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ARTICLE

# The Societal Perception and Challenges of Municipal Solid Waste Management in Russian and Chinese Megacities: A Comparative Study

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**ABSTRACT**
This study offers a comparative sociological analysis of public perceptions surrounding municipal solid waste management in the megacities of Russia and China. Against the backdrop of an intensifying global environmental crisis, there is an urgent need for innovative research to inform effective ecological strategies. Urbanization stands as a primary driver of environmental degradation, with municipal solid waste management representing one of the most pressing challenges in contemporary urban governance. Despite technological advancements in waste segregation and disposal, widespread public acceptance remains elusive, hindering the operational efficiency of urban waste systems. In both Russia and China, prevailing societal attitudes toward waste segregation present a formidable obstacle to the

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successful implementation of environmental policies. Consequently, transforming public perceptions of modern waste collection and management technologies is imperative. The evolution of these attitudes is closely tied to the development of environmental ethics within urban populations. This article investigates the current status and key challenges in fostering environmental consciousness across Russian and Chinese megacities.

**KEYWORDS**
municipal solid waste, urbanization, societal perception, environmental policy, environmental ethics, social ecology, social and environmental security

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## Introduction

The escalating global environmental crisis demands innovative research to devise and implement effective solutions to pressing ecological challenges. Crafting meaningful interventions requires a comprehensive understanding of the full spectrum of threats posed by modern society, including those arising from industrialization, urbanization, and consumerism. The intensified exploitation of natural resources for production and consumption is accompanied by increasing anthropogenic pollution, which adversely affects soil, water, and air quality. These processes collectively contribute to large-scale environmental degradation, including desertification, climate change, ozone depletion, biodiversity loss, declining soil fertility, and deforestation. Scholars and experts widely recognize this phenomenon as a socio-ecological crisis of global proportions.

Among the various drivers of environmental decline, urbanization stands out as particularly impactful. More than the physical expansion of cities, urbanization is a complex socio-historical process that reshapes contemporary lifestyles and consumption patterns. According to the United Nations, the global urban population continues to grow due to rising birth rates and migration, especially in low- and middle-income countries. It is projected that the proportion of the world's population residing in urban areas will increase from 56% in 2021 to 68% by 2050 (Khor et al., 2022).

While this trend reflects a growing preference for urban amenities and economic opportunities, it also places mounting pressure on the environment. Expanding cities require ever-greater quantities of natural resources—land, water, forests, and clean air—thereby intensifying ecological degradation.

One of the most urgent challenges facing today's megacities is the effective management of municipal solid waste (MSW). Despite the availability and gradual integration of advanced technologies for waste segregation and disposal in both Western and Eastern urban centers, societal acceptance remains a critical barrier to their widespread adoption. A key impediment lies in the psychological resistance exhibited by various social groups and urban communities, who are often reluctant to participate in structured waste segregation practices. In both Russia and China, public perceptions of waste segregation serve as major obstacles to the successful implementation of comprehensive environmental policies in megacities. Therefore, reshaping societal attitudes toward the feasibility and benefits of modern waste collection and management technologies, alongside fostering stronger environmental ethics, is of vital importance.

Drawing on international best practices in incentivizing waste sorting provides valuable insights into the development of social strategies for transforming public perceptions of waste management in Russian and Chinese megacities. Efficient segregated waste collection systems are well-established across European Union (EU) member states, where institutional frameworks ensure the effectiveness of waste management efforts (Seyring et al., 2015). Most EU countries mandate the separation of key waste categories—paper, glass, plastic, and metal—as part of their comprehensive national waste strategies (Ionkova & Simonis, 2018; Williams et al., 2020).

Japan provides a compelling example of a successfully cultivated "recycling society," in which municipal solid waste is systematically repurposed or reused. The Japanese model emphasizes resource conservation at the production stage by incorporating the extensive use of secondary raw materials into manufacturing processes (Zhong & Zhong, 2020).

Hong Kong, one of the world's most densely populated megacities, offers another instructive case. Although comparable in density to Tokyo and Seoul, Hong Kong's per capita MSW generation is nearly twice as high. In response, the local administration has adopted proactive measures to strengthen waste recycling, including robust government support for recycling enterprises and the development of eco-parks (Environment Hong Kong, 2022).

## Literature Review

Over the past several decades, the collection and disposal of municipal solid waste in Russia have been the subject of extensive scholarly investigation. Contemporary researchers such as Kirillova and Musinova (2018) have analyzed the organizational and economic frameworks currently employed in Russian waste management, emphasizing the need for continued development and optimization. Equally important

is the comparative study of international approaches to establishing municipal waste management systems at the megacity level. This area of inquiry has been advanced by numerous scholars, including Molokov (2024), Nesterenko (2023), Pavlenkov and Voronin (2018), Stepanova and Stepanov (2020), and Vega et al. (2020). Of particular note are the recent contributions of Mikhaylova (2019) and Kirillova and Musinova (2022), which offer critical insights into the evolving landscape of waste management strategies.

Another significant research focus concerns the engagement of megacity populations, the private sector, and governmental institutions in implementing diverse models of MSW collection and utilization. Scholars such as Motorin (2022), Litvintsev et al. (2023), Plokhikh (2020), Putintseva (2019a, 2019b), Shabanova (2019) have explored the socioeconomic and behavioral factors influencing public participation in waste segregation, along with the policy mechanisms that underpin effective waste management systems.

A further essential strand of Russian waste management research examines the role of regional operators and the challenges arising from interactions among the public, businesses, and governmental agencies in addressing environmental concerns. In this context, important contributions have been made by Prelikova et al. (2019), Fedotov and Ponyavina (2019), Artemova (2019), Zakharov (2020), Druzhakina and Ryazanova (2022), Primak and Ivanova (2024). Their studies offer valuable perspectives on policy coordination, regulatory frameworks, and economic incentives necessary to support sustainable waste management practices.

