IRSTI 87.01.09 https://doi.org/ 10.63051/kos.2024.4.124

***[1]Moshkal M.A.** **[2]Akhapov Y.A.** **[3]Ogihara A.**
*[1,2]Al-Farabi Kazakh National University, Almaty, Kazakhstan*
*[3]Waseda University, Saitama, Japan*
*E-mail: [1]madina.moshkal@gmail.com, [2]erlan.ahapov@kaznu.kz, [3]aogi@waseda.jp*

# JAPANESE EXPERIENCE IN SUSTAINABLE DEVELOPMENT: THE HISTORICAL EVOLUTION OF WASTE MANAGEMENT SYSTEM

***Abstract.*** The need to enhance efficiency in waste management is one of the biggest issues affecting modernizing societies trying to develop economic growth. Globalization has prompted more countries to aim for increased economic development. However, pursuing advanced economic development comes with its own set of challenges. The unsustainable utilization of limited natural resources and the increasing waste issue are both sources of concern. Containers and packaging, food waste, home electric appliances, and construction materials comprise a portion of Japan's household waste. Consequently, the country needs to develop an effective waste management system. The goal of the research is to examine the historical experience of the development of a sustainable waste management system in Japan, with a focus on the integration of economic, social, and environmental factors within the context of sustainable development. The tasks of the study include the examination of the impact of legal and regulatory changes, the analysis of Japan's waste management evolution across various historical eras, and the evaluation of the efficacy of current waste management initiatives, such as the 3Rs (Reduce, Reuse, Recycle). The research employs a historical and regulatory analysis methodology, using both primary and secondary data to trace the development of waste management policies and practices. The comprehensive approach of the study, which classifies Japan's waste management evolution into eras and identifies the primary drivers of change in policy and technology, contributes to its novelty. The results show a significant shift from basic hygiene-focused waste management to a sophisticated system that seamlessly integrates into economic and production processes. The current emphasis is on proactive environmental management and resource recovery.

***Keywords*:** Japan, sustainable development, waste management, history of development, reuse, reduce, recycle

## Introduction

The concept of sustainable development has emerged from the integration of three key aspects: economic, social, and environmental (United Nations, 2015), all of which are intertwined, and even little deviations in one would have consequences in the others. Waste management is also a problem that affects all three factors.

The impact of human activities on the environment (social aspect), as well as economic progress and global population growth (economic aspect), has resulted in a substantial increase in waste (environmental aspect). Consequently, they pose a threat to human health and the environment, while also generating additional complications in terms of their placement, processing, and disposal. Waste management has become one of the most pressing issues in recent years in global practice. As a result, one of the goals of sustainable development is to solve global challenges by implementing policies that address the three aspects mentioned above.

According to the Glossary of Statistical Terms of the Organization for Economic Co-operation and Development (OECD), waste management activities cover the following:

(a) “collection, transportation, treatment and disposal of waste;

(b) control, inspection, and regulation of waste generation, collection, transportation, treatment, and disposal;

(b) prevention of waste generation through modification in the production, recycling, and recycling process ” (https://data-explorer.oecd.org/, 2024).

Waste management is the process of recycling garbage that reduces its adverse effects on human health and the environment. The classification system is based on the origins of agricultural, municipal, industrial, and mining waste. Each of them is required to destroy their identities in a manner that is consistent with the applicable laws and regulations. Composting, anaerobic decomposition, plasma gasification, incineration, and waste disposal constitute various methods. Each nation demonstrates which garbage disposal method is most effective, depending on its economic and political beliefs, as well as its cultural and traditional characteristics. A multitude of factors affect the choice of waste management strategy.

The development and implementation of a sustainable waste management system is a time-consuming and difficult task. The visible accomplishments in this field came from industrialized countries, but even they had to go through numerous experiments, failures, and adjustments over several decades to create a sustainable waste management system. The implementation phase is an important component of this process since the system must reflect the results, and the situation with waste management evolves in response to the country's economic and social development.

Japan is one of the industrialized countries that has made significant progress toward developing a sustainable waste management system. The waste management systems used in Japan were chosen for a variety of reasons. Japan's geographical isolation as an island nation with a population of 125.71 million people (as of 2020) (Statistical Handbook of Japan, 2021: 7) will inevitably result in increased waste. It also raises the issue of waste management, including mitigation of the consequences. Japan has greatly improved its waste management by implementing various policies integrated with relevant systems within the country. However, Japan has had several issues along the way, from the beginning of its path to the current outcomes.

Thus, the purpose of this article is to study the experience of Japan in achieving sustainable waste management in the context of historical development.

