

A Qualitative Document Analysis of Afghanistan's National Waste Management Policy: Identifying Policy Gaps and Context-Based Solutions from Islamic and Organizational Perspective

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ABSTRACT

This study aims to identify weaknesses and gaps in Afghanistan's national waste management policy through an analytical assessment and to identify effective solutions based on the current situation in Afghanistan and international best practices. The National Environmental Protection Authority (NEPA) of Afghanistan established a National Solid Waste Management Policy in 2010. The policy outlines three types of waste (medical, hazardous, and municipal) and provides specific guidelines for their management. This study used a qualitative approach to identify weaknesses and gaps in Afghanistan's national waste management policy through an analytical assessment and to identify effective solutions based on the current situation in Afghanistan and international best practices. The findings indicate that Afghanistan's solid waste policy has made progress in defining basic frameworks, but considering the policy's knowledge, international best practices, and the country's current situation, the main and fundamental problems and shortcomings in this policy include the lack of integration and attention to Islamic principles and principles, ineffective management by municipalities, lack of public-private partnership, and lack of guidelines for e-waste management. The findings of this study provide practical guidelines for reforming Afghanistan's national solid waste policy, including integrating Islamic principles, e-waste management, strengthening public-private partnerships, and waste separation and recycling mechanisms. Implementing these recommendations can improve the effectiveness of policy implementation, environmental protection, and public health. This study is the first comprehensive analytical review of Afghanistan's national solid waste policy, assessing the policy from the perspective of public policy science, international best practices, Islamic principles, and the country's current needs. Furthermore, the study's key scientific innovation is to provide a practical framework for e-waste management, public-private partnerships, and policy reform.

Keywords: Islam, Public Policy, Solid Waste, Electronic Waste

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1. Introduction

Allah has given humans the responsibility of protecting the environment. Human existence requires natural equilibrium maintenance because it enables social connections and economic activities, and safeguards physical and spiritual health. The world now faces an unprecedented solid waste crisis because industrial development has enhanced, urban populations have expanded, and consumer culture has spread across the globe. Several countries across the world have developed complete solid waste management policies to support sustainable development and protect natural resources (World Bank, 2018). Waste is the useless materials and wastes produced by human activities or natural processes that are harmful to the environment and human life (Samoon, 2019). The environment is an important part of our lives, and its protection is not only essential for the sustainability of nature but also important for the health and economic development of society.

The solid waste management system in Afghanistan has multiple operational and structural problems that negatively impact its performance. The combination of fast urban development, population expansion and weak institutional frameworks has created an ongoing waste management crisis. Cities operate waste collection systems, that transport waste to unregulated open dumping sites

that lack proper sanitation and professional management. The present waste disposal techniques generate major environmental harm because they pollute water supplies, harm soil health, and generate atmospheric contamination. People in the community lack sufficient knowledge about hazardous waste identification and proper waste segregation and material recycling practices. The combination of insufficient government focus and low public participation has created worsening health problems. The lack of suitable waste collection systems and segregation facilities, and specialized waste management expertise results in poor waste management outcomes (Yosufi, 2019).

The Afghan government created the National Waste Management Policy to tackle waste management issues that emerged in 2010. The policy describes step-by-step procedures for waste collection and sorting and transportation, and treatment and disposal operations. The policy achievement through its development has not solved all its implementation problems because of rising population numbers and changing environmental conditions. The policy divides waste into three main categories, which include medical waste and hazardous waste, and municipal solid waste. The policy estimates that each Afghan citizen produces 0.40–0.50 kg of waste daily, and Kabul's ten major hospitals generate 3,000 cubic meters of medical waste annually. The nation generates 0.8 kg of electronic waste per person, which produces dangerous environmental problems and health dangers that require urgent policy solutions (Chakraborty et al., 2025).

The research investigates methods to enhance Afghan waste management through policy evaluation and Islamic value assessment and e-waste management framework development and PPP implementation for service delivery improvement and cost reduction. The research uses library-based methods to analyze secondary data sources. The national policy lacks specific guidelines for electronic waste management according to the research findings. The management of e-waste requires immediate inclusion into the complete solid waste management system because of its dangerous properties. Public education programs need to exist for e-waste management because they educate people about proper waste disposal methods. The implementation of waste management rules needs to happen simultaneously with electronic device refurbishment programs that enable market resale to reduce domestic e-waste generation and decrease foreign electronic product imports.

1.1. Problem Statement:

Afghanistan developed a national policy for waste management in 2010, but cities, streets, markets, and residential areas are still full of garbage. The waste management system in Kandahar City operates with major issues because 76% of residents express dissatisfaction with the existing waste management system (Mangal et al., 2023). The field data shows that 26.4% of households discard their waste in open spaces, 2% of households burn their waste, and 2.8% of households throw their waste into drainage channels. The waste collection process takes place during morning hours when people are going to their organizations, universities, and schools, thus creating more environmental health risks and public safety hazards (Hussain, 2019). Afghanistan generated 26 KT of e-waste in 2019 and 32 KT in 2022. Afghanistan does not have a stable framework for collecting and recycling e-waste, while the generation of this waste is increasing day by day, in addition, there is not enough information about e-waste (Chakraborty et al., 2025).

