NEEDS ASSESSMENT REPORT

Solid Waste Management

Kasur Municipal Corporation

sng
Sub-National Governance

Oxford Policy Management

UKaid
from the British people

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ABSTRACT

Solid Waste Management (SWM) is accorded relatively low priority in service provision. The policy, legal, institutional, and regulatory environment does not adequately support a modern and sustainable system of waste management. For example, cost recovery cannot be introduced because it is not provided for in relevant policies and laws. The institutional framework does not properly define responsibilities for SWM, or provide appropriate levels of authority, skills or financial resources.

Data on SWM is limited. For example, Kasur MC holds little data on solid waste data, or plan to collect such data in the future. Inadequate SWM resources is characterised by insufficient budget allocations, covering just salaries and little else, inadequate technical and managerial staff (competence and number), outdated equipment and facilities, and lack of cost recovery. The most problematic functional element is final solid waste disposal, with no managed dumpsite, no formal recycling or intermediate treatment facilities.

There is a need to restructure the SWM system, much of which is dependent upon the decisions and resources from the provincial government. This Needs Assessment Report reviews the existing situation, and identifies gaps and proposals for improvement. The report is based on an assessment of SWM in the city of Kasur undertaken in June and July 2021.

CONTENTS

CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF BOXES

LIST OF ABBREVIATIONS

3Rs	Reduce, Reuse, Recycle
AHKMT	Akhtar Hameed Khan Memorial Trust
CCO	Chief Corporation Officer
DC	Deputy Commissioner
DTD	Door to Door (Collection)
GoPb	Government of the Punjab
IRRC	Integrated Resource Recovery Center
ISWM	Integrated Solid Waste Management System
KP	Khyber Pakhtunkhwa
KPCIP	Khyber Pakhtunkhwa Cities Improvement Project
LFS	Landfill Site
LG	Local Governments
MC	Municipal Corporation
NGO	Non-Governmental Organization
OPM	Oxford Policy Management
PLGO	Personal 2424 Protection Equipment
PPE	Punjab Local Government Ordinance
SWM	Solid Waste Management
SNG	Sub-National Governance
TMA	Tehsil Municipal Administration
WACS	Waste Analysis and Characterization Study

CHAPTER 1

INTRODUCTION & BACKGROUND

The Sub-National Governance Program (SNG) is supporting provincial and local governments to improve planning, financial management, and governance that leads to better quality, demand-driven and more equitable services for citizens. The core objective of SNG is to work with local governments to support efficient and effective service delivery.

SNG is in a unique position to support improvements in service delivery by supporting centre-of-government strategic reforms together with sectoral technical assistance. SNG has developed a comprehensive Local Government (LG) engagement strategy proposing an "an end-to-end service delivery pilot" for two LG functions in two selected LGs. This Need Assessment Study focusses on a Solid Waste Management (SWM) pilot in Municipal Corporation (MC) Kasur.

The needs assessment analysis follows an evidence-based approach to SWM service delivery improvement. The exercise is relevant for cities of the same scale as Kasur facing similar SWM challenges.

The need assessment will serve two purposes:

- ***Identification of the gaps and challenges*** faced by Municipal Corporation Kasur in solid waste collection and disposal to identify areas for implementation interventions of the pilot.

- ***Definition of a baseline*** to enable assessment of the impact of the proposed service delivery pilot. While the need assessment has been undertaken this year, assessment of improved service delivery will happen at the end of the pilot, in 2023.

Currently there is no available data or baseline on the capacity and capability of the MC Kasur in delivering SWM services in a sustainable manner. This study is the first step in the proposed end-to-end service delivery pilot, the purpose of which is to improve waste collection and disposal service for the local government's population of approx. 400,000.

The study identifies service delivery gaps in SWM in MC Kasur, and proposes measures to improve service delivery, including priorities for immediate improvement, and the resources required to deliver these changes.

The study adopted a consultative approach, including the following activities:

- Inception meeting to agree requirements and expectations;

- Review of legal and institutional framework study (PLGO, PFC awards, MC Kasur budget books);

- Meetings with Deputy Commissioner Kasur, Chief officer MCK and his team at the Municipal Corporation;

- Data collection on key elements of SWM system (waste, HR, vehicles & machinery, finance);

- Field visits to SWM sites;

- One to one discussions and Focus Group Discussions with relevant staff of MC Kasur;

- Interviews with citizens, sanitary workers, and commercial area trade associations;

- Review of international best practice literature;

- Local (Pakistan) previous SWM projects and associated review reports;

Note: the study relies on data that is secondary or proxy. Relevant financial, HR and capital equipment data was difficult to obtain.

This report is organised in five parts:

- **Section 1** is the introduction to the study
- **Section 2** explains the assessment framework
- **Section 3** describes the baseline of the current SWM system
- **Section 4** provides the needs assessment for an improved system of SWM
- **Section 5** sets out proposed recommendation
- **The Annex** contains five case studies from cities that have faced similar issues

CHAPTER 2

SOLID WASTE MANAGEMENT ASSESSMENT FRAMEWORK

A recent World Bank report shows that SWM practices evolve as countries move from low-income to middle- and high-income levels.[1] Urbanization and affluence are directly linked to increases in per capita waste generation. Increasing size and population of cities creates challenges in the collection of all waste and procurement of land for treatment and disposal. The report highlights that SWM can be the single highest budget item for local administrations.

Waste collection and management are essential public services for every community and are necessary for the protection of public health and the environment. Effective SWM is critical for urban management, they underpin thriving local economies and are vital to ensure public spaces can be enjoyed by everyone. When urban waste services fail, inhabitants suffer bad living conditions – especially those in the poorest neighbourhoods and slums – and social discontent rises.

This assessment covers the urban areas of Kasur City, falling within the jurisdiction of the Municipal Corporation. However, there is urban development beyond the limits of MC-Kasur, which is also reflected in the report. Municipal waste includes domestic waste construction and demolition waste, commercial and institutional waste, and market and green waste. Hazardous, hospital and industrial waste are not the responsibility of municipalities, and are not included in the study.

2.1. Sustainable Development Goals:

Pakistan is a signatory to the SDGs (Agenda 2030) and was one of the first countries to ratify all the 17 goals and 196 targets. Within the SDGs, waste services prominently feature in the targets and indicators of both SDG 11 and SDG 12, with commitments to prevent, reduce, recycle and reuse, as well as to properly collect and discharge, urban solid waste and halve global food waste by 2030.

SDG 11: Sustainable Cities and Communities
- 11.1 Ensure access for all to adequate, safe, and affordable basic services, upgrade slums.
- 11.6 Reduce environmental impacts of cities, particularly municipal and other waste management.

SDG 12: Responsible Consumption and Production
- 12.1 Sustainable consumption and production national action plans or targets incorporated into national policies
- 12.2 Sustainable management and efficient use of natural resources
- 12.3 Halve per capita global food waste at the retail and consumer levels and reduce food loss during production, supply chains, and post-harvest steps
- 12.4 Environmentally sound management of chemicals and waste to minimize their adverse impacts on human health and the environment
- 12.5 Promotion of 3Rs to substantially reduce waste generation

SDG 13: Climate Action
- 13.2 Integrate climate change measures into policy and planning
- 13.3 Build knowledge and capacity to meet climate change

[1] Kaza S., Yao L., Bhada-Tata P., And Van Woerden F. (2018). What A Waste 2.0 A Global Snapshot Of Waste Management To 2050. Washington: The World Bank Group

2.2. The New Urban Agenda

Solid Waste targets also feature in the transformative commitments made by UN Habitat member states in the 2016 New Urban Agenda (NUA), which pledges to realise universal access to sustainable waste management systems, minimising landfills and converting waste into energy. The NUA commits to "*environmentally sound management and minimization of all waste.*"

The NUA aims to integrate the principles of the circular economy, sustainable waste management and materials re-use into urban waste disposal and metabolic systems. Emissions also result from waste disposal, so finding sustainable methods of disposal and energy generation are of particular importance. Cities should consider waste to energy technologies for disposal, instead of open dumping, open burning and land fill.