## Research Materials and Methods

The scientific community, as well as the socio-economic sphere, are both concerned with environmental issues, particularly waste management. The ecological imperative of waste management is essential for the implementation of the concept of sustainable development, which is characterized by the gradual adoption of an environmentally friendly production structure. Its description in relation to waste management presupposes the existence of technologies that facilitate their placement in specialized facilities, where they are neutralized, buried, and processed using contemporary methods.

The practical significance of the work is that it can be used as a valuable source for research on the environmental issues of developing countries, and it is feasible to develop a waste management technology that is both environmentally friendly and cost-effective.

The theoretical framework of the study originated from the fundamental and applied research of the Ministry of the Environment of Japan, as well as other secondary sources that examined the economic and environmental processes underlying waste management in Japan.

The study was divided into two primary sections: Evolution of Japan's Waste Management and Evolution of Japan's Regulations on Waste Management. Each section addresses a related topic within the five development periods of Japanese waste management.

## Discussion

Different types of waste impacting an economy include household, business, and industrial waste. Waste generation is a natural result of humans living their everyday lives. It is reported that in Japan, one person produces a kilogram of waste daily, amounting to an estimated 365 kilograms annually (Yoshida, 2018: 2). Since 2000, Japan has made strides in managing its waste. However, data shows that as the economy advances, there is a significant increment in the waste produced. This phenomenon is because waste increases with increased production operations and imports (Yoshida, 2018: 4). As a result, the economic development of a country is associated with increased waste. In 2013, Japan's households and businesses generated an estimated 45 million tons of municipal solid waste, which is equivalent to 0.97 kg of water per capita on a daily basis (UTS Institute for Sustainable Futures, 2020: 45). Nevertheless, this figure has declined from a high of 55 million tons of waste in 2000. As of 2000, the nation was capable of recycling an estimated 21% of its municipal solid waste, a significant increase from the 5.3% achieved in 1990. Approximately 10.7% were handled through landfills, while the remainder was incinerated (UTS Institute for Sustainable Futures, 2020: 46).

Japan is Asia's biggest producer of packaging waste. The country's detailed waste management system leads to a better plastic management index. However, the management of plastics is still a significant problem. An average Japanese uses an estimated 450 plastic shopping bags annually. It is considered eleven times and seventeen times higher than Indonesia and the United Kingdom, respectively. They also buy an estimated 23.2 billion PET bottles per year, approximately 183 bottles per individual (Lee, 2022). Other wastes include home appliances, automobiles, small home appliances, and construction. The issue of food waste in Japan is considerable. In 2011, it was estimated that the nation produced 37.86 million tons of food waste. The agricultural production phase resulted in 3.81 million tons of waste, while the storage and distribution phase produced 3.95 million tons. The commercial food phase was responsible for 19.95 million tons, and the household phase added 10.14 million tons of waste. The commercial stage constituted the highest amount of waste at 53%. However, it has the highest waste recycling, with an estimated 80% of the waste being recycled (Liu, Hotta, Santo, 2016: 557). These figures show that Japan has a significant waste problem synonymous with all countries recording significant economic growth. The table below shows the amount of waste produced in the country in 2014.

Table 1 – Amount of Generated Waste

| **Type of Waste** | | | **Vol. (Million Tons)** |
|---|---|---|---|
| Municipal Solid Waste | 44 | Household Waste | 28.842 |
| | | Office Waste | 13.11 |
| | | Others | 2.622 |
| Industrial Waste | 393 | Sludge | 168.68 |
| | | Animal waste | 81.28 |
| | | Construction waste | 64.24 |
| | | Dust | 17.48 |
| | | Metal and plastics | 60.74 |

Evolution of Japan's Waste Management

Japan has come a long way in its management of waste. It is important to examine the evolution of Japan's technology in managing the waste it generates. The country underwent a gradual concerning how it handled its waste. These will be illustrated below:

*Developments before the Meiji Restoration*

The period was during the late nineteenth to the early twentieth century. During this period, Japan was starting to modernize, and waste generators conducted waste management operations (JESC, 2014: 32). Alternatively, there were private waste treatment organizations that sought to manage waste. The private companies would sort valuables from the waste for sale and discard the rest in public spaces. It is evident that during this time, the country lacked a formal water management system (Mekonnen, Tokai, 2020: 88). The result was the establishment of unsanitary conditions leading to the spread of infections. The experiences resulted in an increased focus on public health, ensuring clean public spaces.

*Time Public Health Development*

After the war, between 1945 and the 1950s, there were factors that necessitated the head to address the problem of urban waste (JESC, 2014: 32). For instance, there was increased generation due to population growth and the absence of appropriate measures to address the waste. In addition, there was rapid economic growth resulting in increased waste generation. The need to improve public health was due to the deplorable state of the environment characterized by wastes in water bodies leading to public concerns such as flies and an increase in infectious diseases (JESC, 2014: 32). The collection of the generated wastes was not advanced, and their operations were manual using carts. These manual operations were insufficient to deal with the increasing waste in the urban centers. In addition, the transfer of the wastes from the carts to the automobiles was done on the streets, resulting in more public safety problems (JESC, 2014: 32). At the time, it was established that waste management operations were the responsibility of the municipalities, but the collaboration framework between residents and the government had not been established. By the end of the 1950s, there was an increased call for reforms since waste management had become overwhelming to the municipalities (JESC, 2014: 32).