1.2. Significance of the Study

Human existence depends on the environment because its protection enables economic development and maintains public health, and safeguards natural resources. The waste management system in Afghanistan operates at a basic level, and like other developing countries, Afghanistan also suffers from insufficient waste management (Zia et al., 2024). According to the results of the survey mentioned above, 76% of Kandahar city's citizens are dissatisfied with the way waste is now managed. The improper disposal of waste in Afghanistan has resulted in various health issues, which include malaria, together with respiratory and skin diseases. Therefore, based on this analytical study, the shortcomings and gaps of Afghanistan's national waste policy will be identified, and the best solutions will be shared with the subordinate institutions of the Islamic Emirate of Afghanistan (National Environmental Protection Agency, municipalities, etc.) The recommendations derive from current situations and scientific research that scientists obtained through their analysis of worldwide case studies.

1.3. Research Objectives

Overarching Objective:

Identifying major gaps in Afghanistan's national waste management policy and proposing rational and sustainable solutions based on Afghanistan's existing situation and international best practices.

Sub Objectives:

1. The research investigates the degree to which Islamic principles, together with jurisprudential concepts, appear in Afghanistan's National Waste Management Policy.
- 2: Identifying major shortcomings in Afghanistan's national solid waste policy, both from the perspective of policy science and the current realities of society;
3. Finding better and more practical solutions to this policy's gaps while taking into account the current state of Afghan society and successful worldwide experiences.

1.4. Research Questions

Overarching Research Question:

What are the major strengths and weaknesses of Afghanistan's national waste management policy, and what are better and evidence-based solutions for these weaknesses?

Sub Research Questions:

- 1: How has the Afghan National Solid Waste Policy addressed Islamic and jurisprudential guidelines?
- 2: In terms of policy science and current societal realities, what are the major shortcomings of the Afghan National Solid Waste Policy?.
- 3: Considering the existing situation in Afghan society and effective experiences around the world, what are the best and most realistic solutions to the shortcomings in this policy?

2. Literature Review

Mangal Pashtoon and Sharaf conducted research under the title "A Survey of Waste Management Analysis in Afghanistan" to identify the municipal solid waste management problems in Kandahar City and develop workable solutions. The 2023 research study showed that Kandahar residents strongly dislike their current waste management system. The authors demonstrate that the system faces major problems because of insufficient waste bins and insufficient municipal staff and insufficient dump trucks for efficient waste collection and transportation. The research appeared in the *Integrate journal for research in arts and humanities* to demonstrate the urgent requirement for urban waste management system improvements, which will enhance service delivery and environmental results (Mangal et al., 2023).

Khadim Hussain (2019) conducted an empirical study called "Municipal Solid Waste Management Analysis in Kandahar" to assess the operational condition of Kandahar City's municipal solid waste management system. The research investigated service delivery challenges to create operational solutions that would establish an efficient waste management system. The research conducted in Kandahar during 2019 demonstrated that the city faces major difficulties when handling its municipal solid waste. The study showed that 26.4% of residents discard their waste in public areas because they lack access to municipal waste collection services, and they are unaware of proper waste disposal methods. The research shows that waste governance encounters various structural and administrative obstacles that stop waste management from reaching its targets. The research appeared in the *Octa Journal of Environmental Research* under the authorship of Hussain (2019).

Sahil, Ehsas, and Rahmani (2018) conducted research titled "Environmental Aspects of Sanitation Landfill Site Selection and Design for Municipal Solid Waste of Kandahar City, Afghanistan" to study

waste composition at disposal sites and commercial facilities for developing evidence-based waste classification and recycling and environmentally friendly disposal methods. The research investigated waste material composition throughout different waste management stages to establish the amount of recyclable materials that could be recovered for waste reduction at disposal sites. The researchers conducted their study in Kandahar City during 2018 to determine waste composition and waste generation patterns. The research showed that construction waste makes up most of the municipal solid waste stream because it represents a large portion of total waste. The research discovered that disposal sites handled minimal waste amounts but food waste made up 70% of all waste generated by households and commercial shops. The research established that municipal waste needs between three to seven days to move from residential areas to the landfill site. The researchers conducted spatial analysis to find Kandahar International Airport as the best location for establishing a sanitary landfill. The site contains all required elements to establish a protected waste disposal facility. The study published in the International journal of engineering in science invention (Sahil et al., 2018).

Mujeebullah M. and Sherzad M. D. (2025) published their research Investigation of the Methodology and Environmental Importance of Incinerators in Disposing of Hazardous Waste in Afghanistan in the Journal of Natural Sciences – Kabul University. The researchers investigated how current hazardous waste incineration methods in Afghanistan perform through their study. The researchers demonstrated that current incinerators fail to meet safety standards while producing environmental hazards which threaten human health. The researchers performed a technical assessment to determine how current incinerators match international standards and what impact they have on the environment. The research showed that present incinerators do not fulfill safety requirements and environmental rules which leads to rising dangers for people and environmental harm. The researchers determined that modern waste incineration technology along with complete regulatory oversight and ongoing monitoring systems must be implemented for safe hazardous waste disposal (Mujeebullah & Sherzad, 2025).