In China, MSW collection and utilization have also become an increasingly prominent topic of academic inquiry. Significant contributions in this field have been made by Peng and Shan (2019), Li and Li (2019), who have examined a wide range of issues including policy development, technological innovation, and public participation. In addition, the organizational and managerial structures that govern MSW collection and processing in Chinese megacities have been explored by Qiu and Wang (2017), and Huang (2019), whose work provides critical insights into system efficiency and the challenges posed by policy implementation and infrastructural expansion in rapidly urbanizing contexts.

Moreover, the complex interplay between society, the business sector, and municipal authorities in addressing environmental challenges has attracted growing scholarly attention. Researchers Liqiang and Wenyu (2017), Li and Zeng (2019), Biaobin et al. (2019), and Mei et al. (2024) have analyzed these dynamics, emphasizing the importance of public engagement, corporate social responsibility, and government regulation in shaping sustainable waste management systems. Their findings underscore the necessity of coordinated efforts among stakeholders to enhance collection efficiency and foster environmentally responsible behaviors.

Despite these valuable contributions, a notable gap persists in the academic literature: few comprehensive comparative studies have systematically examined public perceptions of MSW collection and utilization in Russia and China.

## Theoretical Assumptions and Methodology

The empirical foundation of this study is based on sociological surveys conducted among residents of Russian and Chinese megacities, with a particular focus on educated youth and entrepreneurs in Moscow, St. Petersburg (Russia), and Nanjing (China). The research investigates the system of norms, values, and behavioral patterns that inform societal perceptions of municipal solid waste (MSW) collection and utilization. A central conceptual category in this study is ecological consciousness, understood as a specific subset of broader social consciousness. This notion encompasses the collective ideas held by various social groups regarding the environment, including their beliefs about the permissible boundaries of natural resource exploitation. Furthermore, ecological consciousness reflects societal aspirations toward harmonizing the relationship between nature, humanity, and society, as well as fostering robust environmental ethics. The realization of such harmony depends critically on the implementation of effective environmental policies, which serve as key instruments in shaping public attitudes and behaviors related to waste management (Baynova et al., 2021).

This study also examines how major social factors—education level, income, and place of residence—influence shifts in public attitudes toward MSW collection and utilization. The theoretical framework is grounded in scholarship on urban social ecology and environmental sociology. Specifically, it draws upon the work of prominent environmental theorists including Sideris (2003), Traer (2009), Keller (2010), Rolston (2012), Attfield (2014), McShane (2013), Gardiner and Thompson (2017), Bassham (2021), and Hourdequin (2024). These scholars have made substantial contributions to environmental discourse, particularly with regard to its role in shaping public perceptions of waste management (Smith, 2001). Their work highlights the significance of ideological frameworks in advancing a global transition toward sustainable environmental practices.

In identifying theoretical approaches relevant to pro-environmental behavior and perception, particularly in the context of waste management, this study incorporates several key models. These include the Theory of Planned Behavior developed by Ajzen (Ajzen & Fishbein, 1980), the Value–Belief–Norm Theory by Stern (Stern et al., 1999), the Protection Motivation Theory by Rogers (1975), and the Ecological Modernization Theory by Mol and Spaargaren (2009), among others. Each of these frameworks informed the development of the study's theoretical and methodological foundations. Notably, the empirical research design and data analysis were guided by conceptual insights derived from ecological modernization theory, particularly in its role as a political and ideological foundation for the advancement of environmentalism.

Environmentalism is widely recognized as a coherent paradigm for addressing the risks posed by increasing human intervention in natural systems, particularly under conditions of accelerated scientific and technological development. As industrialization and economic expansion continue to drive resource-intensive production, the imperative for sustainable environmental policies becomes ever

more pressing. In this context, environmentalism functions as a normative framework for mitigating ecological degradation by promoting awareness of the planet as an interconnected and interdependent system.

Environmental concern has long played a pivotal role in societal development, with environmentalism emerging as a dominant theoretical orientation in the late 20th and early 21st centuries. However, despite growing awareness, the progression of ecological consciousness remains impeded by persistent and evolving challenges. Chief among these are economic forces, particularly the global spread of consumerist values, that act as substantial barriers to long-term behavioral transformation. From this perspective, a sociological analysis of evolving public attitudes toward MSW management becomes especially significant. Shifts in societal perceptions of waste collection and utilization may be interpreted as indicators of ecological modernization, expressing the intention of various social groups to redefine the relationship between modern society and the natural environment. Within this transformation, urban communities, especially youth and entrepreneurs, play a particularly influential role. As the most dynamic and socially mobile demographic segments, their active participation in sustainable practices holds considerable potential to shape broader societal norms and behaviors concerning MSW management in the megacities of Russia and China.

## Results and Discussion

Urbanization has exerted a profound influence on both societal development and the natural environment in Russia. As of 2024, the rural and urban populations were reported at 36.624 million and 109.527 million, respectively, with their proportional distribution within the total population remaining relatively stable over time (Rosstat, 2024). Similar to other global megacities, Russian urban centers face escalating challenges related to the collection and disposal of municipal solid waste. Official statistics reveal that the total volume of MSW collected and transported to treatment facilities and final disposal sites amounted to 53.9 million tons in 2018 and 47.4 million tons in 2021. Over the past decade, annual MSW volumes have remained consistently high, posing sustained environmental pressures (Rosstat, 2022). These figures highlight the importance of examining public perceptions of MSW management across different sociodemographic segments. Notably, younger generations exhibit heightened awareness and concern regarding these issues, positioning them as a key demographic for targeted policy interventions. For instance, a recent sociological study reported that 70% of individuals aged 18–24 expressed serious concern about environmental pollution, compared to only 48% among older age groups. Similarly, 44% of respondents in this younger cohort identified solid waste collection and disposal as a pressing concern, in contrast to just 11% of respondents aged 60 and above (Otkuda iskhodit ugroza miru, 2023).