*Increased Economic Growth*

Japan experiences significant economic growth at the conclusion of the 1950s and the onset of the 1970s (Yago, 2019). The time was characterized by increased generation of industrial waste and the onset of serious pollution issues. Despite innovations promoting economic growth, environmental protection measures were abandoned (UNEP, 2016). There were changes in the economy, such as consumer behavior. There was a paradigm shift to an economy characterized by mass production and consumption. The result was the generation of various types of waste. For instance, there was waste from home appliances and industrial wastes, including sludge and waste oil. The same era led to increased pollution from industrial wastewater and smoke, which adversely affected the environment and the inhabitants (UNEP, 2016). In addition, there was inappropriate wastewater treatment due to fewer spaces at landfills and other factors. As in the previous stage, the incineration of waste was difficult due to a large amount of wet debris and ash. Ultimately, there was increased environmental pollution leading to adverse effects on society and human health (Mitsuo, 2015: 234). An example of adverse health implications was the outbreak of Minamata disease that occurred in Japan in the 1950s (JESC, 2014: 32). People ate fish contaminated with large amounts of mercury compounds that were dumped into Minamata Bay by a chemical plant. Its main symptoms are neurological that include sensory disturbances, ataxia, concentric visual field constriction, auditory disturbances and other, including high level of death. This was a milestone in Japan's recognition of the importance of pollution prevention measures, leading to the development of new strategies to protect the environment.

## Conclusion

*Increased Economic Development to Bubble Economy*

Japan, from the 1980s to the onset of the 1990s, was marked by increased economic growth. The result was expansive waste issues concerning the quality and quantity of waste. Alongside the increase in garbage volume, there was a diversification in waste types. The volume of large household appliances, packaging materials and other materials has increased and has proven difficult to handle. (JESC, 2014: 32). The proliferation of plastic bottles characterized the time. For example, the plastic bottles produced in 1993 were 123,798, and those in 2000 were 361,944 (JESC, 2014: 32). The increase in waste has some implications, such as it was impossible for solid waste to be landfilled without incineration. In addition, it was challenging to develop new landfills due to the inability to get agreements with residents. The residents were concerned about the possible adverse effects of landfills (Mansouri, Kacha, 2014: 7). Other issues concerning illegal dumping include dioxins from waste incineration facilities.

*The Inception of the Sound Material-Cycle Society*

The 1980s were marked by detailed waste management (JESC, 2014: 32). Despite the development, the country was still experiencing problems such as intensive waste generation leading shortage of landfills. Therefore, the government must develop solutions to address the problem of waste generation. The inception of the detailed material-cycle society occurred from the 1990s to the 2000s (JESC, 2014: 32). The government sought a paradigm shift from a one-way consumption economy to a recycling-based economy (METI, 2020: 33). Japan has implemented this strategy to become a zero-waste society (Frazier, 2015: 69). The government initiated the Reduce, Reuse, and Recycle (3R) program in 2005 (Ministry of the Environment, 2005: 16). The reduction component pertains to the minimization of waste and by-products in manufacturing processes, while the reuse component involves the repeated utilization of things within the production process (OECD, 2010). Finally, recycling involves the economy repurposing resources that cannot be reused as basic materials. The objective of the 3R initiative was to develop a sound material-cycle society, significantly minimizing waste being disposed to landfills (UNEP, 2016). 3R marked a dramatic in the country's stand on waste management. There are various strategies implemented for waste management and 3R in Japan. These include the 3R promotion month, the 3R promotion national convention, the Environmentally Friendly Shopping Campaign, the 3R Promotion Meister system, the R mark, the 3R mark, and the eco-town development (JESC, 2014: 32).

Many initiatives show Japan's emphasis on addressing the waste problem as one of the Island nations sharing the Pacific Ocean and have collaborated with others to enhance waste management and safeguard the environment. The country has been involved through the Pacific Islands Leaders Meeting (PALM), which started in 2000. Japan has collaborated with other Pacific Islands Forum (PIF) members since 1997; other meetings reflecting the shared interests of Japan and Pacific Island countries in tackling climate change and promoting sustainable development occurred in 2000, 2003, 2006, 2009, 2012, 2015, 2018, 2021 and expected in November 2024. The first PALM underscored collaboration with PIF members concerning development and environment. Japan's focus on waste issues can be witnessed through PALM outcomes. In PALM1, Japan performed a project development study concerning regional waste problems. During PALM2, Japan developed the SPREP Training and Education Center and enhanced the Tafaigata disposal landfill in Samoa. It also created the Pacific Regional Solid Waste Management Master Plan. Japan was involved in PALM3 by sending experts to SPREP, promoting training programs, and enabling the creation of grassroots programs. Lastly, there is PALM4, in which the country adopted bilateral technical cooperation initiatives in Fiji and Vanuatu (JICA: 9). It was involved in developing region-wide initiatives in Samoa.