Mohsini M. S. and Rahmany N. A. (2025) conducted research to find the best waste-to-energy technology for Kabul City through their study Technical Review and Comparative Evaluation for Power Generation Technology Selection published in the Journal of Natural Sciences – Kabul University. The researchers investigated waste management through incineration as an efficient method to handle waste while producing energy. The researchers conducted a technical evaluation of anaerobic digestion and incineration and landfill gas recovery systems based on social and technical and economic and environmental factors to determine waste-to-energy technology suitability for Kabul. The researchers established that waste incineration represents the most suitable waste management solution for Kabul City. The authors support the deployment of waste-to-energy incinerators while emphasizing the need for policy backing from policies and environmental monitoring systems (Mohsini, & Rahmany, 2025).

Azimi A. N. , Dente S. M. R. and Hashimoto S. (2020) published their research Social Life Cycle Assessment of Household Waste Management System in Kabul City in Sustainability to evaluate social impacts of Kabul's household waste management system on different stakeholders. The researchers studied how present waste management systems impact social welfare results for workers together with their surrounding community members. The researchers conducted surveys and interviews and conducted field observations to collect data for Social Life Cycle Assessment (S LCA) of Kabul's household waste management system. The research discovered multiple social problems which affect workers through excessive work and weak community involvement and unsatisfactory working conditions among sanitation staff. The research established that better waste bin placement and waste education programs and better institutional backing will boost social sustainability in Kabul's waste management system (Azimi et al., 2020).

Khoshbeen A. R. Logan M. and Visvanathan C. (2020) published their research Integrated Solid-Waste Management for Kabul City Afghanistan in the Journal of Material Cycles and Waste Management. The researchers developed an ISWM plan for Kabul to enhance operational performance and environmental results through their research. The researchers tested ISWM alternatives through quantitative waste management data analysis to prove that this approach would decrease costs and boost service reach and environmental protection. The research results demonstrated that ISWM implementation would lead to reduced expenses and better environmental outcomes and superior public service delivery. The authors support changes in policy which will promote waste segregation and recycling practices and implement waste management service payment systems (Khoshbeen et al., 2020).

The current national waste management policy of Afghanistan faces multiple critical weaknesses because of insufficient organizational strength, inadequate waste collection and recycling facilities, insufficient community participation, inadequate hazardous waste treatment methods, and insufficient waste-to-energy conversion.

The research proposes to establish an integrated solid waste management system, which will enhance social sustainability and implement advanced hazardous waste management systems and waste-to-energy conversion programs, and develop waste management policies based on precise waste composition data. The research provides full analytical evidence to assess policy success and develop innovative solutions that handle environmental and social elements of solid waste management in Afghanistan..

3. Methods and Materials

3.1. Research Approach

This study used a qualitative approach. Based on this approach, researchers can gain an in-depth understanding of complex institutional, social, economic, and political issues through conceptual and analytical methods (Creswell & Creswell, 2018). The aim of this study is to identify weaknesses and gaps in Afghanistan's national waste management policy through an analytical assessment and to identify effective solutions based on the current situation in Afghanistan and international best practices. Therefore, a qualitative approach has been chosen in this study to accurately analyze this policy.

3.2. Research Philosophy

This research is based on the constructivist philosophy, which believes that humans' meaning, analysis, and interpretation of the world and the things in it are based on their knowledge, experiences, and social and cultural characteristics. Therefore, constructivist philosophy has been chosen in this study because the researchers conduct an analytical assessment of Afghanistan's national waste management policy based on the researchers' knowledge, experience, skills, and also the current social and cultural conditions of Afghanistan (Creswell & Creswell, 2018).

3.3. Research Design

Considering the research methodology and philosophy, this study used a case study design. This research design helps the author to analyze a topic in light of the world and society's realities (Creswell & Creswell, 2018). In this study, the author analyzes Afghanistan's national waste management policy in light of the existing situation in Afghanistan, current world-class best practices, and policy knowledge.

3.4. Research Method

This study used qualitative document analysis, which is a systematic and critical method for official government documents, policies, laws, strategies, and other written sources (Bowen, 2009; Corbin & Strauss, 2008; Rapley, 2007). Through this method, the researcher reads, evaluates, and interprets printed and electronic documents to extract information, meaning, and understanding from them.

The main analytical document for this study was the Afghanistan National Solid Waste Management Policy. This policy was compared and analyzed with applicable Islamic environmental principles, Afghan laws, international standards, and relevant academic research on the same topic to scientifically identify the policy's shortcomings, implementation problems, and practical ways to improve it.

3.5. Data Collection and Sampling Criteria

The data for this study were collected only from secondary sources. Purposeful Criterion-Based Sampling was used to select the documents, as this method is considered the most appropriate scientific method in qualitative documentary research (Bowen, 2009; Creswell & Creswell, 2018).

3.6. Analytical Framework and Coding Procedures

Thematic qualitative analysis was used to analyze the data based on Braun and Clarke's (2006) six-step analytical framework (Creswell, 2018; Saunders et al., 2019; Silverman, 2020).

The analysis process was completed in the following steps:

First: Afghanistan's National Waste Policy and other relevant reports, books, and articles were read several times carefully to gain a full understanding of their content, concepts, and main themes.

