss innovative solutions to food security challenges.

Scientific Research on Food Security

Scientists are studying food security within the framework of global challenges such as climate change, population growth, and economic instability.

Scientific Research on Food Waste Reduction 1. "Improving the Food Waste Reduction System"

This study examines how high tax burdens on food products, the absence of food-sharing platforms, and the lack of food banks contribute to food waste in Uzbekistan. The authors suggest adopting policies from countries such as Germany, France, and Italy.

2. "Challenges and Solutions of Food Security in the Digital Economy"

This article discusses how digital technologies affect food systems, changing consumption patterns, cybersecurity threats, and food waste issues. The authors propose solutions such as developing sustainable agriculture, investing in food processing technologies, expanding online food markets, and enhancing cybersecurity measures.

Recommendations of FAO on Reducing Food Loss in Uzbekistan

This seminar material presents a strategy for reducing food loss in Uzbekistan. FAO representatives emphasized that adopting this strategy would improve the sustainability of food systems, ensure food security, and open new opportunities for business development.

The Importance of Environmental and Legal Awareness in Reducing Food Waste

This article highlights that despite global food shortages, thousands of tons of food are wasted, leaving millions of people suffering from hunger. The authors demonstrate that through environmental and legal awareness, food waste can be reduced, and underprivileged populations can be provided with food through charitable donations.

Food Security: National and Global Challenges

This article analyzes national and global challenges in ensuring food security. The authors

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discuss measures necessary to enhance food security.

Existing Food Waste Reduction Systems

Food waste reduction systems are evolving in various directions and can be categorized into the following main groups:

1. Digital and Innovative Technology-Based Systems Food Sharing Platforms – These help distribute surplus food to those in need. For example, apps like Too Good To Go, Olio, and No Waste connect restaurants, supermarkets, and consumers, facilitating food redistribution. Blockchain-Based Monitoring Systems – These ensure traceability along the food supply chain, minimizing losses and waste. They provide accurate information about food origin and quality, helping prevent improper storage and transportation issues. Artificial Intelligence and IoT (Internet of Things) Technologies – These monitor food expiration dates, optimize delivery processes, and prevent food waste in warehouses and stores. 2. International and National Strategic Systems FAO (Food and Agriculture Organization of the United Nations) – Develops global strategies for reducing food loss and provides country-specific recommendations. FAO's "Save Food" initiative promotes worldwide cooperation in food conservation and waste reduction. European Union’s FUSIONS Program – Focuses on research and policy strategies to reduce food waste. U.S. "Food Recovery Challenge" Program – Encourages companies and organizations to adopt innovative methods to minimize food waste. 3. Systems Ensuring Environmental and Social Sustainability Food Banks – These collect surplus food and distribute it to socially vulnerable populations. Organizations such as the Global FoodBanking Network and Feeding America play a significant role in this area. Zero Waste Movement – A global initiative promoting waste-free living through food conservation, recycling, and sustainable consumption. 4. Local and Regional Regulatory Systems Legal Standards and Government Policies – Some countries have enacted specific laws to reduce food waste. For example, France requires supermarkets to donate excess food to charities. Public Education and Awareness Programs – Schools and universities organize special courses and events to educate students on reducing food waste. Key Insights from International Researchers on Food Waste Reduction Tim Lang (University of London) attributes food waste to poor logistics, improper consumer storage habits, and market demand fluctuations. He advocates for a synergy between state policies and innovative technologies to address the issue. Dana Gunders (NRDC, USA) suggests using artificial intelligence and digital technologies to reduce waste. Smart storage systems and automatic expiration date monitoring could cut waste by 20-30%. Jessica Fanzo (Johns Hopkins University) emphasizes the importance of composting, recycling, and effective utilization of local food resources. Tristram Stuart (University of Surrey) highlights that misconceptions about food expiration dates contribute to waste. He stresses the need for increased public awareness and education. Conclusion

Food waste is one of today's most pressing global issues, with economic, environmental, and social consequences. Research indicates that the primary causes of food waste include supply chain inefficiencies, improper consumer habits, poor resource management, and insufficient adherence to food safety standards.

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A comprehensive approach is required to address this issue:

Technological Innovation in Food Production and Distribution – Artificial intelligence, blockchain, and smart storage systems play a crucial role in monitoring food expiration, optimizing usage, and minimizing supply chain losses. Improvement of Government Policies and Legal Frameworks – Legislative measures, charity incentives, and public environmental education have proven effective in reducing food waste. Raising Consumer Awareness – Educating individuals about proper food storage, consumption, and sorting can significantly contribute to waste reduction.

By integrating modern technologies, effective state policies, and social responsibility, food waste prevention can enhance economic efficiency, promote environmental sustainability, and strengthen global food security.

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