A sociological survey on environmental consciousness among educated youth in Moscow and St. Petersburg, conducted by the authors between December 2019

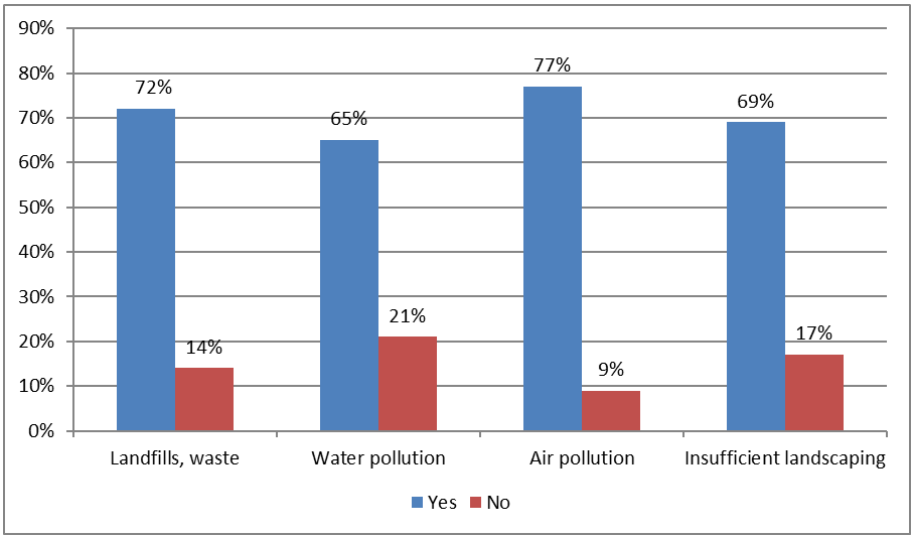
and March 2020, underscored the urgency of waste collection and disposal issues in major urban centers. The study utilized a quota-based sampling method targeting individuals aged 17 to 29, with an average age of 21. A total of 688 respondents participated in the online questionnaire-based survey. One of the principal aims was to assess how educated youth in Russia's largest cities perceive the challenges of MSW collection and disposal. The findings revealed that a majority of respondents viewed these issues as critical urban environmental concerns.

In St. Petersburg, participants identified the most pressing environmental problems in the following order: air pollution (77 responses), landfill-related concerns (72), inadequate urban greenery (69), and water pollution (65). Overall, 85% of respondents in St. Petersburg evaluated the city's environmental situation as difficult or problematic.

Similarly, in Moscow, over two-thirds of respondents reported facing persistent environmental challenges. Air pollution emerged as the most frequently cited concern, noted by 84.7% of participants, followed by the accumulation of waste in landfills (79.5%). Water pollution was identified by 76.9% of respondents, while diminishing green spaces were mentioned by 69.7% (Figures 1 and 2). These findings indicate that MSW management is widely recognized by urban residents, particularly younger cohorts, as a critical environmental issue requiring immediate and effective intervention. Given the increasing ecological consciousness among urban youth, their active participation in sustainable waste management initiatives holds significant potential to catalyze broader societal transformation.

**Figure 1**

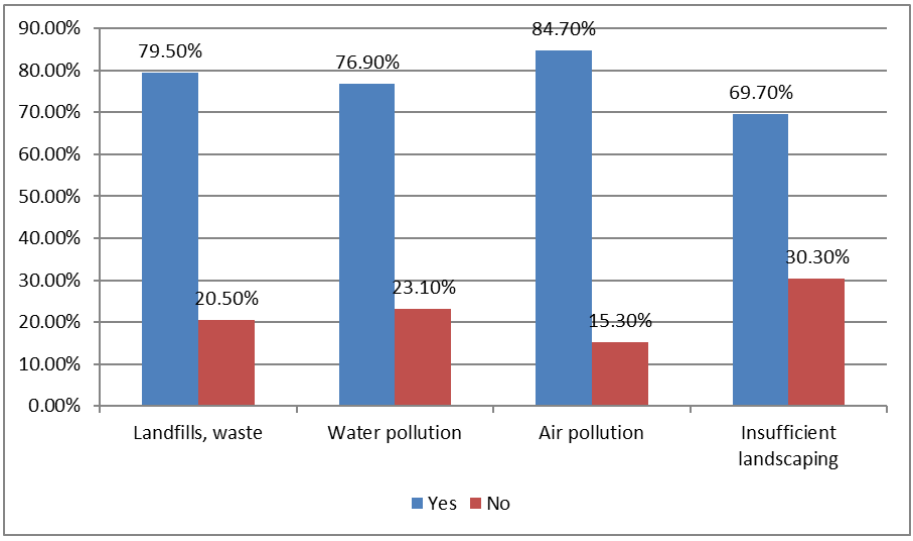
*Common Environmental Issues Reported by Respondents in St. Petersburg*




*Note.* Source: compiled by the authors.

**Figure 2**

*Common Environmental Issues Reported by Respondents in Moscow*



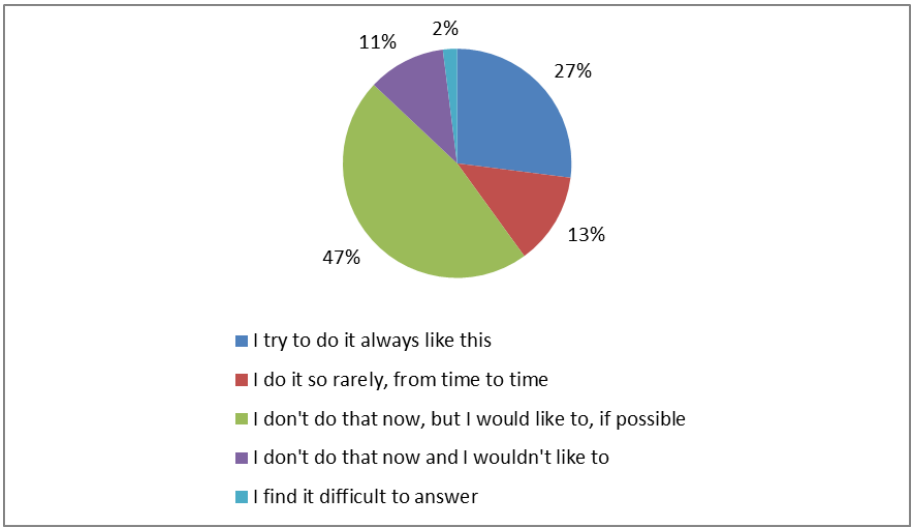

*Note.* Source: compiled by the authors.