Evolution of Japan's *Regulations* on Waste Management

Japan's waste management has undergone significant evolution to what it is today. A good legal framework has enabled the development of its waste management strategies and techniques. It is important to examine Japan's historical evolution of its regulations concerning waste management.

*Developments before the Meiji Restoration*

The first legislation concerning waste management in Japan was the Waste Cleaning Act which came into action in 1900, and the target was night soil (JWNET, 2018: 45). Its objective was to promote public health and detail the guidelines for collecting and disposing of waste (JESC, 2014: 32). The Act explained that waste management was the role of municipalities. Therefore, the companies involved in waste disposal were answerable to government agencies. At the time, their incarnation infrastructure had not been well developed, and burning the waste was done out in the open. The Act was enacted at the beginning of rapid urbanization (JWNET, 2018: 45).

*Time Public Health Development*

Another regulation is the Public Cleaning Act of 1954, enacted during the era of increased waste generation due to increased economic development after the Second World War. The target of the government regulations transition from night soil to solid waste. The main objective of the Act was to enhance the speedy removal of waste from locations inhabited by people in their everyday life. As a result, it detailed the roles and responsibilities of the national governments in offering help to the municipalities (JWNET, 2018: 45). In addition, it outlined the role of the residents in collaborating with the municipalities to enable speedy waste collection and disposal. In 1963, the government implemented the Emergency Measures on Development of Living Environment Facilities aimed at improving the living environment and public health (JESC, 2014: 32). This facilitated the formulation of a Five-Year Plan for the Development of Living Environment Facilities by the authorities. This measure aimed to establish guidelines for the development of waste incineration infrastructure. The plan facilitated the automation of waste collection, leading the local government to collaborate with the private sector to enhance waste collection and transportation activities (JESC, 2014: 32). Although municipalities organized waste management, the period was characterized by an absence of a comprehensive system for effective industrial waste management.

*Increased Economic Growth*

At this time, Japan was dealing with the onset of increased pollution. The government must address the issue of industrial waste and therefore made reforms to the Public Cleaning Act in what they termed the pollution session. Another important regulation was the Waste Management and Public Cleansing Law of 1970 (JWNET, 2018: 45). The Act differentiated industrial waste from municipal waste and reiterated the role of municipalities in managing municipal waste. However, it added that the industrial waste generators were responsible for its management. In addition, it detailed safeguards for the living environment. One of the major functions of the Act was to control pollution (JESC, 2014: 32). The Act was then amended in 1976, illustrating criteria for waste disposal (JWNET, 2018: 45).

*Increased Economic Development to Bubble Economy*

The 1980s were characterized by substantial development in proper waste management practices (JESC, 2014: 32). Despite the progress, there was the persistence of some problems, such as continued growth in waste generation leading to the inadequacy of landfills.

*The Inception of the Sound Material-Cycle Society*

The Promotion of Effective Utilization of Resources Act, which was enacted in 1991, established standards for environmental consideration during the production process. Japan enacted the Basic Environment Act of 1993, which was the foundation of the country's environmental policies (Yolin, 2015: 142). It was instrumental in creating a sound material-cycle society (JESC,

2014: 32). The Act created a framework for an environmental policy with a transition from measures to prevent environmental pollution to addressing global environmental problems and promoting sustainability. A Basic Environment Plan 1994 offered environmental policy guidelines to be reformed every six years (UTS Institute for Sustainable Futures, 2020: 45). In 2000, the Basic Act formulated a sound material-cycle society established on waste management law. It specified the procedures for waste disposal, which include heat recovery, required recovery, reuse, and recycling. The formulation of a solid material-cycle society was the focus of the Fundamental Plan 2013 (UTS Institute for Sustainable Futures, 2020: 45). The new pillars of environmental policy were the subject of discussion, which included the promotion of 3R global collaboration, the reinforcement of secure recovery efforts, the recovery of useful metals, and the delay of reinforcing reduction and reuse efforts, in relation to recycling.

In addition, the fundamental plan for the Creating Sound Material-Cycle Society in Japan consisted of the following provisions:

1) regardless of the cost of consumption, action must be taken to prevent the conversion of products into waste;

2) considering the utility of created wastes in real-world applications and their utilization as secondary resources (recycling, reuse, energy production);

3) waste disposal must be neutralized consciously; it cannot be the goal of material turnover (Filimonova, 2011: 80-85).