2.3. Paris Agreement and the NDCs

As part of the international climate policy regime, national governments must submit their Intended Nationally Determined Contributions (INDC) to reduction of greenhouse gas (GHG) emissions, with a timeframe that adequately allows for adaptation to climate change. An INDC indicates a country's contribution to achievement of the universal target set in the Paris Agreement, and the accompanying compliance mechanism at country level.

Table 1: Pakistan GHG Emissions; Current and Projections [2]

Sector	GHG Emissions 2015 (Tonnes, actual)	GHG Emissions 2030 (Tonnes, forecast)
Energy	186	898
Industrial Processes	22	130
Agriculture	175	457
Land Use Change & Forestry	10	29
Waste	12	89
Total	**405**	**1603**

Although waste is a low contributor to GHG emissions, rapid urbanisation in Pakistan together with high forecast GDP growth, is expected to increase Pakistan's GHG contributions from the waste sector. If left unchecked, it is projected that Pakistan GHG emissions from waste will increase from 12 tonnes CO2 equivalent in 2015, to 89 tonnes CO2 equivalent in 2030 (Table1). There is therefore an urgent need to develop and implement treatment and disposal technologies that are environment friendly with minimum GHG emissions.

[2] Pakistan: First/Pak-INDC.pdf

2.4. Punjab Local Government Act 2019

The Punjab Local Government Act 2019 states that SWM in urban areas falls within the responsibility of the Municipal Corporation.

PLGA (2019), Chapter VI: Functions of Local Governments:

Sec 21. (I) For the purposes of this Act, (a) A Metropolitan Corporation, Municipal Corporation and Municipal Committee shall be responsible for the functions listed in the Third Schedule.

Third Schedule: Part I, sub section (g) includes the function of solid waste collection and disposal.

Chapter VI – Functions of Local Governments

21. Responsibility of local governments.– (1) For the purposes of this Act:-
(a) A Metropolitan Corporation, Municipal Corporation and Municipal Committee shall be responsible for the functions listed in the Third Schedule;

Third Schedule
(See section 21)

Functions of a Metropolitan Corporation, Municipal Corporation and Municipal Committee

Part I

(a) Economic and value chain development;
(b) Management of primary, elementary and secondary education facilities;
(c) School enrolment and universal education;
(d) Monitoring and supervision of primary health care facilities;
(e) Preventive health and hygiene;
(f) Population welfare including population control;
(g) Solid waste collection and disposal;

SWM systems cannot be sustainable without community awareness and participation. To prevent littering and unauthorised dumping of waste, PLGA 2019 has special provisions for the enforcement of Municipal byelaws. Section 277 defines such offences as follows:

'Dumping of solid waste and refuse by any person or entity on a place other than landfill or dumping site, notified or designated by the concerned local government.'

The offence is punishable with fines of up to PKR 200,000, and / or imprisonment of seven days, as shown below.

Chapter XXXIV – Municipal Offences and their Cognizance

277. Municipal offences.– Acts or omissions listed in the second column of the Fifteenth Schedule by a person, either directly or indirectly, by himself or any other person, shall be an offence under this Act and shall be prosecuted or dealt with in the manner given under section 278 and 279 of this Act.

Fifteenth Schedule
(See section 277)

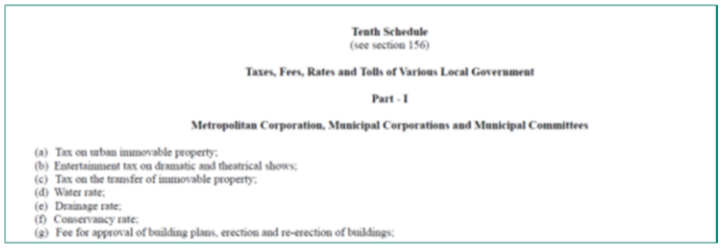
Municipal Offences

Serial	Offence	First stage administrative penalty	Administrative penalty by enforcement officer	Imprisonment or fine to be imposed upon a person on conviction by a competent court (maximum limit)

Sec 283 of the Act authorises government to appoint officers of the local government as Inspectors to enforce the provisions of the Act, as per Fifteenth Schedule, including offences relating to SWM.

Serial	Offence	First stage administrative penalty	Administrative penalty by enforcement officer	Imprisonment or fine to be imposed upon a person on conviction by a competent court (maximum limit)
(23)	Dumping of solid waste and refuse by any person or entity on a place other than landfill or dumping site, notified or designated by the concerned local government.	Rupees three thousand	Rupees five thousand to fifteen thousand	Imprisonment of seven days, or fine of rupees two hundred thousand or both

The Act also authorises Municipal Corporations to charge fees for the provision of services, including SWM (referred to as a conservancy fee) under the Tenth Schedule, part I (f).



Tenth Schedule
(see section 156)

Taxes, Fees, Rates and Tolls of Various Local Government

Part - I

Metropolitan Corporation, Municipal Corporations and Municipal Committees

(a) Tax on urban immovable property;
(b) Entertainment tax on dramatic and theatrical shows;
(c) Tax on the transfer of immovable property;
(d) Water rate;
(e) Drainage rate;
(f) Conservancy rate;
(g) Fee for approval of building plans, erection and re-erection of buildings;

2.5. Integrated Solid Waste Management

Waste is an inevitable product of society. Waste management practices have come a long way from those initially designed simply avoid adverse health effects, to managing waste in environmentally sustainable ways.

For an Integrated Waste Management System, there are two fundamental requirements: (i) that less waste is produced, and (ii) waste is managed as effectively as possible.[3] An Integrated Solid Waste Management (ISWM) system comprises five components: [4]

1. Generation and Storage at Source,
2. Primary and Secondary Collection,
3. Transportation,
4. Treatment, and
5. Disposal.

Table 2: Functional Elements of Waste Management System

Functional element	Description
1. Waste generation, handling and separation, storage and processing at the source	Waste generation encompasses those activities in which materials are identified as no longer being of value and are either thrown away or gathered together for disposal. Waste handling and separation involve the activities associated with managing wastes until they are placed in storage containers for collection. Handling includes the movement of loaded containers to the point of collection. Separation of waste components is an important step in handling and storage of solid waste at the source. On-site storage is of primary importance because of public health concerns and aesthetic considerations.
2. Collection	Collection includes both the gathering of solid waste and recyclable materials and the transport of these materials, after collection, to the location where the collection vehicle is emptied, such as a material- processing facility, a transfer station or a landfill.
3. Transfer & transport	The functional element of transfer and transport involves two steps: 1. The transfer of wastes from the smaller collection vehicle to the larger transport equipment, 2. The subsequent transport of the wastes, usually over long distance, to a processing or disposal site. The transfer usually takes place at a transfer station.
4. Separation, processing and transformation of solid waste	The means and facilities that are now used for the recovery of waste materials that have been separated at the source include curb side collection and drop off and buyback centres. The separation and processing of wastes that have been separated at the source and the separation of commingled wastes usually occur at material recovery facilities, transfer stations, combustion facilities and disposal sites. Transformation processes are used to reduce the volume and weight of waste requiring disposal and to recover conversion products and energy. The organic fraction of MSW can be transformed by a variety of chemical and biological processes. The most commonly used chemical transformation process is combustion used in conjunction with the recovery of energy. The most commonly used biological transformation process is biological transformation process is aerobic composting.
5. Disposal	Disposal by landfilling or land spreading is the ultimate disposal option of all solid waste whether they are residential wastes collected and transported directly to a landfill site, residual material from Material Recovery Facilities (MRFs), residue from the combustion of solid waste, compost, or other substances from various solid waste processing facilities.

[3] McDougall F. R., White P.R., Franke M., Hindle P. (2001) Integrated Waste Management: A life Cycle Inventory. 2nd Edn. UK: Procter & Gamble Technical Centres Limited
[4] Tchobanoglous. G et al, (2002), Handbook of Solid waste management, mcgraw Hills, Colorado

To evaluate and compare different municipal solid waste collection systems, various aspects are relevant - technical function, operating costs, information strategies, social codes and people's behaviour.[5]

Effective SWM systems are needed to ensure human health and safety. They must be safe for workers and safeguard public health by preventing the spread of disease. In addition to these prerequisites, an effective system of solid waste management must be both environmentally and economically sustainable.