Public willingness to engage in MSW management—both at the national level and within major urban centers—represents a critical determinant of the overall effectiveness of waste collection and disposal systems. Findings from a sociological survey conducted in 2019 reveal a moderately optimistic perspective on public participation in waste management initiatives (Figures 3 and 4). According to the survey, approximately 27% of Russian residents reported actively sorting at least one type of household waste, while 33% indicated that they properly dispose of hazardous materials, such as batteries and electronic waste, at designated collection points. Moreover, 47% of respondents expressed a willingness to adopt waste sorting practices if adequate infrastructure and institutional support were provided. These findings underscore the potential for expanded public engagement in sustainable waste management, suggesting that, with the implementation of appropriate policy measures and public awareness campaigns, participation in MSW segregation could increase substantially.

Despite this generally positive outlook, the survey also identified several significant barriers to widespread participation in waste sorting. Specifically, 29% of respondents viewed the practice as ultimately futile, while 27% cited a lack of time as the primary deterrent. These data suggest that public awareness of the benefits and technological advancements associated with waste segregation remains limited. Nevertheless, the results also indicate that with improved access to information and the implementation of comprehensive public education campaigns, there is substantial scope for enhancing participation in waste sorting programs. This highlights the dual necessity of improving waste management infrastructure and fostering social motivation through educational initiatives and incentive-based schemes aimed at promoting sustainable waste management behaviors.

**Figure 3**

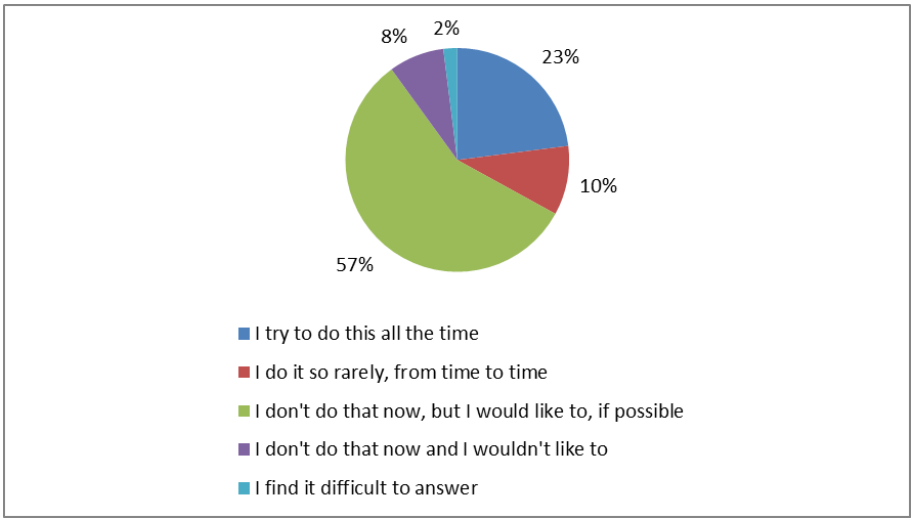
*Distribution of the Survey Answers to the Question "Do You Sort Any Type of Household Waste? (At Least One Type of Household Waste)?"*




*Note.* Source: compiled by the authors based on *Zabota ob okruzhaiushchei srede*, 2019.

**Figure 4**

*Distribution of the Survey Answers to the Question "Do You Bring Hazardous Waste (e.g., Batteries, Electronics, Mercury Lamps) to Designated Collection Points?"*




*Note.* Source: compiled by the authors based on *Zabota ob okruzhaiushchei srede*, 2019.

Among urban populations, young people in Russian megacities demonstrate particularly strong commitment to environmental sustainability. Throughout the early 2020s, youth in Moscow played an active role in organizing environmentally conscious initiatives, such as the "Hand Over Waste Paper—Save the Tree" campaign, supported by the crowdfunding platform *Podari derevo*[1] [Give a Tree]. This demographic has also contributed significantly to volunteer-led environmental actions, including the "Coast of Good Deeds" initiative, which focuses on cleaning riverside and lakeside areas in major cities. Furthermore, interactive waste collection events such as "Clean Games" in St. Petersburg have garnered substantial youth participation. In both Moscow and St. Petersburg, year-round campaigns organized by the youth-led movement "Separate Garbage Collection," along with "Electric Spring" and "Clean Coast" projects, have further promoted ecological engagement. These initiatives have particularly emphasized the separate collection of hazardous waste, including household appliances, office electronics, chargers, and batteries (Aksenova, 2024; Ekologicheskie aktsii vesny 2022, 2022). The active participation of younger generations in these programs highlights their pivotal role as agents of societal transformation in the pursuit of sustainable waste management.

In addition to public participation, the role of the business sector is equally vital in addressing the challenges associated with MSW management. To assess entrepreneurial attitudes toward waste reduction and recycling, a survey conducted in the early 2020s yielded important insights. The results that are summarized in Tables 1 and 2 highlight key areas where government intervention and state–business cooperation could support waste reduction goals and promote circular economy principles. These findings illuminate promising avenues for policy reform, financial incentives, and strategic collaboration aimed at bolstering corporate engagement in sustainable waste management efforts.

**Table 1**

*Recommended Measures to Promote the Sorting and Utilization of Municipal Solid Waste: Insights From Entrepreneurs (Multiple Responses Allowed)*

| Areas of stimulation | Result of responses |
|---|---|
| Support for social entrepreneurship | 28.6% |
| Benefits to management companies for the collection of recyclables | 40.0% |
| Support for transparency of the work of regional garbage collection operators | 52.4% |
| State regulation in the field of ecological types of packaging | 46.7% |
| Support for solid waste recycling enterprises | 70.5% |
| Support of scientific and technical developments in the field of waste sorting and recycling | 68.6% |
| Other | 3.8% |

*Note.* Source: compiled by the authors based on *Indeks delovoi sredy*, n.d.