The plan also establishes the responsibility of the waste producer. Including the state, local governments, business operators and citizens (JESC, 2012: 30).

The Law on Waste Management and Public Cleansing aims to regulate the activities of organizations that have entered into agreements with municipal authorities for waste management. It has strengthened the licensing requirements for waste management organizations and established rules for participatory waste management decisions.

In 2001, the Law promoting resource efficiency went into effect. Based on this statute, the two primary axes of Japan's national waste management policy have been identified in order to address environmental issues:

1) Reducing waste and byproducts;

2) Using renewable resources wisely; and

3) Using recycled materials (Filimonova, 2011: 80-85).

According to the Japanese Ministry of the Environment, governments and municipalities need to work to encourage "every citizen" to use waste efficiently and protect the environment. For this, it is important to develop economic instruments, as well as social infrastructure. At the same time, it is recognized that it is necessary to improve the information provision of the population to the nature of the waste management process and to influence the behavior of the population through the delivery of products made from recycled materials using visual information (Filimonova, 2011: 80-85). The 4th Fundamental Plan for Establishing a Sound Material-Cycle Society was introduced in 2018. It covers modernizing and enhancing the effectiveness of monitoring waste treatment processes using the IoT and AI, as well as building a waste management system that considers changes in the social structure. Furthermore, it is expected that local governments will promote collaboration with a diverse array of stakeholders, including universities, research and academic representatives, business operators, NPOs, NGOs, and citizens. These stakeholders will collaborate in a variety of capacities to establish a healthy material cycle society and contribute their ideas (Ministry of the Environment, 2018: 119).

The Waste Management and Public Cleansing Act, which was initially enacted in 1970 and underwent a revision in 2016, includes provisions for the regulation of waste operators, as well as provisions for adequate waste management and control of waste generation. In addition to that, the legislation establishes guidelines for the handling of waste. Additionally, the act sets standards for

waste management. refuse is classified as "industrial waste" and "solid waste" under this act. Furthermore, industrial waste is required to be processed, while domestic municipal bodies are obligated to process household waste (Kiryushina, Korotkikh, Kucherova, 2019: 60-62).

Producers and importers of personal computers are now required to participate in the recovery and recycling of waste by virtue of the 2013 revision of the Promotion of Effective Utilization of Resources 1991 (UTS Institute for Sustainable Futures, 2020: 45). A Sound Material-Cycle Society in Japan is established under the legal framework of the Basic Environment Act, as illustrated in Figure 1.

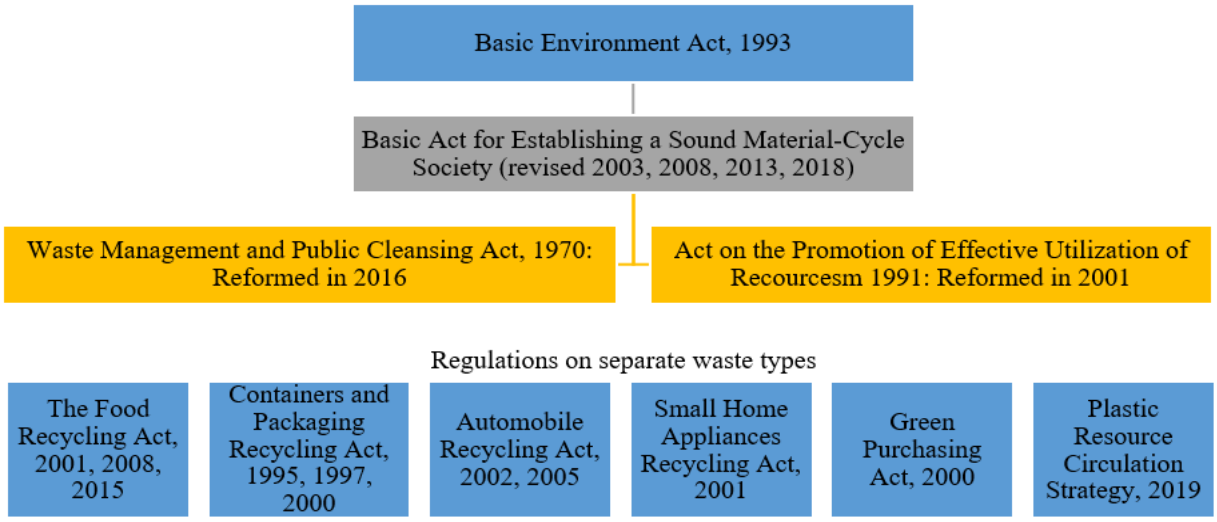


Figure 1 – Legal Framework for Creating Sound Material-Cycle Society in Japan (JESC, 2014: 32)