Second: The sections of the documents that were related to policy weaknesses, strengths, Islamic environmental principles, urban management, e-waste, and public-private partnerships (PPP) were recorded as initial codes.

Third: Similar codes were organized into conceptual categories to clarify the relationships between key policy problems and reform issues.

Fourth: These categories were organized into high-level analytical themes that revealed key policy gaps and opportunities for reform.

Fifth: The themes obtained were compared with international best practices, Islamic environmental principles, and previous academic research findings to increase the validity of the analysis and the accuracy of the interpretation of the results.

Sixth: The final themes were interpreted and analyzed in light of the research objectives and questions, and based on this analysis, practical and evidence-based recommendations for policy reform were presented.

Four main themes emerged from the analysis:

- Limited integration of Islamic principles and values;
- Lack of clear policies for e-waste management;
- Weak implementation of municipal solid waste management;
- Lack of effective public–private partnership mechanisms.

These four themes form the basis of the results and discussion of this study.

4. Results

Identifying Policy Gaps and Context-Based Solutions from Islamic and Organizational Perspective

Afghanistan's National Solid Waste Policy is the plan the country has for handling municipal waste, hazardous waste, and clinical waste. The National Environmental Protection Agency (NEPA) created Afghanistan's National Solid Waste Management Policy in 2009 under the Environmental Protection Law. Afghanistan's National Solid Waste Policy puts waste into three groups: clinical waste, hazardous waste, and municipal solid waste. Afghanistan's national solid waste management Policy will help keep our towns cleaner. The World Bank evaluation of Kabul reported that ten major hospitals produced about 3,000 metric tons of waste each year. The World Bank evaluation of Kabul also reported that overall hospital waste production was 5,000 metric tons (World Bank, 2005).

UN-Habitat data showed that the average Afghan citizen produced about 0.40 to 0.50 kilograms of waste each day. The policy will be carried out with three actions: (1) The policy will establish a well-run waste management system. (2) The policy will reduce waste generation by making operations better and by managing waste. (3) The policy will encourage citizens to take part in cutting waste and in recycling and reusing.

This policy provides the following guidelines for waste management: proper disposal of waste, reduction of waste generation, raising public awareness, preparation of a waste management plan in accordance with urban plans, and use of simple, affordable, and sustainable technologies. This policy also emphasizes providing economic investment opportunities for the private sector, identifying the institutions involved in waste management and their responsibilities, promoting the 3R principles, and implementing the precautionary principle, which were among the strong points of this policy.

As this policy was designed in 1388, at that time, on average, each citizen produced 0.4 kilograms of waste per day, but current research shows that each citizen produces an average of 0.9 kilograms of waste. This policy does not consider the future. This policy provides guidelines for hazardous waste, but does not specifically address solid electronic waste. Also, it only mentions the economic opportunity for businessmen for public-private partnerships, but does not pay much attention to public-private partnerships like other countries (NEPA, 2010). In this bibliographic article, we find the following shortcomings of Afghanistan's national waste management policy and their solutions:

1. Limited mention of Islamic principles and guidelines in Afghanistan's National Solid Waste Policy

A. Identified Gap: Description and Analysis

A comprehensive study of the content of Afghanistan's National Solid Waste Policy has revealed that the mention of Islamic principles and cultural values is very limited and superficial, because although some parts of the policy mention social ethics and public awareness, but from the perspective of Islam, the clear guidelines for cleanliness, and environmental protection, which are based on the principles of the Quran, Sunnah, and jurisprudence, are not included in detail. Also, the policy fails to give the people a religious or culture-based framework. The policy cannot shape the people's attitudes and actions toward waste management.

Additionally, the policy has a limited focus on the local and traditional values of Afghan society, as the role of religious scholars, social structures, and tribal leaders in the cultural dimension of waste management is not well-defined. Therefore, as an effective solution to bridge this gap, the following major (waste control from an Islamic perspective, the basic principles of the holy religion of Islam regarding the environment, and the integration of Islamic teachings into the policy) should be included in this policy, which are briefly mentioned below: To increase the social ethics and public awareness of individuals in society and bring about a significant change in the mindset, behavior, and attitudes of citizens in society.

B. Proposed Solution: Strengthening the Policy Through Islamic and Jurisprudential Guidance

In order to further enrich the Islamic and jurisprudential guidance in the policy, the following essential topics should be included in this policy.

i. Waste Control from an Islamic Perspective

1: The Value of Cleanliness in Islam

Islam is a religion dedicated to cleanliness. Maintaining cleanliness is considered part of societal order, individual worship, and natural and environmental balance. Mohammad (ﷺ) expressed: "Al-ṭahūru shaṭr al-īmān" — "Cleanliness is part of faith" (Sahih Muslim, Hadith No. 223).

This hadith shows that preserving a clean environment is not only a civic and social responsibility, but also a part of the value of faith. All efforts to control waste, whether it is garbage collection, water purification policies, or maintaining urban order, are considered acts of worship from the perspective of Islamic principles, because they are an effort to protect the safety of human life and the blessings of Allah (Jalloh et al., 2022).

2: Preventing the environment from corruption (Fasad)

The Holy Quran gives a strong warning about the corruption (pollution) of the environment:

[وَلَا تُفْسِدُوا فِي الْأَرْضِ بَعْدَ إِصْلَاحِهَا]. Translation: (Do not make mischief on the earth after Allah has set it in order.) (Al-A'raf: 56).