[1] https://podari-derevo.ru

Entrepreneurs offered informed and forward-looking perspectives on key areas of MSW management. These included the role of digital technologies in optimizing waste collection and recycling processes, financial incentives for companies engaged in the recycling of raw materials (e.g., paper, glass, plastic), and strategies aimed at encouraging household participation in waste sorting. Among the proposed measures to increase public engagement were the provision of separate waste bins, free removal of sorted waste, and the imposition of higher fees for unsorted waste disposal. Respondents also emphasized the importance of stringent oversight of businesses involved in MSW sorting, along with targeted support for companies that independently manage and process waste.

**Table 2**

*Key Measures to Stimulate the Sorting and Utilization of Municipal Solid Waste: Insights From Entrepreneurs (Multiple Responses Allowed)*

| Support measures | Response results |
|---|---|
| Preferential lending for the industry as a whole | 44.8% |
| Subsidies for the reception of secondary raw materials, used goods | 64.8% |
| Benefits for investments in the renewal of production, taking into account the introduction of eco-friendly products and packaging | 61.0% |
| Accounting for the processing of rare fractions as charity programs | 14.3% |
| Other | 1.0% |

*Note.* Source: compiled by the authors based on *Indeks delovoi sredy*, n.d.

Among the most frequently cited priorities, 70.5% of entrepreneurs underscored the need for state support for enterprises specializing in solid waste recycling. This finding aligns with policy directions set forth in *Kontseptsiia sovershenstvovaniia instituta rasshirennoi otvetstvennosti proizvoditelei i importerov tovarov i upakovki* [The Concept for the Improvement of the Extended Producer Responsibility Framework] (2020), which aims to enhance corporate accountability in the waste management sector. Additionally, 68.6% of respondents advocated for the advancement of scientific and technological innovations in waste sorting and processing. While large companies may be well-positioned to invest in such developments—often through philanthropic initiatives or grant-based programs—smaller enterprises frequently face financial constraints. Thus, ensuring broad access to technological upgrades is essential for achieving the ambitious waste reduction targets outlined in state environmental strategies, necessitating increased public and private investment.

More than half of the surveyed business representatives (52.4%) also stressed the importance of enhancing transparency in the operations of regional waste collection operators. Improved transparency is seen as a critical factor in building public and business trust in municipal waste systems and fostering broader acceptance of technological and regulatory reforms related to MSW management.

While 46.7% of respondents expressed support for government regulation of environmentally friendly packaging, this measure was not viewed as a top priority by the majority of entrepreneurs. Nevertheless, sustainable packaging remains a key

concern for policymakers, particularly in the context of expanding the use of secondary raw materials in packaging production.

Moreover, 40.0% of respondents advocated for financial incentives for waste management companies involved in the collection of secondary raw materials, recognizing the pivotal role these enterprises play in supporting the circular economy. Importantly, 28.6% of entrepreneurs also expressed strong support for social entrepreneurship initiatives within the MSW sector. This reflects growing interest in innovative business models that combine environmental goals with social impact, models that may prove instrumental in scaling up separate waste collection and recycling in Russian megacities. As social entrepreneurship gains momentum, it could emerge as a significant driver of sustainable urban waste management.

In summary, the survey highlights a high level of interest among business leaders in contributing to MSW sorting and recycling efforts. These findings reinforce the importance of sustained collaboration between governmental authorities and private enterprises to improve infrastructure, enhance operational transparency, and implement targeted financial support mechanisms. Such partnerships are essential to cultivating a robust and resilient waste management system capable of advancing national environmental objectives.

A majority of surveyed entrepreneurs expressed strong support for government and municipal incentives aimed at fostering investment in technological modernization (64.8%). These incentives could include tax breaks for companies upgrading their production processes, especially those prioritizing environmentally friendly products and sustainable packaging solutions. Equally endorsed was the provision of subsidies to facilitate the collection and recycling of used packaging and other secondary raw materials (64.8%). In addition, 44.8% of respondents favored concessional lending schemes for the waste management sector, recognizing the financial barriers that often hinder innovation in this field.

However, the proposal to treat the processing of rare waste fractions as charitable activities exempt from income taxation received limited backing, with only 14.3% of entrepreneurs supporting the idea. Notably, one response under the “Other” category proposed full exemption from taxes and administrative regulations for enterprises engaged in raw material recycling highlighting the demand for more robust financial incentives in the industry. These survey results underscore the pivotal role of technological innovation in improving waste management efficiency.

The environmental consequences of rapid urbanization have become increasingly pronounced in both Russia and China, with China facing particular acute challenges. Throughout the early 21st century, China’s urbanization accelerated at an unprecedented pace. In 2010, the rural and urban populations were nearly equal, 671.13 million and 669.78 million, respectively. By 2020, the rural population had declined to 509.92 million, while the urban population had surged to 902.2 million. This dramatic shift, largely driven by large-scale rural-to-urban migration, has significantly intensified environmental pressures, particularly those related to the generation and management of municipal solid waste (National Bureau of Statistics of China, 2011, 2021).

China's modern MSW management system encompasses multiple stages, including classification, collection, transportation, storage, disposal, and regulatory supervision. Nonetheless, the system continues to face challenges arising from inefficiencies and structural constraints across its interconnected components. Since the implementation of China's economic reforms, both the size and density of the urban population have grown substantially. By the end of 2020, average urban population density had reached 2,778 people per square kilometer. This surge has led to exponential increases in MSW generation—from 158.05 million tons in 2010 to 235.12 million tons in 2020. Over the same period, the area designated for garbage collection in urban regions expanded from 4.85 billion square meters to 9.76 billion square meters, and the number of specialized waste collection vehicles rose from 90,414 to 306,422 (National Bureau of Statistics of China, 2011, 2021, 2022).

Despite considerable advances in infrastructure, a lack of public awareness and engagement remains a major barrier to the success of waste segregation policies. Many urban residents remain unaware of the benefits of separating waste and are unfamiliar with the organizational structure of municipal waste management systems (Li & Zeng, 2019). Without widespread public commitment to waste classification, even the most well-designed systems cannot operate at full effectiveness.

