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PROMOTING GREEN CONSUMPTION AND ENVIRONMENTALLY RESPONSIBLE ECONOMIC DECISIONS THROUGH BEHAVIORAL ECONOMICS: STATISTICAL EVIDENCE AND POLICY SCENARIOS FROM UZBEKISTAN

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ABSTRACT. The transition toward a green and circular economy requires not only technological modernization and institutional reforms but also fundamental changes in consumer behavior. This article examines the potential contribution of behavioral economics to promoting environmentally responsible consumption and improving waste management outcomes in Uzbekistan. The study integrates concepts of bounded rationality, social norms, loss aversion, default effects, and behavioral nudging with descriptive statistical analysis based on official government publications. According to the Agency for Waste Management and Circular Economy Development, Uzbekistan generated approximately 14.8 million tonnes of household waste in 2024 and 15.1 million tonnes in 2025. An official report on 2024 activities indicates that 766.3 thousand tonnes of household waste were recycled, equivalent to approximately 5.2% of generated waste. Another government publication reports a broader processing figure of more than 900.5 thousand tonnes, highlighting the importance of statistical definitions. The study calculates an annual waste-generation growth rate of approximately 2.03%, analyzes service coverage and waste management indicators, and develops hypothetical scenarios for improving material recovery through behavioral interventions. Under a scenario in which recovery reaches 15% of the 2025 waste-generation baseline, the amount of recovered material would equal approximately 2.265 million tonnes. This estimate is a scenario rather than a forecast. The findings suggest that well-designed behavioral interventions may complement infrastructure investment, environmental education, and regulatory reforms. The article proposes a framework integrating household waste separation, information feedback, social norms, economic incentives, and measurable environmental outcomes.

Keywords: Behavioral economics, green consumption, circular economy, environmental responsibility, waste management, social norms, recycling, green nudging, sustainable development, Uzbekistan.

INTRODUCTION

The transition toward sustainable economic development requires coordinated changes in production systems, consumption patterns, resource allocation, and environmental governance. Traditional environmental economics frequently emphasizes economic instruments such as taxes, subsidies, and regulatory restrictions. Although these mechanisms remain important, environmentally responsible decisions also depend on psychological and behavioral characteristics. Consumers may recognize the importance of environmental protection while continuing to purchase resource-intensive products or neglect waste separation. This difference between environmental awareness and actual behavior is often described as the attitude–behavior gap.

Behavioral economics provides an analytical explanation for this phenomenon by examining how habits, convenience, information limitations, social expectations, and cognitive biases influence decisions. Green consumption includes choosing products and services that reduce environmental harm throughout their life cycle. The circular economy seeks to preserve the value

of materials and products through waste prevention, reuse, repair, recycling, and resource recovery. These objectives require participation by households, businesses, public institutions, and local communities. In Uzbekistan, waste management has become an important area of environmental policy. Official government information indicates that household waste generation reached approximately 15.1 million tonnes in 2025.

At the same time, significant challenges remain in collection coverage, sorting, recycling, and public participation.

The objective of this research is to investigate how behavioral economics can complement environmental policy and contribute to more sustainable consumption patterns.

The main research questions are:

1. What do official statistics reveal about waste generation and waste management in Uzbekistan?
2. Which behavioral barriers may limit environmentally responsible consumption?
3. How can behavioral interventions encourage household waste separation and resource conservation?
4. What quantitative outcomes could arise under alternative waste recovery scenarios?
5. Which policy measures can integrate behavioral insights into circular economy development?

LITERATURE REVIEW

Behavioral economics has contributed to environmental policy research by demonstrating that individuals do not always respond to information and economic incentives in fully rational or predictable ways.

Simon (1955) introduced bounded rationality, emphasizing the role of cognitive constraints in decision-making.

Kahneman and Tversky (1979) established prospect theory, which helps explain how individuals respond to perceived environmental gains and losses.

Thaler and Sunstein (2008) developed the choice architecture framework, emphasizing how the presentation of alternatives can influence decisions without prohibiting available options.