- **Environmentally sustainable:** It must reduce, as much as possible, the environmental impacts of waste management.
- **Economically sustainable:** It must operate at a cost acceptable to community.

The challenge is to reduce the overall environmental impacts of the SWM system as far as possible, within an acceptable level of cost. An economically and environmentally sustainable SWM system is effective if it follows an integrated approach: i.e., it deals with all types of solid waste materials and all sources of solid waste.[6] A multi-material, multi-source management approach is usually more effective in environmental and economic terms than a material specific and source specific approach. Specific waste should be dealt with in such a system, but in separate streams.

2.6. Waste Management Options

SWM in cities of Pakistan has a lot of potential for improvement. There is however a need to carefully understand, evaluate and assess the factors that determine sustainability. This needs to be done at the local level. An effective waste management system should be based one or more of the following options:

Waste collection and transportation using the most efficient equipment and vehicles, optimum route planning and zoning as per land use & urban design.
Resource recovery through sorting and recycling i.e., recovery of materials (such as paper, glass, metals) etc. through separation, either at source or post collection, depending upon the overall system, citizens' cooperation and cost efficiency.
Resource recovery through waste processing i.e., recovery of materials (such as compost) or recovery of energy through biological, thermal or other processes.
Waste transformation (without recovery of resources) i.e., reduction of volume, toxicity or other physical/chemical properties of waste to make it suitable for final disposal.
Disposal on land i.e., environmentally safe and sustainable disposal in landfill.

MC-Kasur does not have reliable solid waste composition and generation data, as Waste Analysis & Characterization Studies (WACS) for the city have not been undertaken in the recent past. However, as the demographics and socio-economic characteristics of MC-Kasur are similar to other cities in the province, relevant data from other cities can be used as a proxy.

2.7. Urban planning and waste management

SWM is linked to the quality of urban design and planning ('good engineering - good cleanliness', bad engineering - bad cleanliness'). In most cities in Punjab, urban plans often fail to adequately address SWM needs. In many areas urban planning is reactive rather than proactive, with urban plans devised by urban authorities lagging far behind the needs of growth and development. Even when urban plans incorporate SWM needs, they are poorly implemented and are often overtaken by changes in the situation on the ground. Kasur city is an example of these challenges.

[5] Berg, P.E.O., 1993. Source separation - Theory, Methodology and Implementation. Doctoral thesis. Sweden
[6] Marshall R. E., Farahbakhsh K. (2013) 'Systems Approaches to Integrated Solid Waste Management in Developing Countries' Waste Management 33(4) Available at: DOI: 10.1016/j.wasman.2012.12.023

CHAPTER 3

THE CURRENT SYSTEM OF WASTE MANAGEMENT

3.1. MC-Kasur, City Profile

Kasur City is the district head quarter of Kasur District situated in the south of Lahore. The word Kasur comes from the Arabic word Qasr, meaning "palace". The city has an estimated population of 400,000 (2017 census). The 'urban area' defined by the 2017 census only covers the area within the boundaries of MC-Kasur. However the city has been growing in all directions (Figure 1), with urban areas now established beyond the MC limits. For the purposes of SWM planning, these areas also need to be considered as part of the city.

Land use in MC-Kasur is undefined and haphazard, with expansion that has taken place in an unplanned and fragmented manner. The internal road pattern in residential areas is irregular, making planned waste collection a challenge. Streets are narrow, and congested, especially in the old city areas.

Commercial activity is present along the main roads, with the circular road the hub of commercial activity. As a result of its haphazard development, land use across most areas is mixed between commercial, offices, public buildings, and residential use, especially in the central part of town. This creates a challenge for the design and operation of an effective SWM systems.

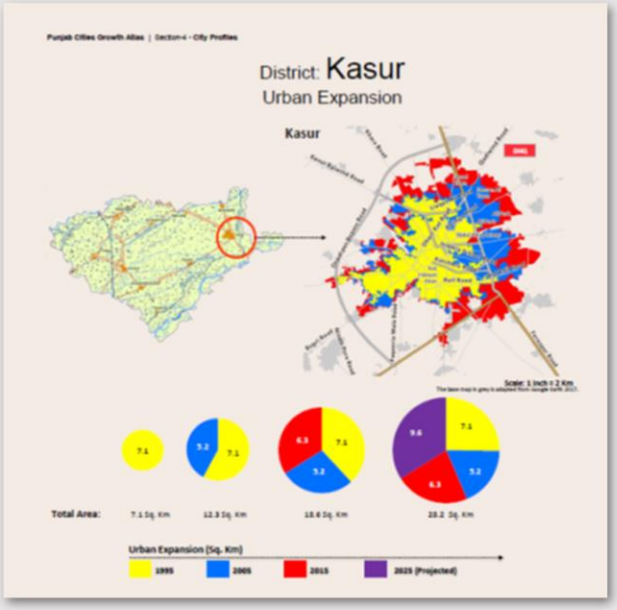


Figure 1: Growth Pattern of MC-Kasur over the last 20 years

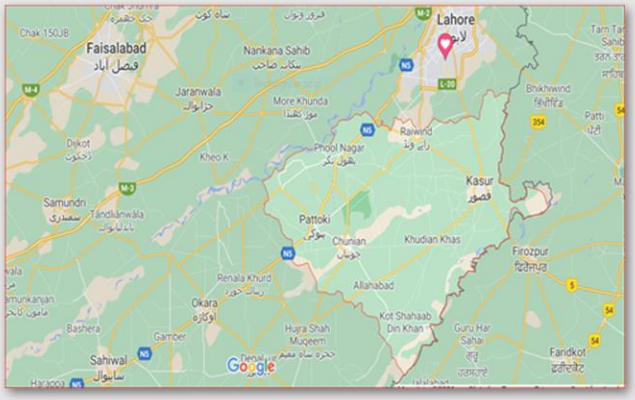


Figure 2: District Kasur, regional connectivity (relevant for proposing Regional Landfill Sites)

The city's Master Plan[7] (1995-2020), describes the city's SWM system, which remains similar today. Twenty-five years ago, the city had just 5 tractor trollies and 35 donkey driven carts for waste management. There were no collection facilities (then referred to as 'filth depots') and no specified dumping site.

[7] Kasur Master Plan 1995-2020; Directorate of Physical Planning and Housing, Government of the Punjab.

Box 1: Assessment of Solid Waste Management (Master Plan 1995-2020)

SOLID WASTE DISPOSAL.

The refuse collection and disposal in Kasur is quite unsatisfactory. The municipal Committee, Kasur is equipped with only five tractors and thirty five animal drivens (Donkey) Carts. No truck is available for the rapid collection and disposal of the solid waste. The total staff engaged in sanitation branch of Municipal Committee is 335 persons.

The quantity of waste is approximately 300 tons per day, out of which only 100 tons is collected and disposed off properly and the remaining 200 tons is dumped in front of houses or in the street corners as there is not a single filth depot in the City. The solid waste collected by the Municipal Committee is finally disposed off in Rohi Nallah at different points on Shahbaz Khan Road, Rod Kot and Ferozepur Road. There is a need to build filth depots in different areas of the City from where the solid waste is properly collected and disposed off.

As per the master plan, the recommendation was to carry waste in covered trucks, build collection points in the city, to have a designated dumping site and recruit appropriate technical staff. However, little progress has been made over the last twenty five years. (Box 2).