Similar to Russia, Chinese youth have emerged as a pivotal demographic in advancing environmental awareness and reform. Their engagement stems from a variety of factors: recent municipal ecological policy reforms, increased environmental coverage in national and local media, improvements in environmental education, and a growing recognition of the link between quality of life and environmental conditions. Furthermore, digital technologies, social media platforms, and online activism have significantly amplified public discourse and mobilization around ecological issues.

One of the most noteworthy developments in China's MSW policy landscape was Shanghai's introduction of a mandatory waste segregation system in 2019 (Jia, 2023). This initiative sparked extensive public debate on social media, with urban youth emerging as some of its most vocal participants. In the early 2020s, grassroots movements and citizen-led environmental campaigns gained increasing momentum, including "A City Without Waste" and the "Zero Tolerance for Household Garbage" campaign (Gao & Yang, 2020). These initiatives have played a critical role in fostering environmental responsibility and collective action at the local level.

Beyond municipal waste management, Chinese youth have demonstrated active involvement in broader environmental sustainability efforts. In major urban centers, young people participate in initiatives such as Beijing's "Public Bicycles" program, which promotes eco-friendly transportation, and the "Plastic-Free on Campus" campaign, aimed at reducing single-use plastic consumption in university settings (Liu, 2022). The rise of university-based environmental organizations, e.g., "Green Tsinghua" at Tsinghua University has further bolstered youth-led environmental advocacy (Zhao & Zou, 2015).

In addition to direct engagement in sustainability projects, Chinese youth have increasingly turned to digital platforms to support ecological awareness. Many

have participated in volunteer-driven waste collection campaigns while also utilizing technological tools such as WeChat[2] mini-programs and short educational videos on Douyin[3] (the Chinese counterpart of TikTok[4]) to promote sustainable lifestyles and disseminate environmental knowledge (Song, 2021). This trend underscores the growing influence of digital activism in shaping environmental awareness and fostering a more sustainability-conscious urban population in China.

A sociological study conducted between December 2023 and March 2024 on the environmental consciousness of educated youth in Nanjing (Jiangsu Province, China) offers valuable insights into the rising environmental awareness and proactive engagement of Chinese urban youth. The empirical study based on an online questionnaire survey was conducted by the authors of this article and utilized a randomized sample of 1,286 young individuals aged 20 to 35, with an average age of 25. The primary aim was to assess perceptions regarding MSW collection and disposal, using Nanjing as a representative case for broader trends in urban China.

Regarding waste sorting policies, the findings revealed that only 6.2% of respondents reported the presence of an operational waste sorting system in their residential district, while an overwhelming 93.8% stated that no such system was in place. Moreover, awareness of existing regulations was remarkably low: only 15.3% of respondents indicated any familiarity with MSW sorting policies, while 84.7% expressed complete unawareness. These results point to a significant public knowledge gap and highlight the urgent need to expand environmental education and improve the dissemination of information related to waste sorting systems in Chinese cities.

The study also explored respondents' everyday waste-sorting behaviors. Engagement was found to be particularly limited: only 3.1% reported actively sorting their household waste, while 67.8% acknowledged not engaging in any form of waste segregation. These results suggest that despite increasing ecological awareness among young people, practical behavioral commitment remains weak. This discrepancy emphasizes the necessity for structured incentives, behavioral nudges, and policy-driven interventions to promote active public participation.

Additionally, the study assessed respondents' understanding of various waste categories, including food waste, recyclables, hazardous materials, and general waste. While participants exhibited relatively higher awareness of recyclables and hazardous waste, their understanding of other categories remained insufficient. Another pressing issue identified in the study was the lack of public awareness regarding available waste collection and recycling infrastructure.

When asked about the primary factors influencing waste-sorting behavior, respondents identified several key barriers. The most frequently cited was the influence of the social milieu (31.6%), indicating that prevailing social norms and

[2] We Chat is a trademark of Tencent Holdings Ltd. registered in China. https://www.wechat.com

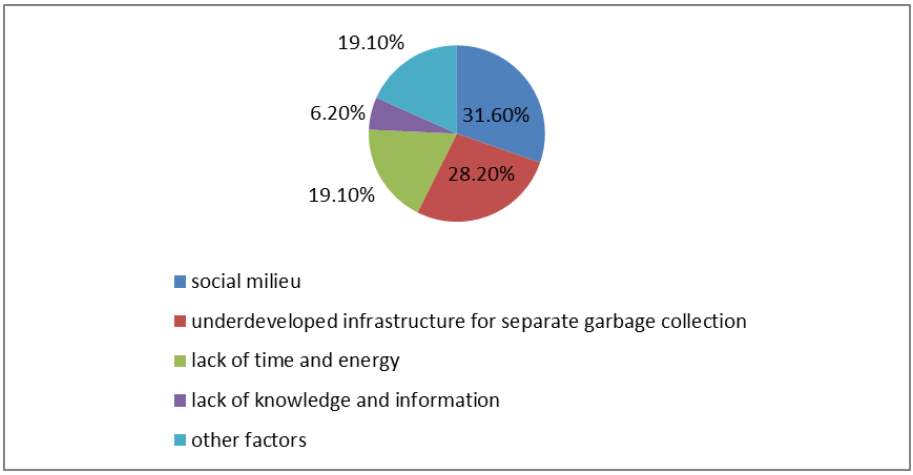
[3] Douyin™ is a trademark of ByteDance Ltd., registered in China and other countries. https://www.douyin.com

[4] TikTok is a trademark of ByteDance, registered in China and other countries. TikTok has suspended all new posting and live-streaming for users in the Russian Federation.

peer behavior significantly affect individual participation. Other notable impediments included underdeveloped infrastructure for separate collection (28.2%), time and effort constraints (19.1%), and lack of knowledge or information (6.2%) (Figure 5). These findings suggest that addressing structural and cognitive barriers, through improved infrastructure, streamlined collection systems, and widespread awareness campaigns, has the potential to substantially increase public engagement in sustainable waste management.