Allcott (2011) examined the effects of social norms and behavioral interventions on energy conservation, illustrating how comparative feedback can influence household decisions.

Schultz et al. (2007) demonstrated that descriptive social norms can influence energy conservation behavior and that additional normative feedback may help avoid undesirable responses.

White, Habib, and Hardisty (2019) synthesized research on encouraging sustainable consumer behavior and identified several mechanisms related to social influence, habits, individual identity, emotions, and perceived consequences.

These theoretical developments indicate that environmental policy can benefit from combining traditional economic instruments with behaviorally informed interventions.

However, the effectiveness of such interventions varies across societies, institutions, and economic conditions.

Therefore, Uzbekistan-specific interventions should be tested before their impacts are generalized.

DATA AND RESEARCH METHODOLOGY

Official Statistical Sources

The research utilizes information published by:

- The Agency for Waste Management and Circular Economy Development of Uzbekistan.

- The Ministry responsible for ecology and environmental protection.
- Official government communications on recycling and circular economy development.

The primary indicators include household waste generation, waste processing, recycling, service coverage, and household payments for waste services.

Quantitative Methods

The annual growth rate of waste generation is calculated as:

$$WGR = [(W_t - W_{t-1}) / W_{t-1}] \times 100$$

Where W represents the annual volume of household waste generated.

The recycling rate is calculated as:

$$RR = (RW / TW) \times 100$$

Where RW is the amount of recycled waste and TW is total household waste generated.

The service coverage rate is calculated as:

$$SCR = (\text{Population covered} / \text{Total population}) \times 100$$

The waste recovery scenario is calculated as:

$$RWS = TW \times TR$$

Where TR is an assumed target recovery rate.

The additional recovery requirement is estimated as:

$$AR = RWS - BR$$

Where BR represents the selected baseline quantity of recovered waste.

These equations are applied to official statistical data and hypothetical scenarios.

The study does not claim that any behavioral intervention has already produced the calculated scenario outcomes.

RESULTS AND DISCUSSION

Dynamics of Household Waste Generation

Official government reports indicate that Uzbekistan generated approximately 14.8 million tonnes of household waste in 2024 and 15.1 million tonnes in 2025.

Table 1. Household Waste Generation in Uzbekistan

Indicator	2024	2025
Household waste generated, million tonnes	14.8	15.1
Absolute annual change, million tonnes	-	+0.3
Annual growth rate, %	-	+2.03
Average daily generation, thousand tonnes	40.44	41.37

Source: Official Uzbekistan government publications. Growth and daily averages are author's calculations. Daily averages use 366 days for 2024 and 365 days for 2025.

The annual increase can be calculated as:

$$\Delta W = 15.1 - 14.8 = 0.3 \text{ million tonnes}$$

Thus, household waste generation increased by approximately 300,000 tonnes.

The annual growth rate is:

$$WGR = (15.1 - 14.8) / 14.8 \times 100 = 2.03\%$$

Average daily waste generation in 2025 is:

$$DW = 15{,}100{,}000 / 365 = 41{,}370 \text{ tonnes per day}$$

This represents approximately 41.37 thousand tonnes per calendar day when annual generation is distributed evenly.

These calculations indicate the scale of the national waste management challenge.

However, annual waste growth cannot be attributed entirely to consumer behavior.

Population growth, changes in income, consumption patterns, tourism, urbanization, and statistical coverage may all influence the measured volume of household waste.

Statistical Assessment of Recycling Performance

Government publications provide different figures for household waste processing and recycling in 2024.

A report by the waste management agency indicates that 766.3 thousand tonnes were recycled, equivalent to approximately 5.2% of generated household waste.

Another official environmental publication reports that more than 900.5 thousand tonnes were processed by specialized enterprises, equivalent to approximately 6.1%.

Table 2. Alternative Official Indicators for 2024 Waste Processing

Indicator	Agency report	Environmental publication
Total household waste, million tonnes	14.8	14.8
Reported recovered or processed amount, thousand tonnes	766.3	Over 900.5
Corresponding percentage, %	5.18	Over 6.08
Published rounded rate, %	5.2	6.1

Source: Agency for Waste Management and Circular Economy Development and official government environmental publications. Calculated percentages are based on reported volumes.