In this verse, fasad goes beyond corruption. Fasad also covers any act that breaks the balance, the purity, and the harmony of the environment. When individuals or institutions pollute the air, the soil, or the water by dumping the waste or the electronic waste in a way those actions are fasad fi al-ard. Fasad creates a ban on environmental pollution.

3: The Principle of Public Welfare (Maslahah 'Ammah)

Maslahah 'ammah is a public welfare idea, in law. Maslahah 'ammah tells that every policy and every action must work for the welfare. Solid waste management follows maslahah ' because solid waste management protects health, solid waste management keeps the city orderly and solid waste management saves natural resources (Al-Qaradawi, 1999). The policy gains legitimacy when the policy is tied to the framework of maslahah 'ammah.

4: The Concept of Purity (Tahara) in Environmental Ethics

In Islamic thought, cleanliness is not only about the body or clothes, but also about the environment, space, and social spaces. The Prophet (ﷺ) said: [إِمَاطَةُ الْأَذَى عَنِ الطَّرِيقِ صَدَقَةٌ]. Translation: (Removing harmful things from the road and street is charity). (Bukhari, 2893)

"Removing harmful objects from the road is an act of charity." (Sahih al-Bukhari, Hadith No. 2893)

This guidance provides a religious and moral basis for waste control. Keeping cities clean, collecting waste, and implementing recycling programs are practical expressions of this tradition.

ii. Three Foundational Principles of Islamic Environmental Ethics

1: Trusteeship (Amānah)

In teaching, the human being is a trustee of the resources that Allah gave, such as land, water, and air. The principle comes from the Qur'anic verse: [إِنَّا عَرَضْنَا الْأَمَانَةَ عَلَى السَّمَاوَاتِ وَالْأَرْضِ...] (Al-Ahzab 33:72). The concept of amanah extends to stewardship. The concept of amanah encourages individuals and organizations to keep systems safe. The concept of amanah ties the duty to intergenerational justice and responsible governance.

2: Moderation (I'tidāl) and the Prohibition of Wastefulness

Islamic ethics condemn excess, waste, and careless use of resources. The Qur'an says, "Do not commit excess for Allah does not love the wasteful" (Al-An'ām 6:141). The overproduction of waste is a form of isrāf, which means wastefulness, and the overproduction of waste goes against values. Islamic ethics call for the better use of resources and more recycling. Islamic teachings match the goals of development and of an economy that cares for the environment.

3: Individual and Collective Responsibility (Mas'ūliyyah)

Islam asks each of us to look after the community and the environment. The Prophet Muhammad (ﷺ) said: "Each of you is a shepherd and each of you is responsible for his flock" (Bukhārī, 893). Islam treats waste management as a duty for every person, not a job for the government. Islam makes environmental protection a shared commitment that needs the work of individuals, families, communities and the state.

iii. Strengthening and integrating Islamic principles into the formulation of national waste policies

Policy-making in Islamic societies must be consistent with Sharia. If a national solid waste policy is consistent with Islamic principles, its public acceptance is greatly enhanced. For example, the slogan "Cleanliness is Faith" can be part of public awareness campaigns. According to the research of Islamic scholars such as Sheikh Yusuf al-Qaradawi, Fazlur Rahman, etc., waste-related policies for environmental protection give practical meaning to the Sharia objectives (protection of life, property, offspring, and intellect) (Al-Qaradawi, 2001).

Afghanistan is an Islamic society, where Sharia values are part of the daily lives of the people. For any environmental policy to be successful, it is essential that it be designed and implemented based on Islamic principles. One of the challenges in implementing a national waste control policy is that the integration of religious perspectives is limited, while awareness-raising through scholars and mosques can change people's behavior. Islam emphasizes social order, public health, and the protection of human dignity. Waste control prevents diseases, maintains urban beauty, and ensures environmental balance. Therefore, Afghanistan's solid waste policy should strengthen public awareness based on Islamic values, so that people participate in waste control as a religious responsibility.

2. Absence of Guidelines for Electronic Waste (E-Waste)

A. Explanation of the Gap

Electronic waste or e-waste is any electronic device that is broken, outdated or no longer works, such as computers, mobile phones, televisions, etc. This waste is produced from domestic (mobile phones, refrigerators, etc.), commercial (cameras), industrial (generators), government (fax machines, printers, etc.), and medical (ultrasound, MRI) sources.

Afghans generate approximately 0.8 kilograms of electronic waste per year, and no formal system has been defined for collection. All electronic waste is collected informally and dumped without treatment. Afghanistan has no laws, policies, or regulations for e-waste, nor has any target been set for collection and recycling, and the lack of effective management of e-waste can harm the environment. And it affects human health because this waste contains heavy metals and toxic substances (Chakraborty, et al, 2025).