Box 2:Recommendations of the City's Master Plan (1995-2020)

3. SOLID WASTE DISPOSAL

Solid wastes both from residential areas and tanneries are disposed off at various locations in the City and Rohi Nullah. It is estimated that the total quantities to be disposed off are 300 tons per day, out of which only one 100 tons is treated and disposed off properly and the remaining is lying in the streets and roads of the City. In order to improve the sanitary conditions following proposals are made:

1. Permanent filth depots should be constructed at appropriate locations from where the Municipal Committee's vehicles should collect waste and dispose it off to a fixed dumping ground.
2. Municipal Committee should be equipped with motorized vehicles i.e. Trucks for the rapid collection and disposal of the solid waste.
3. The transportation of the solid waste should be done by covered vehicles.
4. The solid waste of whole of the City is proposed to be disposed off to a site away from the City to avoid atmospheric pollution of the City.
5. Number of vehicles and technical staff in the Municipal Committee Kasur should be increased for the efficient collection and disposal of the solid waste.

In 2008, another study was conducted by the Punjab Municipal Fund Development Company, under a World Bank funded project. According to this study, the city collected only an estimated 30% of the waste generated in the city. The target set by the project was to collect 50% of the waste generated, using an additional 8 tractor trollies. Some of the equipment recommended under this study was provided to the municipality, but as expected, the improvement did not bring any significant change, and there was little follow up on the long term plan.

3.2. Waste generation, collection, and disposal

MC-Kasur is responsible for SWM within its limits. However, it faces challenges in delivering on this responsibility. A tour of the city and a preliminary meeting with relevant officials reveals that the MC-Kasur is unable to fulfil its duty to ensure environmentally sound and sustainable ways of dealing with waste collection, transport, treatment and disposal. Waste is found littered along many roads and in open plots. Collected waste is neither treated nor disposed off properly, either in a landfill site or a treatment facility - it is just dumped at the disposal site.

3.2.1 Waste Generation

The city comprises 11 union councils, each of which has different waste generation characteristics. Since there is no recent Waste Analysis and Characterisation Study (WACS) available for MC-Kasur, we have drawn on data a 2016 study of Sahiwal, which has similar socio-economic characteristics to Kasur (Table 3). It is assumed with reasonable confidence that the data is close to what the findings for Kasur would be.

With average per capita waste generation of 0.45 Kg / capita / day, the estimated daily waste generation for the city is 180-200 tonnes per day. of this, approximately 10% is recyclables and 60% organic waste - both of which can be processed, instead of open dumping or disposal in landfill.

Table 3: Waste Analysis and Characterization Study Sahiwal [8]

Waste Analysis and Characterization Study Sahiwal (2016)				
Component	**High Income**	**Middle Income**	**Low Income**	**Average**
Waste generation /capita (Kg)	0.57	0.47	0.31	0.45
Specific Gravity (Kg / cu M)	260	244	217	240
Moisture Content (%)	63	67	56	62
Carbon & Nitrogen Ratio (%)	53	60	50	55
Combustible Organic Waste (%)	n/a	n/a	n/a	57
Gross Calorific Value (kCal/kg)	4,545	3,500	3,594	3,544
Recyclables (%)	n/a	n/a	n/a	9
Refuse Derived fuel (RDF) (%)	n/a	n/a	n/a	12
Earth fill (%)	n/a	n/a	n/a	20
Disposables (%)	n/a	n/a	n/a	1%

[8] Waste Amount and characterization study, Sahiwal; The Urban Unit; 2016

Municipal Waste: Most municipal waste in Kasur is generated in residential and commercial establishments. In a well-managed system, there needs to be an arrangement for storge of waste at the site of generation prior to collection, which in Pakistan is usually once a day. In an advanced system, waste will be segregated at source, usually into recyclables and organic.

In Kasur households usually keep their waste in the house, but most commercial waste is thrown into the streets, throughout the day. The same applies to waste generated by shoppers and pedestrians, causing indiscriminate littering. Waste is thrown, not only into the streets, but into any place outside the home or shop, including drains, open spaces, water bodies. The assumption is that municipality workers will remove this waste. Since such waste is primarily biodegradable, it starts decomposing fast, especially in summer and becomes a nuisance, attracting rodents and animals.

Waste Segregation: There is an informal system of segregation at source, whereby households separate newspapers, empty tins, plastic bottles, glass, and even old shoes and clothes, for sale to itinerant scrap / waste buyers who roam the streets, reselling to kabbariyas for use by industry.

Scavengers: Data on waste scavengers in Kasur is not available. However, studies in Karachi and Lahore show that scavengers are often young children, who pick discarded recyclables from the streets, bins and even from the dumpsites, segregate these components and sell them to a dealer for a small price to earn a living. They usually start early in the morning before the municipality workers come for collection.

Construction and Demolition Waste: Such waste is generated during repair, maintenance, and construction activities. It includes bricks, stones, tiles, cement, wood etc. It is not usually stored within the premises, but disposed of at the nearest public place on a daily basis. It is the responsibility of the contractor to transport and dispose of this waste at an official disposal point. However, the common practice in Kasur is for it to be mixed with garbage, for collection by the municipality.

Industrial Waste: There are several small and medium sized industries in the city, especially leather tanneries. Waste includes both hazardous and non-hazardous content. Waste from small industrial units located in mixed residential areas is often disposed of and collected with residential waste. Waste form large industrial units is disposed of separately.

Figure 3: Mixed Waste including some from Industries (leather scrap)

Healthcare Waste: Waste generated by hospitals, clinics and medical laboratories is not the responsibility of the Municipal Corporation. Healthcare waste is managed by the health department, under the Healthcare Waste Management Rules 2005. However, waste from smaller units does find its way into dumping sites. This practice poses serious health risks to sanitary workers and scavengers.

3.2.2 Waste collection

Most of the city is ill planned with narrow winding streets, suitable only for handcart waste collection. Secondary waste storage happens at road junctions, where waste from containers is collected by trucks (Figure 4).

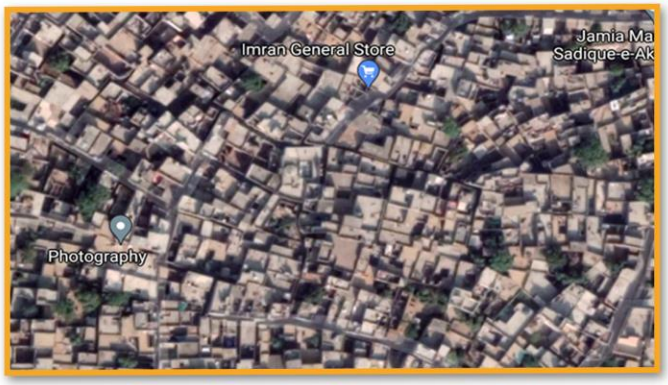


Figure 4: Overview of the narrow city streets

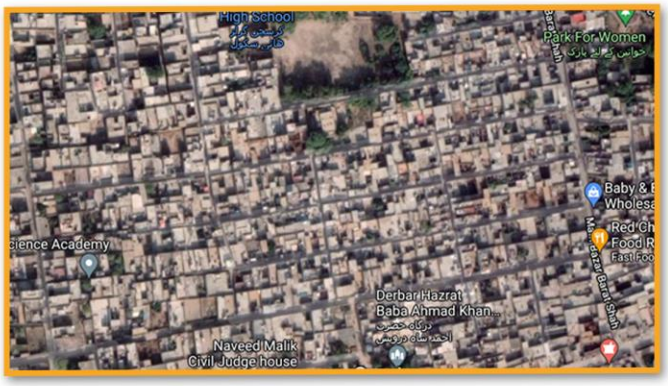


Figure 5: Kasur - new developments

Some new developments in Kasur have wider and straighter streets, suitable for waste collection by small vehicles (motorcycle rickshaw or mini-tippers) (Figure 5).

Sludge from open drains is cleaned but left on the roadside for drying. Much of it goes back into the drains, or is scattered. Little is collected as this takes places 2-3 days

Figure 6: Sludge from drain cleaning

Figure 7: Solid waste dumped in vacant plots

Figure 8: Waste dumped near (but not in) metal containers

3.2.3 Waste Transfer and Transport

The SWM department of MC-Kasur operates old-fashioned tractor trollies and hand carts. These vehicles are old (over ten years), and neither sufficient nor suitable for urban waste management (Table 4).