Using the agency figure:

$$RR_1 = 766{,}300 / 14{,}800{,}000 \times 100 = 5.18\%$$

Using the other official figure:

$$RR_2 = 900{,}500 / 14{,}800{,}000 \times 100 = 6.08\%$$

The difference between the two reported quantities is at least:

$$900{,}500 - 766{,}300 = 134{,}200 \text{ tonnes}$$

The corresponding percentage-point difference is at least:

$$6.08 - 5.18 = 0.90 \text{ percentage points}$$

The difference may reflect alternative definitions, reporting coverage, or measurement periods, but the precise explanation cannot be established from the published summary figures alone.

Therefore, these estimates should not be combined into a single time series without further methodological verification.

For the subsequent illustrative comparison, the agency's 766.3 thousand tonne figure is used as the 2024 reported recycling baseline.

4.3. Service Coverage and Institutional Capacity

According to official information published in January 2026, waste collection services covered 8,105 of Uzbekistan's 9,452 mahallas.

The coverage rate by mahalla is calculated as:

$$SCR_m = 8{,}105 / 9{,}452 \times 100 = 85.75\%$$

The number of uncovered mahallas is:

$$9{,}452 - 8{,}105 = 1{,}347$$

According to the same report, 23.9 million people out of a population of 37.5 million were covered.

The population coverage ratio is:

$$SCR_p = 23.9 / 37.5 \times 100 = 63.73\%$$

The population not covered by these services is:

37.5 − 23.9 = 13.6 million people

Table 3. Waste Collection Service Coverage

Indicator	Value
Total mahallas	9,452
Mahallas covered	8,105
Mahallas not covered	1,347
Calculated coverage by mahalla	85.75%
Total population, million	37.5
Population covered, million	23.9
Population not covered, million	13.6
Calculated population coverage	63.73%

Source: Agency for Waste Management and Circular Economy Development, 2025 activity report. Calculated ratios: author's calculations.

The difference between the two measures is significant.

Coverage by mahalla does not represent the same concept as coverage by population. Differences in settlement size and service availability can cause the two indicators to diverge.

This finding has policy implications.

Behavioral interventions encouraging waste separation may be less effective where households lack access to regular collection services or appropriate containers.

Consequently, infrastructure and service availability should be treated as necessary complements to behavioral programs.

Financial Indicators of Waste Management Services

Official agency information shows that, for 2025, household waste management service charges amounted to approximately UZS 1.454 trillion, of which UZS 1.304 trillion was paid.

The collection performance indicator is calculated as:

Collection ratio = 1.304 / 1.454 × 100 = 89.68%

The difference between charges and payments is:

1.454 − 1.304 = 0.150 trillion UZS

Thus, the difference amounts to UZS 150 billion.

Table 4. Household Payments for Waste Services, 2025

Indicator	UZS billion
Charges accrued during 2025	1,454
Payments received	1,304
Difference between charges and payments	150
Calculated payment-to-charge ratio	89.68%

Source: Agency for Waste Management and Circular Economy Development. Calculations by the author.

The reported total receivables balance was higher than the annual difference between charges and payments.

This distinction matters because receivables can include balances accumulated in previous periods and accounting adjustments.

Behavioral economics may contribute to improving payment discipline through timely reminders, clear billing information, transparent digital payment systems, and positive communication.

However, payment enforcement mechanisms should be evaluated separately from voluntary behavioral nudges.

Household Waste Generation per Capita

Using the reported 2025 waste generation volume and the population figure given in the agency's coverage report, an approximate indicator can be calculated.

Waste per capita = 15,100,000 / 37,500,000

Waste per capita = 0.4027 tonnes per person annually

This is equivalent to:

402.7 kilograms per person per year

The corresponding daily value is:

402.7 / 365 = 1.10 kilograms per person per day

This estimate reflects annual household waste generation divided by the reported population.

It is not a direct household survey measurement, and actual waste generation differs across urban and rural areas, household types, and income groups.