**Figure 5**

*Factors Influencing Municipal Solid Waste Sorting Behavior in Nanjing (%)*

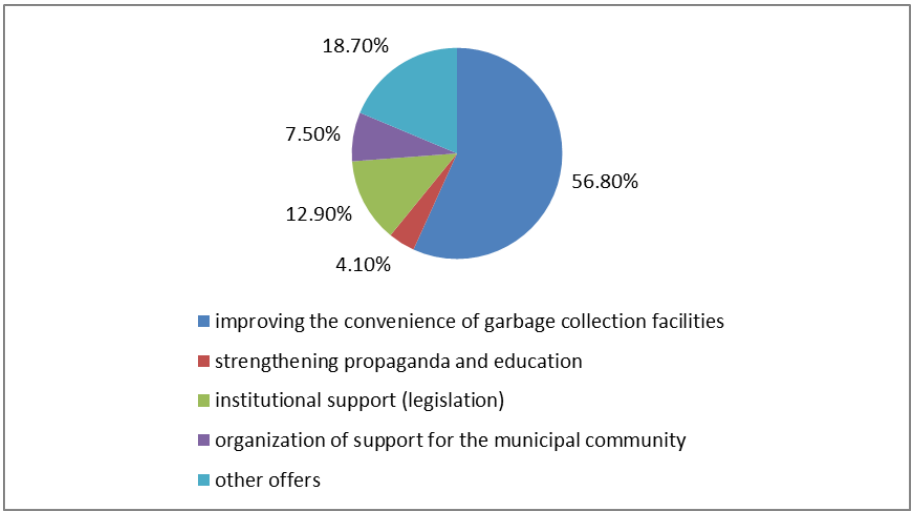



*Note*. Source: compiled by the authors.

When respondents were asked to identify key measures for enhancing public awareness and participation in waste sorting, several strategic priorities emerged. The most frequently mentioned recommendation cited by 56.8% of participants was the improvement of convenience and accessibility of waste collection infrastructure, underscoring the pivotal role of streamlined and user-friendly disposal systems in fostering behavioral change. This was followed by the expansion of educational and informational outreach (41.1%), reflecting the recognized need for robust public communication strategies that emphasize the environmental and societal benefits of waste segregation. Legislative and policy interventions were also regarded as essential by 12.9% of respondents, signaling the necessity for formal regulatory frameworks to institutionalize and standardize waste sorting practices across urban districts. Furthermore, 7.5% of participants stressed the importance of involving local communities in municipal-level decision-making, advocating for a bottom-up governance model that incorporates grassroots perspectives in policy formulation. An additional 18.7% of respondents proposed other context-specific recommendations, further illustrating the complexity and diversity of strategies required to improve urban waste management (Figure 6).

**Figure 6**

*Proposed Measures to Enhance Public Awareness and Participation in Waste Sorting in Nanjing (%)*




*Note.* Source: compiled by the authors.

In conclusion, young adults in Nanjing aged 20 to 35 have demonstrated a growing interest in municipal solid waste sorting, particularly with regard to everyday environmental practices. However, despite increasing environmental awareness, substantial challenges remain in the areas of public communication, policy enforcement, and systemic encouragement of sustainable behaviors. Priority areas for future development include the strengthening of institutional support through updated legislation, greater community participation in governance, and expansion of ecological education initiatives. In addition, factors such as social norms, infrastructure availability, and access to accurate information play a decisive role in shaping urban youth's environmental awareness and behavior. To effectively translate ecological consciousness into sustainable practices, integrated policy measures are required to enhance youth engagement in both municipal waste management and broader environmental protection efforts.

In China, the private sector has come to play an increasingly significant role in the collection, transportation, and processing of household waste. This domain is largely populated by small and medium-sized enterprises that collect waste and resell it as secondary raw materials to specialized processing facilities. This operational model closely parallels the situation in Russia, where local businesses similarly act as intermediaries between waste generation and recycling, often collaborating with government bodies to streamline municipal waste services (Wang et al., 2015).

However, findings from a sociological survey conducted among entrepreneurs in China's first-tier cities including Beijing, Shanghai, Guangzhou, and Shenzhen reveal a disjunction between state-led environmental initiatives and private sector engagement. Despite active governmental promotion of market-driven waste

management systems, participants reported a persistent lack of institutional support for urban recycling businesses. This disconnect has created a notable service gap in the waste collection and utilization sector, limiting the effectiveness and scalability of private-sector contributions to municipal solid waste management.

A separate empirical study conducted in Nanjing between December 2023 and March 2024 further explored the evolving role of private enterprises in shaping waste management outcomes and environmental awareness. Conducted by the authors of this paper, the research employed a randomized sample of 327 entrepreneurs and found that Chinese business owners, as well as their Russian counterparts, are increasingly engaged in efforts to address MSW-related challenges.

The majority of surveyed entrepreneurs demonstrated a solid understanding of national environmental protection policies, with 62.1% reporting a good or very good level of policy awareness. Nevertheless, a considerable minority (13.3%) admitted to limited or no familiarity with relevant regulations. This disparity underscores the urgent need to improve policy communication and offer targeted training programs focused on corporate social responsibility, environmental compliance, and sustainable business practices.