Sr #	Machinery / Vehicle	Reg No	Allocated UC
1	Tractor	260/1	UC 06
2	Tractor	260/2	UC 07
3	Tractor	260/3	UC 09
4	Tractor	260/4	UC 03
5	Tractor	260/5	UC 08
6	Mechanical Sweeper	260/6	Ferozepur Rd
7	Bucket no 2	375/2	Kot Murad Khan
8	Bucket Trala	385/2	Trala attached
9	Bucket #3 $ wheeler	385/4	DHQ Route
10	Bucket Trala	385 /5	Attached to Trala
11	Blade Rented #2	385/6	Kasur City
12	Tractor	385/ P1	UC 11
13	Tractor	375/1	UC 10
14	Bucket no 1	385/1	Repair
15	Tractor	640/2	U 01
16	Tractor	640/3	Repair
17	Tractor	640/4	UC no 02
18	Tractor	640/5	UC 05
19	Tractor	240/2	UC 04
20	Tractor	240/1005	Park
21	Tractor	340 NH-1	Encroachments
22	Tractor	640 Fiat	Park/repair
23	Tractor	265 MF	Park / repair
24	Generator	-	Office use
26	Mechanical Sweeper	NA	Main Ferozepur Road
27	Water Bouser	NA	Functional
28	Water Bouser	NA	Non-functional
29	Trollies (15)	-	Functional
30	Containers (15)	-	Functional
31	Lifter		Functional

Table 4: SWM vehicles and machinery, MC-Kasur

MC-Kasur has only 13 tractor trollies currently operational, for the transport of an estimated 200 tonnes per day to the dumping site (av. 0.45 kg waste per capita x population of 400,000). A tractor trolly has the carrying capacity of up to 3.5 tonnes per trip. Even if all 13 trollies make the scheduled 3 trips to the dumping site, there is still a deficit of 45 tonnes per day (25%). This waste is scattered in the streets, dumped in open plots, and gets into open drains, compromising the efficiency of the drainage system.

A tractor trolly with two labourers loading waste from a number of collection points, takes up to 3 hours for a round trip to the dump site and back. Hence, in practice, it is unlikely that these trollies make three trips on a daily basis. If they make 1-2 trips per day, actual capacity is less than 40% of need.

Type of vehicles	Number of vehicles	Est Waste / Trip	Number of Trips	Total / day
Tractor trolly	13	3.5 tons	3	136 tons

Table 5: Vehicle's capacity of waste lifting and transport at SWM MCK

A number of condemned or non-operational waste collection vehicles were found occupying parking spaces (Figure 9).

Figure 9: Condemned waste collection vehicles

The weakness of the system lies in the management of transport fleet. The usual practice is for the vehicle manager to issue a fixed daily quota of diesel to each vehicle, based on an estimated 3 trips requirement. Any diesel saved by cutting trips, is a potential saving for the driver and his team. With no weigh bridge to measure vehicle loads, or trackers to monitor number of trips, there is no reliable record of performance.

3.2.4 Waste Disposal

There is no proper landfill site for waste disposal. The municipality uses an open area on unused plots of the Kasur Tanneries Wastewater Treatment Plant. The site is an abandoned railway line, that linked Pakistan and India, but closed after the 1965 war (Figure 11).

The management of the plant are not happy with the dumping of waste in the proximity of their lagoons. The dumping site is approximately 5 km from the main city, but a reasonable distance away from the nearest residential areas. As a matter of principle, a waste disposal site should be at least half a kilometre away from the nearest habitation.

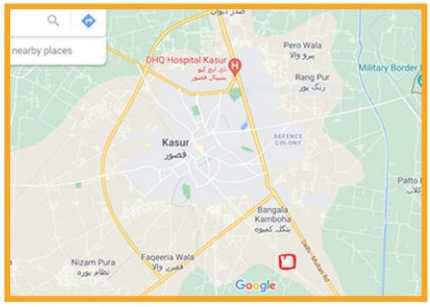


Figure 10: Existing waste disposal site

Figure 11: Site of new proposed disposal site - 15 km out of town and on prime agriculture land

The team were shown an area of land proposed by the revenue department as the new dumping site. The proposed site is 15 km out of town on prime agricultural land, making it unsuitable as a waste disposal site.
It is recommended that the municipality continue to use the current KWWTP site, but maintain it properly as a managed dumping ground, while a more suitable long-term solution is found.

3.3. Human Resources

Human resources are the key to a successful and efficient waste management system, and usually the most cost intensive component. This is often the greatest challenge faced by municipalities in Pakistan. This has followed an incremental approach, where the focus has been on adding more sanitary workers (manpower) and less on modernising the system or adding more professional staff (brainpower). As shown in Tables 6 and 7, out of 504 sanctioned SWM posts, only 453 are filled.

SWM staff Municipal Corporation Kasur			
Total sanctioned posts	**Filled**	**Vacant**	**Remarks**
504	453	51	
Source: Municipal Corporation Kasur July, 2021			

Table 6: SWM Staff at MC-Kasur

Sr #	Designation	Pay Scale	Posts	Regular	Vacant
1	Head Clerk* (San)	16	1	1	-
2	Clerk (sanitation)	11	1	1	-
3	Computer Operator	12	1	1	-
4	Naib Qasid	3	1	1	
5	Sr Sanitary Inspector	11	1	-	1
6	Sanitary Inspector	6	1		1
7	Sanitary Supervisor	5/6	12	9	3
8	Vaccinator	5	1	1	-
9	Naib Darogha Malaria	4	1	1	-
10	Quli Malaria	3	3	3	-
11	Tractor Driver	4	23	10	13
12	Bahishti	1/2/3	30	25	5
13	Sanitary Workers	1/2/3	418	386	32
14	Sewer man	1/2/3	10	7	3
	Total HR	**-**	**504**	**453**	**51**
**** Post vacant - additional charge is with HC Pension***					

Table 7: Human resources for SWM at MC-Kasur

The provision for sanitary workers (418) for a population of 400,000 is adequate (a ratio of 1 worker for 1,000 residents). However, little training is provided to these staff, and no personal protection equipment provided. Mostly wear ordinary open slippers or sandals, no masks or gloves (Figure 12). The only gear provided is a cap and a jacket, but mostly these are not worn.
As a minimum standard, personal protective equipment's (PPE) should include a proper uniform with a reflector jacket / logo, gloves, mask, proper shoes, and long boots and raincoat for use in the wet season. Operational equipment sanitary workers includes: a broom, shovel, wheelie bin, waste bags, scrapper and hand cart.[9]

In Kasur, there are 12 sanitary supervisors, each managing 35-40 workers. This supervisory ratio is a little higher than the usual practice. In Islamabad, for example, a sanitary supervisor, supported by two mates manages 30 workers (15 workers per mate).[10] The Sanitary Supervisor is BPS 8, while mate is a BPS 3 employee, and the worker is in BPS 1 or 2.

Figure 12: Sanitary works – wearing open chappals and operating a broken wheelbarrow

3.4. Financial assessment

Annual expenditure by MC-Kasur on SWM services is shown in Table 8. Total expenditure for 2020-21 was PKR 140m per year, equivalent to PKR 350 per head of population (400,000 population). This is low relative to other cities in Pakistan and the region. Lahore spends approximately 1,000 PKR per head per year, almost three times that of MC-Kasur. The low level of expenditure in MC-Kasur is evident when considering the quality of machinery and service delivery.