The indicator is useful as an aggregate reference for scenario modeling and national planning.

Scenario Analysis of Improved Material Recovery

Behavioral economics provides several possible approaches for encouraging recycling and waste separation.

However, the effect of interventions depends on service infrastructure and household participation.

To illustrate potential national outcomes, three hypothetical recovery targets are considered using the 2025 generated waste volume of 15.1 million tonnes.

Table 5. Hypothetical Material Recovery Scenarios

Recovery scenario	Target rate	Target recovered waste, million tonnes
Conservative	10%	1.510
Moderate	15%	2.265
Ambitious	20%	3.020

Source: Author's calculations using the official 2025 waste generation baseline of 15.1 million tonnes. Targets are hypothetical.

For the conservative scenario:

$RWS_1 = 15.1 \times 0.10 = 1.510$ million tonnes

For the moderate scenario:

$RWS_2 = 15.1 \times 0.15 = 2.265$ million tonnes

For the ambitious scenario:

$RWS_3 = 15.1 \times 0.20 = 3.020$ million tonnes

These values show the amount of material that would need to be recovered at each assumed target rate.

For an illustrative scale comparison with the 2024 agency-reported recycling quantity of 766.3 thousand tonnes:

Conservative gap = 1.510 − 0.7663 = 0.7437 million tonnes

Moderate gap = 2.265 − 0.7663 = 1.4987 million tonnes

Ambitious gap = 3.020 − 0.7663 = 2.2537 million tonnes

Because the target quantities use the 2025 generation baseline while the comparison quantity comes from 2024, these are reference gaps, not measured improvements from the 2025 recycling level.

They should not be interpreted as forecasts or as effects attributable solely to behavioral interventions.

Actual achievement would require investments in collection, sorting, processing infrastructure, and market demand for recovered materials.

Economic Valuation Scenarios

Recovered waste can potentially generate economic value as secondary raw materials.

However, the value varies substantially according to material composition, contamination, processing requirements, transportation costs, and market prices.

To illustrate the calculation methodology, suppose the average gross value of recovered materials is UZS 300,000, 500,000, or 700,000 per tonne.

These are hypothetical assumptions, not observed market prices.

Table 6. Hypothetical Gross Material Value Under Different Recovery Targets

Target recovery	At 300,000 UZS/tonne	At 500,000 UZS/tonne	At 700,000 UZS/tonne
10%	453.0 bn UZS	755.0 bn UZS	1,057.0 bn UZS
15%	679.5 bn UZS	1,132.5 bn UZS	1,585.5 bn UZS
20%	906.0 bn UZS	1,510.0 bn UZS	2,114.0 bn UZS

Source: Author's illustrative calculations. All unit values are assumed.

Under the moderate recovery scenario and the assumed unit value of UZS 500,000 per tonne:

Gross value = 2,265,000 × 500,000

Gross value = UZS 1.1325 trillion

This figure represents hypothetical gross sales value, not net economic benefit.

A full economic evaluation would need to subtract collection, sorting, transportation, processing, labor, capital, and environmental compliance costs.

It should also account for any negative externalities and avoid counting the same recovered materials at multiple processing stages.

Behavioral Barriers to Green Consumption

Behavioral economics identifies several psychological mechanisms that may prevent individuals from adopting environmentally responsible practices.

Status quo bias

Consumers may continue established consumption and disposal practices because changing habits requires additional effort.

Present bias

Environmental benefits often occur in the future, while recycling or resource conservation may require immediate effort.

Limited attention

Individuals may fail to notice recycling instructions, environmental labels, or opportunities for reducing waste.

Social norms

Households may be more likely to adopt environmentally responsible behavior when they perceive it as common and socially supported.

Loss aversion

Individuals may respond more strongly to information describing avoidable resource losses than to messages presenting equivalent gains.

Choice architecture

The placement of recycling containers, clarity of labels, and convenience of collection systems can influence disposal decisions.

These mechanisms suggest that information campaigns alone may be insufficient.

Behavioral programs should be integrated with accessible facilities and institutional support.

Proposed Behavioral Intervention Framework

The study proposes a five-component framework.