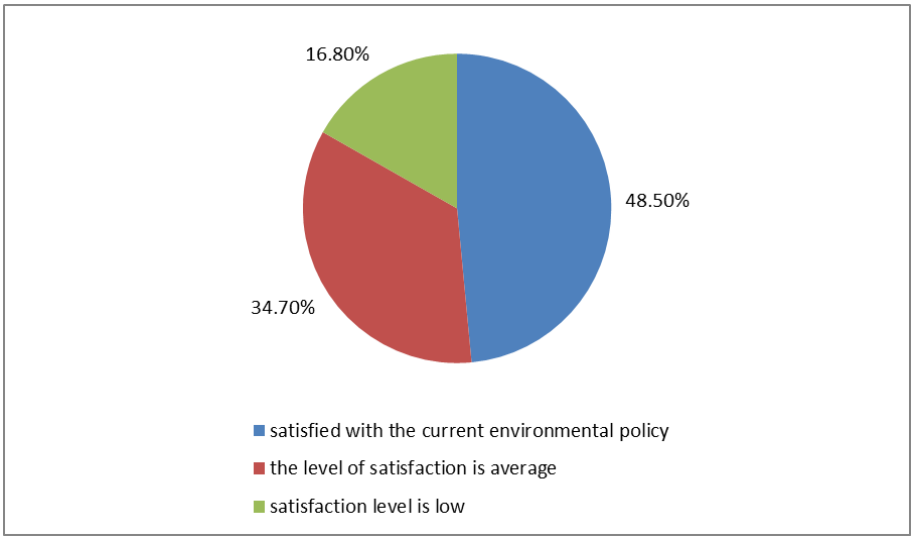
In line with trends observed in Russia, Chinese entrepreneurs voiced strong support for enhanced governmental backing of their environmental efforts. More than half of respondents (52.3%) advocated for increased financial assistance, while 49.1% stressed the importance of greater investment in scientific research and technological innovation. Additionally, 40.6% emphasized the need for more effective policy implementation and enforcement, suggesting that while legislative frameworks are generally well-conceived, their practical execution remains insufficient. These findings point to the necessity of policy modernization, expanded fiscal incentives, and greater technological integration to optimize the contribution of private enterprises to sustainable waste management.

Despite these challenges, 48.5% of business representatives reported being either satisfied or moderately satisfied with existing environmental protection policies, while 34.7% expressed neutral views. Notably, 16.8% indicated dissatisfaction, particularly with respect to the regulation and oversight of MSW collection and processing operations (Figure 7). These results affirm the importance of incorporating business community feedback into policy reform processes, ensuring that regulatory frameworks are not only environmentally effective but also economically and operationally viable for enterprises.

A total of 52.2% of surveyed entrepreneurs expressed a strong or moderately strong willingness to engage in future initiatives aimed at enhancing the collection, sorting, and utilization of municipal solid waste (MSW). Conversely, 21.5% of business representatives reported little to no interest in participating in such efforts. These findings suggest that although a substantial segment of the business community is open to contributing to urban waste management reforms, significant potential remains untapped. Strengthening public-private collaboration and introducing targeted incentives could play a pivotal role in mobilizing greater corporate involvement in environmental sustainability efforts.

**Figure 7**

*Degree of Satisfaction Among Business Representatives Regarding the Effectiveness of Current Environmental Policy Measures in Nanjing (%)*




*Note.* Source: compiled by the authors.

Overall, entrepreneurs across various industries in Nanjing exhibit a foundational level of awareness regarding government support mechanisms for MSW sorting and recycling. However, there is still considerable room to improve the consistency, depth, and efficacy of business engagement in this sector. To promote more robust participation from the private sector, governmental strategies should prioritize enhancing environmental awareness, expanding ecological education initiatives, addressing enterprise-specific challenges, optimizing relevant policies, and developing comprehensive incentive frameworks.

Given the rapid pace of urbanization and the continued expansion of China's urban population, fostering ecological consciousness among citizens has become a cornerstone of effective environmental governance. The successful development and implementation of China's urban waste management system should rest on two guiding principles: (a) drawing upon the technological advancements and best practices of more developed countries, and (b) adapting these insights to China's unique socio-economic conditions and infrastructural realities.

Nevertheless, it is essential to acknowledge that not all foreign waste management models are directly transferable to the Chinese context. The diversity, scale, and developmental trajectory of Chinese cities demand tailored approaches that reflect local needs and capacities. Therefore, while the integration of global innovations remains important, the process of "localization" involving the adaptation and customization of international practices should lie at the heart of China's long-term waste management strategy. By synergizing international expertise with locally attuned solutions, China can build a more efficient, sustainable, and scalable urban

waste management system that aligns with both global environmental standards and national development objectives.

## Conclusion

This study demonstrates that contemporary Russian society, particularly urban youth, exhibits a notable willingness to adopt municipal solid waste segregation technologies. However, this readiness, while promising, does not automatically translate into consistent environmentally responsible behavior. As the findings indicate, many Russian citizens do not perceive themselves as direct stakeholders in municipal waste management efforts, instead placing the primary responsibility on governmental and municipal authorities. Likewise, business representatives in Russia predominantly view state incentives as the principal motivation for incorporating waste segregation technologies into their operations. Despite growing discourse around corporate sustainability, environmental initiatives and waste segregation practices have yet to be fully integrated into corporate social responsibility frameworks. This suggests that, although efforts to separate waste represent an important step toward addressing environmental challenges in Russian megacities, they remain in an early phase of development. A broader societal shift toward proactive participation and shared responsibility is therefore essential to ensure the long-term sustainability of urban ecological systems.

Our study further reveals that, compared to Russia, Chinese society appears less prepared to adopt modern waste segregation technologies. This disparity can be largely attributed to low levels of public awareness. In many Chinese megacities, environmental consciousness remains underdeveloped due to limited public education efforts, a lack of visibility for sustainable waste management practices, and insufficient promotion through media and social campaigns. Although urban Chinese youth are increasingly active in environmental advocacy—mirroring their Russian counterparts—other demographic groups remain relatively unaware of the scope and urgency of waste-related challenges. This lack of awareness is compounded by the limited availability of comprehensive public data on urban environmental conditions and by inadequate municipal efforts to inform and train residents in effective waste segregation methods.

To address these challenges, it is imperative to harness the potential of mass media, digital platforms, and targeted public outreach campaigns to deliver clear, accessible, and actionable guidance on sustainable waste disposal practices. Moreover, the successful implementation of a modern MSW system depends on the active involvement and endorsement of urban populations. Public engagement and societal support are critical for resolving environmental issues in the megacities of both Russia and China. Strengthening environmental awareness, expanding education initiatives, and introducing behavioral incentives are key strategies for building resilient and efficient urban waste management systems that can support long-term ecological sustainability.

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