Head	Per Month	Per Year
Salaries	9,834	118,010
POL	1,300	15,600
Repair & maintenance	500	6,000
Total	**11,634**	**139,610**

Table 8: MC-Kasur expenditure on SWM (2020-21)

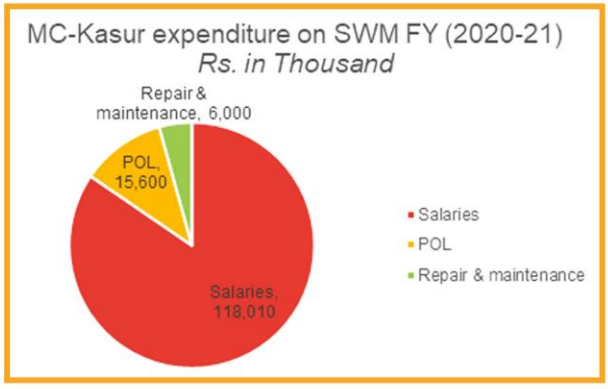


Figure 13: Share of expenditure on SWM by MC-Kasur, 2020-21

[9] As per OZPAK SOPs, in LWMC contract.
[10] https://www.cda.gov.pk/documents/docs/sop-sanitation.pdf

An institutional weakness of SWM system is the mismatch between responsibility for SWM waste management and authority over the resources required to provide the service. Local Governments in Punjab are working without elected councils, and most development funding is provided by the provincial government. MCs therefore have little discretion in the use of development funding to improve SWM systems.

Urban residents are also not as enthusiastic about financing SWM as they are for other services, such as water supply and electricity. This presents a further challenge to improving SWM services.

In 2001, MC-Lahore was the first entity to levy and collect a fee for waste services. In 2019-20, MC-Kasur levied a sanitation fee (Safai tax - notification is annexed) of Rs 100 per household or shop. However, in 2020-21, a total of only Rs 11,300 was collected under this tax – i.e. few people paid the tax. It is expected with the passage of time that households and commercial entities will accept this charge.

3.5. Monitoring & Evaluation

Any complex system, involving hundreds of workers, dozens of vehicles, operating at city level, needs to a robust monitoring system and mechanisms for quality assurance. In MC-Kasur the current system, is manual and based largely on trust. For example:

- ***Sanitary worker attendance*** is taken in the morning and sometimes during the second shift. After morning attendance, workers spread to their respective beats and a supervisor or inspector occasionally checks their presence. With a supervisory span of 1:40, this is a significant task. In many countries, sanitary worker delinquency (including cleaning private houses or collecting waste in return for a fee) is not uncommon.[11] This often happens in connivance with the supervisory staff. There is hardly any mechanism with the senior officers (Inspectors or Chief Officer) to manage such delinquency.

- ***Fuel for vehicles:*** Drivers are provided a fixed quota of diesel on a daily basis, sufficient for three trips to the dump site. There are no vehicle trackers. The system works on manual records and trust. The practice of pilferage of diesel is common in most cities.

3.6. Information, Communication and Community Participation

The team interviewed a small number of households and shop keepers. Currently there is no formal or institutional mechanism for citizen engagement, community mobilisation or public awareness. This is a weakness of the system. No city can be kept clean without community awareness and participation – for depositing waste at a given time and place, and waste segregation at source, avoidance of littering on the streets, and paying of user-charges.

A team of social mobilisers is needed to implement a long-term (at least two years) programme of educating people on community waste management. In areas where door to door collection is implemented, there is a need to educate each household on the system and importance of cooperation.

[11] Pius Gumisiriza, Sylvester Kugonza, "Corruption and Solid Waste Management in Mbarara Municipality, Uganda", Journal of Environmental and Public Health, vol. 2020, Article ID 4754780, 10 pages, 2020. https://doi.org/10.1155/2020/4754780

CHAPTER 4

NEEDS ASSESSMENT – GAPS AND REQUIREMENTS

This section sets out gaps in the existing SWM system, and proposals for an Integrated Solid Waste Management system for Kasur. This not only includes technical needs, such as equipment machinery and landfill sites, but also resources for infrastructure and operations, and legal and institutional reforms.

4.1Data

A comprehensive dataset covering all aspects of SWM is required ('what can't be measured, can't be managed'). Lack of SWM data is a major hindrance for effective SWM in Pakistan. Data and analysis is required on the following aspects of the system:

• **Basic data** of the city, including population, land uses and categories of housing, operational zoning and maps.

• **Technical data** on the SWM system, including waste generation by type, waste storage, collection, transport and disposal methods. Data is also needed to enable effective management of waste vehicles – the type and number of vehicles required, optimum route planning, and proper maintenance.

• **Financial data** - both expenditures and revenues. SWM is typically the most significant expenditure for most municipalities. Major heads of expense include salaries and fuel for vehicles. In both these heads, even a five to ten percent saving means millions of rupees. In the absence of reliable data, achieving such efficiencies is not possible.

• **Human resource** details including current human resource deployed for SWM services and the required staff to meet an acceptable level of service. This also includes geographical allocation of labour.

• **Citizen feedback** - SWM is a service where quality is strongly linked with community participation. A GIS based mapping of complaints will provide a useful tool for continuous improvement of the system. Baseline data and continuous updating of the data is critical to the success of an efficient and sustainable SWM system. There is a need to carry out a Waste Analysis and Characterization Study (WACS) for Kasur.[12] This would provide the data required to design an effective Integrated Solid Waste Management (ISWM).

The WACS study provides only one time data, while actual data on collection, gathered and analyzed over a period of time (may be 2-3 years) provides data that would be not only reliable, but covers the seasonal variations etc. MC-Kasur needs to invest in simple digital systems, covering data on waste generation by different sources (residential, commercial), waste generation by geographic area, GIS-based mapping of the city, and digital vehicle trackers.

[12] (For example) Suggested Citation: EcoGov Project 2011. Waste Analysis and Characterization Study – A Manual. Philippine Environmental Governance Project, Pasig City, Philippines.

4.2 Institutional Framework

There is no department at the provincial level for solid waste management. The subject is managed by the Local Government Department, which is a general administrative department for all functions of the Local Councils. For SWM services to be delivered effectively it requires a dedicated department at the provincial level, ideally part of the Public Health Engineering Department, with two wings - one dealing with water and liquid waste (wastewater) and the other for solid waste.

4.2.1. System re-design

The current SWM system has been developed incrementally over time. There has never been a comprehensive system design for ISWM in MC-Kasur. An attempt was made by the Punjab Municipal Development Fund Company (PMDFC) in 2008, but the proposal was mostly focussed on purchasing equipment, rather than improving SWM systems.

The SWM system needs to be reviewed, covering all steps from waste generation to final disposal. The design needs to define the boundaries of the SWM system from geographical area to type of waste material to be covered. For example, whether construction and demolition material, or medical and industrial waste will be the responsibility of MC-Kasur.

Implementing a new ISWM system cannot be achieved in one go, or in a short period of time. A phased approach is required, covering some steps in each phase, but based on a long-term vision – for example, through a 10-year Master Pan.

Under a phased approach, ***Phase I*** should focus on improved collection and transport, and the establishment of a managed waste dump away from the city. Phase II should establish a proper dumping facility, preferably an engineered landfill site, where the waste is compacted and covered with soil on a regular basis and there are arrangements for managing the leachate as well as the landfill gases. This will ensure that the dumping is less hazardous to the environment and public health. This could be in a regional landfill site, or a city-specific site, based on studies that need to be conducted. In Phase III, the focus should be on waste treatment options, such as conversion of waste to energy, biogas production, refuse derived fuel (RDF) production, composting, and recycling.

4.2.2. Legal and regulatory framework

Institutional and governance arrangements also need to be reviewed and strengthened. The existing institutional and legal framework is insufficient, with just a few lines in the Punjab Local Government Act on environmental protection. Comparison with other developing countries (India, Philippines, Malaysia, South Africa) shows more developed and detailed SWM laws, rules, and regulations.[13] Though not possible at the city level, a more detailed overarching legal and regulatory framework is required.