In addition, following regulations on a separate waste types are defined: The Food Recycling Act 2001 was reformed in 2008 and 2015 to reduce food waste generation and enhance recycling. The Containers and Packaging Recycling Act of 1995 was reformed in 1997 and 2000 to enhance the effective use of resources, such as bottles (including glass bottles and cans, PET bottles, paper and plastic containers and packages (Yamakawa,, 2013: 28), (UTS Institute for Sustainable Futures, 2020: 45). Additionally, the Automobile Recycling Act 2002, which was implemented in 2005, was designed to encourage the recycling of shredder residues, CFCs, and airbags. The Small Home Appliances Recycling Act of 2001 was implemented by the government in order to facilitate the recycling of reusable products, improve the recycling of metals, and designate products for sorted waste collection. It included such products as air-conditioners, televisions, refrigerators, washing machines and other (UTS Institute for Sustainable Futures, 2020: 45). In addition, the Green Purchasing Act of 2000 mandated retail businesses to minimize plastic bags, and cafeterias were required to utilize reusable tableware. The government also enacted the Plastic Resource Circulation Strategy 2019 to reduce single-use plastics, ensure recyclable design by 2025, reduce the utilization of recycled materials, promote the effective use of plastics, and introduce biomass plastics (UTS Institute for Sustainable Futures, 2020: 45). These regulations illustrate the evolution of Japan's waste management policies.

## Conclusion

Japan's waste management system has undergone a significant revolution over the years. The country's waste management system development can be categorized into three main eras according to the waste generation properties, the goal of waste management initiatives, legal system development, and the factors influencing regulation change. First, the era of public health enhancement was marked by the Waste Cleaning Act and concluded in 1970. There was an

increased generation of waste, and there was no guideline distinguishing the various types of waste. The government had promoted measures to reduce the volume of waste generation. Second, the living environment safeguarding era was marked by the Waste Management Act and concluded in 2000. There was the formulation of an independent waste management system and variation in the quality of waste. Lastly, the sound material-cycle society era was marked by increased resource management. The Basic Act was enacted, which formed the fundamental framework for the country's environmental policy. Waste management in Japan became more incorporated into the production systems and proactive. Therefore, the objective of waste management was centered on waste reduction, energy, and resource recovery. Since the implementation of the principles of social development, there has been a downward trend as a result of progress in the development of society. In the example of Japan, we can see that the joint efforts of society and the state can solve the most difficult problems.

**References:**

Filimonova Y.I. (2011). Japan: experience in municipal waste management // Journal of Municipal solid waste. Vol. 6, no. 60. P. 80–85.

Frazier J. (2015). Challenges Associated with Municipal Curbside Recycling in Matsudo City, Chiba, Japan. 69 p.

JESC (Japan Environmental Sanitation Center) (2012). Solid Waste Management and Recycling Technology of Japan: Toward a Sustainable Society. 30 p.

JESC (Japan Environmental Sanitation Center) (2014). History and Current State of Waste Management in Japan. – 32 p.

JICA (Japan International Cooperation Agency) (n.d.). Japan’s Cooperation on Solid Waste Management in the Pacific Region: Our Island, Our Waste, Our Future. 9 p.

JWNET (Japan Waste Network). (2018). Waste Management in Japan ~Rules and Figures~. November. 45 p.

Kiryushina, N.Y., Korotkikh, A.P., Kucherova, Y.O. (2019). Municipal solid waste management in Japan. Innovative approaches to solving modern problems of rational use of natural resources and environmental protection // Collection of reports of the International Scientific and Technical Conference. 60-62 pp. (in Russ.)

Lee, C. (2022). Plastic Atlas Japan special edition: A closer look at Japan's plastic waste management // Heinrich Böll Stiftung Hong Kong: Asia global dialogue. [Electronic resource]. URL: https://hk.boell.org/en/2022/05/30/plastic-atlas-japan-special-edition-closer-look-japans-plastic-waste-management (accessed 10.08.2024).

Liu, C., Hotta, Y., Santo, A., Hengesbaugh, M., Watabe, A., Totoki, Y., Allen, D., & Bengtsson, M. (2016). Food waste in Japan: Trends, current practices and key challenges // Journal of Cleaner Production. Vol. 133. P. 557–564. https://doi.org/10.1016/j.jclepro.2016.06.026 (accessed 22.07.2024).

Mansouri, A., Kacha, L. (2017). Waste Management System in Japan. 4 p.

Mekonnen, G. B., Tokai, A. (2020). A historical perspective of municipal solid waste management and recycling system in Japan: Learning for developing countries // Journal of Sustainable Development. Vol. 13, no. 3. P. 85–101. https://doi.org/10.5539/jsd.v13n3p85 (accessed 08.06.2024).