B. Proposed Solution

Considering the best practices of world countries and the risks of electronic waste, this waste should be considered part of solid waste. In amending and developing this policy, the necessary principles, guidelines, and procedures regarding this waste should be established. In order to reduce environmental impacts through public awareness for the proper management of electronic products, to create mechanisms to prevent old and used products from entering Afghanistan under gifts and other names, to create mechanisms to increase the capacities of those who work in the repair of electronic devices, to create ways to collect electronic waste that prevent it from mixing with other waste. Manufacturers and importers of electronic devices must take responsibility for the disposal of electronic waste. Electronic waste that cannot be disposed of should be made so that it can be repaired (Ministry of Environment Sobadam Piyasa, 2020).

3. Lack of effective solid waste management by municipalities

A. Identified Gap: Problem Analysis

Afghanistan has a hard time handling waste. The biggest cities—Kabul, Kandahar, Herat, Mazar-i-Sharif, and Jalalabad—produce most of the waste in the country. Over the decades, many national and international groups and organizations gave help and money to the municipalities and private groups to improve solid waste systems in the cities. With that help, solid waste management stays a problem in Afghanistan. The current waste management in cities, which collects waste from the city, then combines it in a remote open area and dumps it in the open air, is neither healthy nor professional, and causes pollution of groundwater, soil, and air. Improper management of solid waste in Kandahar has led to many health problems such as malaria, respiratory and skin diseases. This policy is not being effectively managed in terms of implementation.

B. Proposed Solution:(Effective solid waste management Policy Draft for the municipalities)

We have developed a model and Policy draft for the whole of Afghanistan for a period of ten years. Considering the circumstances, resources, and information, this Policy draft has been selected as a model for Kandahar City only, through which solid waste management will be effectively implemented first in Kandahar City and then in all other provinces. The Policy draft is as follows.

According to the statistics of Kandahar Municipality, the number of houses in Kandahar City is (101,638) and the number of garbage bins distributed in the city is 700, which is 1 garbage bin for every 145 houses. Kandahar Municipality should increase this number to 2032, considering the population, for effective waste management. These bins should be split into two colors (red and green), with red (1016 grains) reserved for organic waste and green (1016 grains) reserved for inorganic waste. In addition, continuous training, campaigns, guidance from clerics, and print/non-print media should be organized to increase the level of awareness among individuals. Also, the municipality should hire (309) workers to distribute plastics, collect solid waste, and monitor this process for effective solid waste collection.

The municipality will also establish a factory to process organic waste (compost) and inorganic waste (plastic, metal, glass, and paper), which is a major source of income that does not yet exist in Afghanistan. Therefore, based on this policy draft, the municipality should pay special attention and invest in this sector. This policy draft includes the following sections.

i. Increase in the Number of Waste Bins for Kandahar City

According to the National Statistics and Information Authority (NSIA) report, the population of Kandahar City is about 711,470. The average household in Kandahar City has seven people, so Kandahar City has 101,638 households. Now there are 700 waste bins in Kandahar City. That means there is one waste bin for every 145 households in Kandahar City, so the waste bins are not enough to handle the amount of waste that Kandahar City produces. Therefore, the municipality must expand the waste bin network to 2,032 units. The expansion of the waste bin network will create a ratio of two bins for every 100 households. two (red and green) garbage bins will be placed, of which (1016) are red for organic waste and (1016) are green for inorganic waste.

The placement of the bins should consider household density and accessibility to ensure convenient access for all residents. Add clear signage and visual markers on or near each bin. These signs and markers help the public understand how to dispose of waste properly, encourage adherence to segregation rules, and promote environmental responsibility. Additionally, 3,000 small trash cans will be placed on various streets of the city for the effective management of solid waste from people moving around the city.

ii. Enhancing Public Awareness and Community Engagement

To raise awareness among individuals, a continuous campaign should be launched in mosques, academic centers, and public areas through visual boards, dedicated outreach teams, and printed and digital media, and religious leaders (Imams). The municipality needs to establish plastic waste bins with red containers for organic waste and green containers for inorganic waste, and should add clear symbols to these bins for better household waste segregation.

The municipal oversight teams will check compliance through inspections, which will give rewards to neighborhoods that properly segregate and dispose of waste according to verified inspection findings. The awareness-raising program will operate for ten years through the following schedule progression:

- Years 1–2: Four campaigns per year per district
- Years 3–6: Two campaigns per year per district
- One campaign should be conducted annually throughout Years 7–10 in each district.

The program will receive financial backing through annual budget allocations, which will start at 10 million AFN during the first two years before decreasing to 5 million AFN from years three to six and then to 4 million AFN during years seven to ten for a total of 56 million AFN throughout the ten years. The scheduled sequence of operations will establish enhanced community participation through behavioral training, which will establish environmentally friendly waste management systems to achieve improved environmental outcomes and public health results.

iii. Plastic Distribution and Personnel Deployment:

The Kandahar municipality needs to hire 309 new employees to handle plastic distribution and waste collection from small bins, as well as monitor household, hotel, and commercial outlet waste management. The 103 distribution blocks will each receive three employees who will perform distribution tasks, supervise operations, and manage waste collection to ensure efficient plastic management throughout the city.

iv. Waste Collection and Transportation:

The Kandahar Municipality currently operates 14 dump trucks and 14 cranes for municipal solid waste (MSW) collection. The city requires 15 more dump trucks to meet its waste collection needs. The transportation capacity of each vehicle ranges from 11 to 20 tons, So, if each vehicle carries out the waste transfer process three times a day, all of the city's waste will have effectively reached the recycling centers, requiring two staff members for each vehicle, a driver and a waste collector.

v. Processing Stage:

The processing stage, which has received no attention until now, offers substantial financial potential. The processing stage composting facility will convert 80% (192 tons) of the 240 tons daily organic waste into chemical compost before disposing of the remaining waste in landfills. The annual market for compost in Afghanistan reaches 300,000 tons according to Seerat (2024). The sorting center will provide raw materials from inorganic waste (plastics, glass, metals, and paper) to local industries which will create a circular economy and enhance resource utilization (Zia, et al. 2024).