[13] https://www.ecolex.org/details/legislation/ecological-solid-waste-management-act-no-9003-of-2000-lex-faoc045260/
https://www.ecolex.org/details/legislation/solid-waste-and-public-cleansing-management-act-2007-lex-faoc074261/
https://bbmp.gov.in/documents/SWM-Rules-2016.pdf

4.3Waste collection and storage

4.3.1. Waste Transport Equipment

Depending upon the final details of system design set out in the MC-Kasur waste management Master Plan, additional equipment is required to meet demand for waste collection from residential and commercial areas. In residential areas that have wide enough streets, vehicles such as the one tonne capacity Suzuki / FAW van can be used. However, in other areas where streets are narrow (such as the old city) hand carts are required, preferably with baskets or buckets, so that waste can be directly loaded from the handcart into secondary collection vehicles or containers. The current design of handcart is unsuitable, and designed for construction material which has higher density compared to residential waste. Currently sanitary workers raise the sidewalls of the carts with carboard to enhance capacity, and then dump waste on ground before lifting it into secondary containers or vehicles. If the handcart has baskets or buckets, these can be easily picked and emptied into vehicles/containers.

Estimated Equipment & Vehicles Required for MCK*		
Primary Collection		
Vehicles / Equipment	**Number**	**Remarks**
Handcarts	200 - 250	Assuming 50% of Kasur has narrow streets and vehicles can't go inside
Mini Tippers of 1 cu M capacity	50-60	For door-to-door collection from 30,000 households
Secondary Collection & Transport		
Containers 5-10 cu m	50-75	Size and number to be assessed on survey and data
Arm Roll Vehicles	8 -10	Size and number depend on more detailed data
Tractors with Bucket	5	For filling of containers and debris and heavy waste
Dump Trucks 5-10 Tons	4	For lifting of heavy waste, and debris etc Assuming 30 Tons is heavy waste
Tractor Trollies	3	For Cow dung and silt clearance
Dumping Site		
Tractors with blade	2	For spreading of waste
Wheel Loader	1	Spreading and levelling
tractor loader & Dump Trucks	1+2	For Soil cover on regular basis
Note:** Figures above are initial **estimates. A proper master plan and system design** is **required for accurate estimates of the requirements.		
Calculated for a population of 400,000** (60,000 h/h), **and based on door-to door collection		

Table 9: Cost estimate for SWM equipment required for MC-Kasur (2020-21)

Prior to bulk transport, the current system of waste collection comprises two steps. The first is in streets, where waste is heaped temporarily until it is collected by sanitary workers. The second is waste stored at secondary collection points - open heaps by the road, or in old metal containers or makeshift brick structures. Waste collected by sanitary workers is dumped in these secondary collection points. These points are then cleared by tractor trollies, using manual labour. The tractor trollies are old and outdated. A waste collection vehicle's efficiency is dependent upon the time it takes for loading / unloading and the speed of travel. The tractor trolly fares badly on both counts, and is unsuitable for urban waste as it is uncovered, causing littering on the road surface. This is a nuisance for other traffic, especially during rush hours.

The fleet of waste collection vehicles needs to be replaced with more efficient and suitable vehicles. Large waste collection vehicles with compactors are not suitable for Kasur. Instead, container-based trucks, commonly known as Arm Roll vehicles, should be considered. These vehicles are used to transport metal waste containers, ranging in size from 5 cu M to 20 cu M. Considering the size of Kasur city streets and roads, a combination of vehicles with 5 & 10 cu M containers would be suitable. Once detailed data is available and master planning has been done, the exact number and specifications of the vehicles can be estimated.

For the collection of construction and demolition waste, there is a need to have either loader and dump trucks, or special vehicles with containers designed for high density waste.

At the outskirts of the city are many domestic animals. There is a need to develop and maintain a fleet of tractor trollies, to manage this animal waste for organic manure, rather than taking it to the dumpsite or choking the drains.

For cleaning main roads and highways, vacuum sweepers will add value to the city's cleaning operations. Currently, workers manually lift the waste in a cloth (tarpal) and then 'throw' it into a trolley (Fig. 14).

Figure 14: Workers manually lifting and throwing the street waste in a tarpal

4.3.2. Disposal Site

The current waste disposal site belongs to the wastewater treatment plant for the tanneries. There are functioning lagoons for the treatment of wastewater. However, some land not utilised for wastewater is being used for the dumping of untreated municipal solid waste. A single tractor is used to spread the waste. The waste Master Plan requires specialised equipment for waste compaction and covering with soil, as well as for leachate and gas collection.

The current site is temporary. Whole a new site has been identified by the district revenue department, this is not considered suitable due to the distance from the city and the fact that it uses prime agricultural land.

4.4 Human Resources

There are around 400 sanitary workers in MC-Kasur. This is adequate, based on an accepted norm of one sanitary worker / 1,000 citizens.[14] However, the system within which these staff operate needs to be updated.

Sanitary workers in Kasur are as 'skilled and efficient' as anywhere else in municipalities in Pakistan. They use the most basic system of waste collection, i.e., manual street sweeping and lifting waste into containers and vehicles. They have basic tools, such as brooms, spades, and cloth sheets (tarpal).

Interviews with residents and some workers indicate that some municipality workers collect waste from houses in exchange for a fee (100 to 300 rupees per month, per household). With one supervisors managing 40 workers, there is no effective mechanism to ensure accountability or deliver disciplinary action. This is an inherent weakness in the system.

Numbers of managerial, technical, and engineering staff are not sufficient for a modern ISWM serving a city of half a million people. A professional framework for municipal waste management requires:

- Environmental engineer (there are hardly any SWM engineers in Pakistan) to manage the team.
- A landfill site manager (preferably an environmental engineer).
- Field Engineers to monitor and run the system (trained in SWM).
- ITC managers and a team to monitor the workforce and track vehicles.
- A finance manager person to ensure cost efficiency.
- A mechanical engineer to manage fleet of vehicles.
- Supervisory staff, (ratio of 1:15).
- A communications manager for citizen engagement.

Labour requirements can be reduced significantly with mechanisation, leaving more technical and professional resources available for management.

[14] Improving Municipal Solid Waste Management in India; A Sourcebook for Policy Makers and PRACTITIONERS; DA Zhu et al; World Bank; 2008

4.5 Social Assessment

4.5.1. Community Level

Waste management is a dynamic sector and even the best effort lasts for only twenty-four hours, as new waste is generated continuously. This has an impact on public health, especially during the wet season and summer when waste decomposition happens rapidly. Cooperation from the community is essential, which requires civic education and continuous lobbying.

4.5.2. Sanitary Workers

Waste service jobs are amongst the toughest and most dangerous professions. Waste workers keep communities and the environment safe and clean, and recover materials to everyone's benefit, often putting their own physical and mental health at stake. Daily risks include accidental cuts, biological and medical waste contamination, poisoning by chemical substances and heavy metals, bites from animals and insects, and ergonomic and musculoskeletal injuries. Fatal and invalidating accidents are not uncommon because of traffic, falls from the collection vehicles etc.

There is a need to review the working conditions of sanitary workers, including periodic medical examinations and provision of professional safety equipment, as well as mandatory staff trainings on personal safety.

4.5.3. Scavengers

There are many iterant waste pickers who make their living from picking recyclables from waste dumps and by selling these in the recycling market. They contribute to the waste management cycle by supporting the recycling industry and by reducing the waste going to the landfill site.

However, they encourage waste to be dumped on the ground and not in containers. They also work in the informal sector under dangerous conditions, without any safety measures. In some Indian cities informal waste pickers have now been included in the formal system, under various NGOs and CBOs. This kind of model could be piloted for MC-Kasur, where primary collection is left to such associations, and the municipality is responsible only for lifting from collection points, public places, streets and roads. The household and commercial establishments usually contribute towards paying for the door-to-door collection to keep the area clean. This direct payment to the workers, also adds the accountability element to the service. One of the largest NGOs, 'Akhuwat' has a wide and established network in rural areas and could support this pilot.

CHAPTER 5

RECOMMENDATIONS

Based on this assessment, there is a need to plan for improving SWM in the City of Kasur. Measures to be considered include:

- **Improve the quality of SWM data**, especially carrying out a Waste Analysis and Characterization Study (WACS).

- **Undertake a GIS mapping of the city** to assess residential waste collection requirements by type of housing, type of streets etc. A similar survey needs to be carried out for commercial and industrial premises.

- **Undertake a similar process to map all the primary and secondary roads for street cleaning**. Some streets can be cleaned using vacuum sweepers, which are more cost effective than manual sweeping.