METI (Ministry of Economy, Trade and Industry). (2020). Circular Economy Vision 2020. May. 33 p.

Ministry of the Environment. (2005). Japan's Experience in Promotion of the 3Rs for the Establishment of a Sound Material-Cycle Society. 16 p.

Ministry of the Environment, Government of Japan. (2018). 4th Fundamental Plan for Establishing a Sound Material-Cycle Society. –119 p.

Mitsuo, I. (2015). Gomi to nihonjin. Eisei kinken risaikuru kara miru kindai-shi. Tokyo: Minerva. 338 p.

OECD. Glossary of Statistical terms. [Electronic resource]. URL: https://data-explorer.oecd.org/ (accessed 28.09.2024).

OECD. (2010). Waste management and the 3Rs (reduce, reuse, and recycle) // OECD Environmental Performance Reviews: Japan 2010. – 147-168 pp. https://doi.org/10.1787/9789264087873-7-en. (accessed 28.09.2024).

Statistical Bureau, Ministry of Internal Affairs and Communications, Japan. (2021). Statistical handbook of Japan. 7 p.

UNEP. (2013). The Japanese industrial waste experience: Lessons for rapidly industrializing countries. 132 p.

United Nations. (2015). United Nations Summit on Sustainable Development, 25-27 September 2015, New York. [Electronic resource]. URL: https://www.un.org/en/conferences/environment/newyork2015 (accessed 28.09.2024).

UTS Institute for Sustainable Futures & Asia Pacific Waste Consultants. (2020). Environmentally responsible trade in waste plastics Report 3: Case Studies on Plastic Waste Management and Trade in Asia Pacific. Prepared for the Department of Agriculture, Water and the Environment. – 63 p.

Yago, K. (2019). Japanese aid and economic growth during the 1960s and early 1970s // Revue Française D'histoire Économique. Vol. 11-12, no. 1. 204-224 pp. https://doi.org/10.3917/rfhe.011.0204 (accessed 08.10.2024).

Yamakawa, H. (2013). The packaging recycling act: the application of EPR to packaging policies in Japan. Case study prepared for the OECD. 28 p.

Yolin, C. (2015). EU-Japan Centre for Industrial Cooperation: Waste Management and Recycling in Japan Opportunities for European Companies (SMEs focus). September. 142 p.

Yoshida, M. (2018). Tackling the challenge of Waste // The Magazine of the Japan International Cooperation Agency. Vol. 10, no. 4. P. 2–4.

**[1]Мошқал М.А. [2]Ахапов Е.А. [3]Огихара А.**

*[1,2] Әл-Фараби атындағы Қазақ ұлттық университеті, Алматы, Қазақстан*

*[3]Васеда Университеті, Сайтама, Жапония*

*E-mail: [1]madina.moshkal@gmail.com, [2]erlan.ahapov@kaznu.kz, [3]aogi@waseda.jp*

## ЖАПОНИЯНЫҢ ТҰРАҚТЫ ДАМУ ТӘЖІРИБЕСІ: ҚАЛДЫҚТАРДЫ БАСҚАРУ ЖҮЙЕСІНІҢ ТАРИХИ ЭВОЛЮЦИЯСЫ

***Аңдатпа.*** Қалдықтарды басқарудың тиімділігін арттыру қажеттілігі экономикалық даму жолындағы модернизацияланатын қоғамдарға әсер ететін маңызды мәселелердің бірі. Жаһандану көптеген елдерді экономикалық дамуды жеделдетуге ұмтылуға итермеледі. Дегенмен, экономиканың қарқынды дамуына ұмтылудың кемшілігі де бар. Шектеулі табиғи ресурстарды тиімсіз пайдалану және қалдықтар мәселесінің күшеюі туралы алаңдаушылық осының бір себебі. Жапонияның тұрмыстық қалдықтарының бір бөлігі контейнерлер мен қаптамалардан, тұрмыстық электр құрылғыларынан, тамақ қалдықтарынан және құрылыс материалдарынан тұрады. Сондықтан елде қалдықтарды тиімді басқару жүйесі болуы шарт. Зерттеудің мақсаты – Жапонияда тұрақты даму контекстінде экономикалық, әлеуметтік және экологиялық факторларды біріктіруге назар аудара отырып, қалдықтарды басқарудың тұрақты жүйесін дамытудың тарихи тәжірибесін зерттеу. Зерттеудің міндеттері заңнамалық және нормативтік өзгерістердің әсерін талдауды, Жапониядағы қалдықтарды басқару