Cost and benefit analysis of the Policy Draft

The analysis and evaluation of this policy draft has been carried out based on the cost-benefit analysis (CBA) method.

Table 1. One-Time Expenditures

Table 1 presents the one-time expenditures identified for the ten-year implementation period of the policy draft, including waste bins, collection trucks, buildings and facilities, and containers.

Item	Quantity	Type of Cost	Unit Cost (AFN)	Total 10-Year Cost (Million AFN)
Large waste bins	1,332	One-time	29,000	38.6
Small waste bins	3,000	One-time	10,600	31.8
Waste collection trucks	15	One-time	1,292,000	19.3
Buildings and facilities	2	One-time	20,000,000	40
Containers	103	One-time	63,000	6.49
Total				136.19

The above expenditures are incurred over ten years.

Table 2. Recurrent (Operational) Expenditures

Table 2 presents the recurrent operational expenditures projected for the ten-year implementation period, including public awareness programs, staff salaries, and diesel fuel.

Item	Quantity	Type of Cost	Unit Cost (AFN)	Total 10-Year Cost (Million AFN)
Public awareness programs	Null	Recurrent	Null	56
Salaries of plastic distribution and monitoring staff	309	Recurrent	10,000	370.8

Diesel fuel	317,550 (liters)	Recurrent	55	174.6
Total				601.4

Costs of Organic Waste Processing

Compost Production Equipment

Table 3. Chemical fertilizer (Chain Plate Compost Machine):

Table 3 presents the one-time cost of the Chain Plate Compost Machines required for organic waste processing.

Machine	Quantity	Unit (AFN)	Price	Total Cost	10-Year	Type of Cost
Chain Plate Compost Machine	4	1,679,600		6.7 million AFN		One-time

Table 4. Workforce for Organic Waste Processing

Table 4 presents the recurrent workforce cost associated with organic waste processing, including the personnel required for compost production, maintenance, quality control, raw material management, administration, and security.

Number of Workers	Monthly Salary per Person (AFN)	Total 10-Year Cost (Million AFN)	Type of Cost
200	20,000	480	Recurrent

A total of 200 employees are required for compost production, maintenance, quality control, raw material management, administration, and security services related to the Chain Plate Compost Machine.

Costs of Inorganic Waste Processing

To process inorganic waste, the project includes the procurement of Municipal Solid Waste Sorting Line Machines, forklift vehicles, and baler compressors. A workforce of 111 employees is required for waste separation (plastic, metal, paper, and glass), storage, raw material management, and administrative tasks.

Table 5. Machinery and Equipment

Table 5 presents the machinery and equipment costs required for inorganic waste processing, including municipal solid waste sorting line machines, baler compressors, and forklifts.

Machinery	Quantity	Unit (AFN)	Price	Type of Cost	Total 10-Year Cost (Million AFN)
Municipal solid waste sorting line machine	6	1,360,000		One-time	8.16
Baler compressor	5	353,600		One-time	1.77

Forklift	6	612,000	One-time	3.67
Total				13.6

Table 6. Workforce for Inorganic Waste Processing

Table 6 presents the recurrent workforce cost required for inorganic waste processing and waste separation, storage, raw material management, and administrative tasks.

Number of Workers	Average Monthly Salary per Person (AFN)	Total 10-Year Cost (Million AFN)	Type of Cost
111	20,000	266.4	Recurrent

Revenue Analysis of the Project

Table 7. Revenues from Organic Waste

Table 7 presents the projected revenue from organic waste over the ten-year period based on annual compost production and the stated price per ton.

Annual Production (tons)	Price per Ton (AFN)	Total 10-Year Revenue (Billion AFN)
70,080	8,000	5.6

In Kandahar city, 240 tons of organic waste are generated daily, of which 80% (192 tons) is converted into compost. To ensure effective marketing of the produced compost, the government should impose higher taxes on imported chemical fertilizers.

Table 8. Revenues from Inorganic Waste

Table 8 presents the projected revenue from inorganic waste by waste type, including plastic, metal, glass, and paper, based on the stated annual quantities and prices per ton.

Waste Type	Annual Quantity (tons)	Price per Ton (AFN)	Total 10-Year Revenue (Million AFN)
Plastic	131,400	500	657
Metal	29,200	2,000	584
Glass	29,200	500	146
Paper	14,600	500	73
Total			1,460

In Kandahar, approximately 800 tons of waste are generated daily, 70% of which is inorganic. The composition includes 45% plastic, 10% metal, 10% paper, and 5% glass (Mangal, Pashtoon, & Sharaf, 2023).