Component 1. Environmental information

Households receive clear information about recyclable materials and the environmental consequences of waste disposal.

Component 2. Convenient infrastructure

Separate waste containers and collection systems are made accessible to households.

Component 3. Social norm feedback

Communities receive accurate information about local recycling participation, avoiding exaggerated or misleading claims.

Component 4. Economic incentives

Municipal authorities may test transparent reward systems, deposit-return mechanisms, and appropriate waste-related charges.

Component 5. Monitoring and evaluation

Program outcomes are assessed through measurable indicators, including household participation, contamination rates, recovered material volumes, and net costs.

The proposed mechanism is summarized as follows:

Information → Behavioral Motivation → Convenient Choice Architecture → Waste Separation → Material Recovery → Environmental Outcomes

The mechanism assumes that individual behavioral change is more likely to produce measurable outcomes when appropriate infrastructure and collection systems are available.

4.10. An Econometric Framework for Future Empirical Research

To investigate the potential determinants of green consumption, the following model is proposed:

$$GC_i = \beta_0 + \beta_1 EA_i + \beta_2 FL_i + \beta_3 SN_i + \beta_4 INC_i + \beta_5 INF_i + \beta_6 BI_i + \varepsilon_i$$

Where:

- GC - green consumption or recycling participation;
- EA - environmental awareness;
- FL - environmental or sustainability-related literacy;
- SN - social norm influence;
- INC - household income;
- INF - access to recycling infrastructure;
- BI - exposure to behavioral interventions;
- β_0 - constant;
- β_1–β_6 - regression coefficients;
- ε - error term.

If recycling participation is measured as a binary outcome, logistic regression may be appropriate.

The following hypotheses can be evaluated:

H1: Environmental awareness is positively associated with participation in green consumption.

H2: Accessibility of waste separation infrastructure is positively associated with recycling participation.

H3: Social norm feedback increases participation when the reported norms are credible and relevant.

H4: Behaviorally informed interventions are associated with improved recycling outcomes when supported by appropriate infrastructure.

The model is proposed for future empirical research and does not represent an estimated regression.

4.11. Policy Recommendations for Uzbekistan

The statistical and theoretical analysis supports an integrated approach to green consumption policy.

First, municipal waste collection services should expand coverage while ensuring that separate collection is operationally feasible.

Second, educational institutions and community organizations should promote practical recycling knowledge rather than relying exclusively on general environmental messages.

Third, local governments could test behaviorally informed collection programs in selected districts.

Fourth, digital systems could provide households with transparent feedback on the quantity of waste collected and separated.

Fifth, economic incentive programs should be based on verified participation and cost-benefit assessments.

Sixth, recycling infrastructure investment should be coordinated with initiatives encouraging household participation.

Finally, impact evaluations should distinguish behavioral effects from improvements caused by collection coverage, regulation, or processing capacity.

5. CONCLUSION

The transition toward green consumption and a circular economy requires the integration of economic policy, institutional reform, infrastructure development, and behavioral change.

Official statistics indicate that household waste generation in Uzbekistan increased from approximately 14.8 million tonnes in 2024 to 15.1 million tonnes in 2025, representing growth of about 2.03%.

Official publications report different processing and recycling estimates for 2024, demonstrating the importance of consistent statistical definitions.

The analysis also identifies limitations in the geographical and population coverage of waste management services.

These findings suggest that environmentally responsible consumption cannot be encouraged effectively through psychological interventions alone.

Behavioral economics can complement conventional environmental instruments through social norm feedback, convenient choice architecture, informative labeling, and voluntary commitment mechanisms.

The scenario analysis indicates that a 15% material recovery target applied to the 2025 waste-generation baseline would correspond to approximately 2.265 million tonnes of recovered materials.

However, this figure is hypothetical and should not be interpreted as an observed recycling outcome or a forecast.

The research contributes a conceptual framework connecting household behavior, institutional infrastructure, material recovery, and environmental outcomes.

Future studies should evaluate behavioral interventions using household surveys, waste composition analysis, and experimental research at the municipal level.

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