жүйесінің әртүрлі тарихи кезеңдерде қалай өзгергенін қарастыруды және қазіргі қалдықтарды басқару бастамаларының, соның ішінде 3R (қысқарту, қайта пайдалану, қайта өңдеу) тиімділігін бағалауды қамтиды. Зерттеуде қалдықтарды басқару саясаты мен тәжірибесінің дамуын бақылау үшін бастапқы және қосымша деректерді пайдалана отырып, тарихи және нормативтік талдау әдістемесі қолданылады. Зерттеудің кешенді тәсілі, қалдықтарды басқару эволюциясын кезеңдерге бөліп, саясат пен технологиядағы өзгерістердің негізгі қозғаушы күштерін анықтау арқылы ерекшеленеді. Нәтижелер негізгі гигиенаға бағытталған қалдықтарды басқарудан экономикалық және өндірістік процестерге кедергісіз біріктірілген күрделі жүйеге айтарлықтай ауысуды көрсетеді. Қазіргі уақытта басты назар белсенді экологиялық басқару мен ресурстарды қалпына келтіруге бағытталған.

***Түйін сөздері:*** Жапония, тұрақты даму, қалдықтарды басқару, даму тарихы, қайта пайдалану, қысқарту, қайта өңдеу

**[1]Мошкал М.А. [2]Ахапов Е.А. [3]Огихара А.**
*[1,2] Казахский национальный университет имени Аль-Фараби, Алматы, Казахстан*
*[3]Университет Васеда, Сайтама, Япония*
*E-mail: [1]madina.moshkal@gmail.com, [2]erlan.ahapov@kaznu.kz, [3]aogi@waseda.jp*

## ЯПОНСКИЙ ОПЫТ УСТОЙЧИВОГО РАЗВИТИЯ: ИСТОРИЧЕСКАЯ ЭВОЛЮЦИЯ СИСТЕМЫ УПРАВЛЕНИЯ ОТХОДАМИ

***Аннотация.*** Необходимость повышения эффективности обращения с отходами является одной из самых серьезных проблем, затрагивающих модернизирующиеся общества на пути обеспечения экономического роста. Глобализация побудила все больше стран стремиться к ускорению экономического развития. Однако у стремления к опережающему экономическому развитию есть и обратная сторона. Существуют опасения по поводу нерационального использования ограниченных природных ресурсов и растущей проблемы отходов. Некоторые бытовые отходы Японии состоят из контейнеров и упаковок, бытовых электроприборов, пищевых отходов и строительных материалов. Следовательно, в стране необходимо иметь эффективную систему управления отходами. Целью исследования является изучение исторического опыта формирования устойчивой системы управления отходами в Японии с акцентом на интеграцию экономических, социальных и экологических факторов в контексте устойчивого развития. Задачи исследования включают анализ влияния правовых и нормативных изменений, изучение эволюции управления отходами в Японии на протяжении различных исторических периодов и оценку эффективности современных инициатив по управлению отходами, таких как 3R (сокращение, повторное использование, переработка). В исследовании применяется исторический и нормативный анализ с использованием как первичных, так и вторичных данных для отслеживания развития политики и практик в области управления отходами. Комплексный подход исследования, включающий классификацию эволюции управления отходами в Японии по этапам, и выявление основных факторов изменения политики и технологий, придает работе новизну. Результаты показывают значительный переход от управления отходами, ориентированного на гигиену, к сложной системе, которая гармонично интегрирована в экономические и производственные процессы. В настоящее время акцент делается на активное экологическое управление и восстановление ресурсов.

***Ключевые слова***: Япония, устойчивое развитие, управление отходами, история развития, повторное использование, сокращение, переработка.

Information about authors:

Moshkal Madina Askarbekkyzy, PhD student, Kazakh National University named after al-Farabi, Almaty, Kazakhstan.

Akhapov Yerlan Abdievich, PhD., Senior Lecturer, Kazakh National University named after al-Farabi, Almaty, Kazakhstan.

Ogihara Atsushi, PhD., Professor, Waseda University, Saitama, Japan.

Авторлар туралы мәлімет:

Мошқал Мәдина Асқарбекқызы, докторант, әл-Фараби атындағы Қазақ ұлттық университеті, Алматы, Қазақстан.

Ахапов Ерлан Абдиевич, PhD., аға оқытушы, әл-Фараби атындағы Қазақ ұлттық университеті, Алматы, Қазақстан.

Огихара Ацуси, PhD., профессор, Васеда Университеті, Сайтама, Жапония.

Сведения об авторах:

Мошкал Мадина Аскарбеккызы, докторант, Казахский национальный университет имени Аль-Фараби, Алматы, Казахстан.

Ахапов Ерлан Абдиевич, PhD., старший преподаватель, Казахский национальный университет имени Аль-Фараби, Алматы, Казахстан.

Огихара Ацуси, PhD., профессор, Университет Васеда, Сайтама, Япония.