Table 9. Cost–Revenue Analysis of the Policy Draft

According to the above statistical analysis of this policy draft, which is designed for the upcoming ten years, the cost and revenue analysis is summarized as follows:

Total Costs (Billion AFN)	Total Gross Revenue (Billion AFN)	Net Revenue (Billion AFN)
1.504	7.066	5.562

4. Lack of public-private partnership:

A. Explanation of the Gap

(UNDP, 2019) The lack of public-private partnerships (PPP) is not explicitly mentioned in the study, but the weak legal and institutional frameworks, lack of information, and lack of effective coordination in the management of solid waste and chemicals make it clear that these are all signs of a lack of public-private partnerships. The report also adds that the 2017 PPP policy has not yet been effectively implemented in waste management.

(Mangal, et, al, 2023) The main objective of this study is to identify and analyze waste management in Kandahar city. This study shows that public-private partnership is a good tool for effective solid waste management in Kandahar city. Unfortunately, Kandahar Municipality has no private sector participation in waste management, although there are good opportunities for private investment. The municipality should encourage private companies to enter into public-private partnerships. Public-private partnerships will increase the financial resources of municipalities, and this will be the best solution to many problems.

B. Proposed Solution

(Zia et al., 2024) According to the findings of their study and our above-mentioned policy draft, the municipality distributes garbage cans, distributes plastics, and conducts public awareness programs, along with controlling and supervising the activities of the private sector, and the private sector carries out the transportation and processing of waste. Based on the contract, the private sector will have a share in revenues and expenditures (66%) and the municipality (34%). The revenues and expenditures for this PPP policy draft are all the same as the above mentioned policy draft (Effective Municipal Solid Waste Management policy draft for the municipalities).

Table 10. Ten Years Expenditure and net profits Analysis

Table 10 presents the ten-year expenditure and net-profit analysis according to the proposed revenue-sharing arrangement between the municipality and the private sector.

Investor	Ten years expenditure (Million AFG)	Ten years profits based on share (B)
Municipality	504.690	1.8904
Private Sector	1000	3.6696
Total Net Profit		5.56

5. Discussion

The National Waste Management Policy, which was developed in 2010, provides guidelines and procedures for three types of waste: medical, hazardous, and solid waste (NEPA, 2010). In 2019, UNEP published a report titled "Building a strong foundation for responsible waste management in Afghanistan" stating that hazardous waste, toxic materials, and chemicals must be managed properly and effectively in Afghanistan. This includes e-waste (UNDP, 2019). The people of Kandahar are dissatisfied with the current solid waste management, and the municipality should increase the number of garbage bins, increase staff, and add dump trucks (Mangal, et, al, 2023). Kandahar city faces serious

solid waste problems. 26.4 percent of the population throws waste in the open, public awareness is low, and access to municipal services is limited (Hussain, 2019).

Based on the findings of our research, it was determined that the lack of integration and attention to Islamic principles and principles in Afghanistan's national waste management policy, and the ineffective management by municipalities, the lack of public-private partnerships, and the lack of guidelines for e-waste management are major and fundamental problems and gaps in waste management. To address these problems, integrating Islamic principles into policy, strengthening public-private partnerships, establishing an effective waste management system, developing specific guidelines for electronic waste, and encouraging the private sector to recycle and separate waste will increase the effectiveness and efficiency of the policy. If the focus is on implementing these solutions, Afghanistan's national waste management policy will not only be effective in protecting the environment but will also lead to economic development.

Conclusion

Afghanistan's National Waste Management Policy was an important step in environmental protection, but it still has a number of gaps and shortcomings. This qualitative study aimed to identify the gaps in this policy and to suggest better solutions, taking into account the current situation in Afghanistan and effective experiences from around the world. As a result of this study, it was found that the main and fundamental problems and shortcomings in Afghanistan's national waste management policy include the lack of integration and attention to Islamic principles and principles, ineffective management by municipalities, a lack of public-private partnership, and a lack of guidelines for the management of electronic waste. To address these problems, integrating Islamic principles into policy, strengthening public-private partnerships, establishing an effective waste management system, developing specific guidelines for electronic waste, and encouraging the private sector to recycle and separate waste will increase the effectiveness and efficiency of the policy. If the focus is on implementing these solutions, Afghanistan's national waste management policy will not only be effective in protecting the environment but will also lead to economic development.

Recommendations

Based on the results of the research and discussions, we have the following recommendations to the Islamic Emirate of Afghanistan to address the shortcomings of the national waste management policy.

1: To public policy and decision makers: A: E-waste (electronic waste) should be defined, and guidelines, principles, and procedures for its management should be stated in order to prevent the dangers of this waste. And producers and importers of electronic waste should take responsibility for the disposal of this waste;

B: The policy makers of the Islamic Emirate should pay special attention to Islamic and jurisprudential guidelines in this policy.

2: To municipalities: For effective management of solid waste, municipalities should increase the number of garbage bins, raise awareness among individuals, improve the distribution of plastics, the solid waste collection process, and the processing stages, so that waste can be managed effectively.

3: To the public and private sectors: Public-private partnerships for effective solid waste management, service improvement, cost reduction, and economic growth.

Conflict of Interest

No conflicts of interest were present in this research, ensuring the integrity and objectivity of the findings.

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