- **Undertake a waste generation assessment** – for specialised waste needs, for example, hospital waste, plastic waste, slaughterhouse waste, and electronic waste. Plastic and electronic waste are becoming serious problems for urban waste management systems.

- **Instead of managing waste collection by Union Council areas (designed for election purposes), establish SWM collection and transport zones**. These zones should be based developed in accordance to efficient transport routes to the disposal site.

- **Place litter bins in markets, commercial areas, and public places,** and ensure that they are regularly emptied.

- **Invest in suitable waste transport vehicles, for door-to-door waste collection.**

- **Invest in community awareness and participation** – this is a key element of a successful waste management system.

- **Establish a monitoring and complaints system** – to track waste collection vehicles and enable households register complaints, with a monitoring control room at the MC office.

- **Recruit more managerial and technical staff**, along with suitable and adequate equipment and vehicles to implement an ISWM for the city. A long-term SWM improvement programme is needed.

- **Over the medium term, focus on improving waste recycling.**

  o Inorganic recyclables should be collected separately or segregated post-collection and returned to the economy as raw materials. Inorganic recyclables that cannot be used as raw material can be converted into Refuse Derived Fuel for use in the cement industry.

  o Organic waste (approx. 60% of waste) can be used to produce biogas and compost.

  o Remaining and inert materials would still need landfill - but the requirement for land would be lower with lower minimum GHG emissions.

- **Make the system financially sustainable** - through a combination of sustained government funding and the introduction, where possible, of levies on waste collection, especially from waste producing businesses and industries.

No. SO Tax (LG) 1-7/17 (M.Corp Kasur)
Government of the Punjab
Local Govt. & Community Development Department

042-99212218

Dated Lahore, the 28 January, 2021

To

The Superintendent,
Government Printing Press,
Punjab, Lahore.

Subject: **VETTING OF TAX NOTIFICATION**

I am directed to enclose herewith notification bearing No.562-MCK dated 19.12.2020 regarding "Taxes" received from the Administrator, Municipal Corporation, Kasur duly signed by him for publication in the official gazette with the request to furnish three copies of the gazette Notification to this Department for official record on **top priority basis.**

(DAUD TOUQEER ALAM)
SECTION OFFICER (TAX)
28/1/21.

PC:

i. Chief Officer, Municipal Corporation, Kasur w/r to letter bearing No.563/MCK dated 19.12.2020 with the direction to coordinate with the Superintendent Government Printing Press, Punjab for publication of the gazette Notification on **priority basis** and also clear the requisite dues of the Printing Press.
ii. PSO to the Secretary, LG&CD Department.
iii. PA to Additional Secretary (LG), LG&CD Department.

بلدیہ مستحکم پنجاب مستحکم

از دفتر میونسپل کارپوریشن قصور (L.G No.14200)

(نوٹیفیکیشن)

نمبر 562-MCK تاریخ 19.12.20

میں بحیثیت ایڈمنسٹریٹر میونسپل کارپوریشن قصور بروئے اختیارات حاصل شدہ زیر دفعات 157,156 پنجاب لوکل گورنمنٹ ایکٹ 2019، پنجاب لوکل گورنمنٹس (ٹیکسیشن) رولز 2016 اور نوٹیفیکیشن نمبری SOR (LG)1-11/2019 مورخہ 07-11-2019 کے تحت بعد از تکمیل ضابطہ کارروائی، درج ذیل ٹیکسز کا نفاذ اندرون حدود میونسپل کارپوریشن قصور کے لیے منظور کرتا ہوں جس کا اطلاق تاریخ اشاعت سے ہوگا۔

1۔ واٹر ریٹ

(A) گھریلو (Domestic)

نمبر شمار	نام آئٹم	منظور شدہ شرح
(i)	قیمت فارم برائے کنکشن واٹر سپلائی ہر قسم	-/30 روپے
(ii)	کنکشن فیس (ناقابل واپسی)	-/1500 روپے
(iii)	ماہانہ بل واٹر سپلائی	-/300 روپے

(B) کمرشل (Comercial)

نمبر شمار	نام آئٹم	منظور شدہ شرح
(i)	دوکان، کلینک، سرکاری دفاتر، وینک۔	-/500 روپے
(ii)	حمام، آٹو، پاور لوم، حزینہ خانہ، پیٹرول پمپ	-/1000 روپے
(iii)	ریسٹورینٹ، ہوٹل، پرائیویٹ سکول، پرائیویٹ ہسپتال	-/2000 روپے
(iv)	سروس اسٹیشن	-/3500 روپے

1/3

ADMINISTRATOR
MUNICIPAL CORPORATION
KASUR

28/1/21.
SECTION OFFICER (TAX)
GOVT. OF THE PUNJAB
LG&CD DEPTT.

نوٹ:۔ [illegible] کی صورت میں ان ہدایات کے مطابق عمل درآمد کرتے ہوئے فیس ہائے کا تعین او وصولی عمل میں لائی جائیگی۔

(ix) بلڈنگ برائے پولٹری فارم، مویشی فارم، بھیڑ بکری اور ڈیری فارم پر بلڈنگ پلان فیس

نام آئٹم	منظور شدہ شرح (شیڈول ار یٹس)
(i) اوپن شیڈز	-/1 روپے فی مربع فٹ
(ii) کنٹرول شیڈز	-/2 روپے فی مربع فٹ
(iii) تعمیر ہال یا ہچریز، پروسسنگ اور بریڈنگ یونٹس اور رہائشی او دفتری جگہیں جو متعلقہ کام کے لیے استعمال ہوں	-/4 روپے فی مربع فٹ

نوٹ:۔ بقیہ او دیگر ایگریکلچر جگہوں / عمارتوں کی فیس انڈسٹریل بلڈنگ پلان فیس کے مطابق لاگو ہوں گی۔

3۔ **فیس برائے مخصوص خدمات (صفائی فیکس)**

نمبر شمار	نام آئٹم	منظور شدہ شرح (شیڈول ار یٹس)
(i)	فی دکان	-/100 روپے ماہوار
(ii)	فی گھرانہ	-/100 روپے ماہوار

3/3

ADMINISTRATOR
MUNICIPAL CORPORATION
KASUR

ایڈمنسٹریٹر
میونسپل کارپوریشن قصور

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CASE STUDY # 1

INTEGRATED RESOURCE RECOVERY CENTER ISLAMABAD (2012-21)

The Integrated Resource Recovery Centre (IRRC) is a joint initiative of Akhtar Hameed Khan Memorial Trust (AHKMT), an NGO working in solid waste management in the areas where, there is no formal institutional municipal solid waste management, UN-HABITAT and UN-ESCAPE.
The initiative is first of its nature in Pakistan and targets the reduction of severe impacts of inadequate municipal waste management on environment and achieving the UN Sustainable Development Goals for future clean and healthy environment.

The Challenge
In some of the sectors of Islamabad, developed by the private sector, there is no formal arrangement of municipal waste collection, transportation and disposal, but dumped on open areas along major roads, hidden open spaces and banks of water streams.

In localities outside the municipal area, the responsibility of infrastructure provision in the residential and commercial developments in zones 2 and 5 lies with the respective developers. However, the provision of municipal services including management of municipal solid waste is hardly found adequate or appropriate. The identified gap provided a space for intervention by a third sector for provision of effective solid waste management services in the form of an integrated resource recovery centre (IRRC), a Social Enterprise.

The project area is located in zone 2 of Islamabad, where housing schemes are to be planned and managed in a private setup. The project area is known as Khayaban-e-Kashmir, sector G-15, developed by Jammu and Kashmir Cooperative Society. In this settlement, there are around 4500 residential planned plots in addition to commercial plots and community facilities.

At the time of initiating around 2000 houses were constructed out of planned 4500 residential units and there is an increase of approximately 300 units annually as the settlement is in the phase of development.

Initially, there was no formal arrangement for collection and disposal of garbage other than 2/3 sweepers for occasional sweeping. The increased built housing units in due course of time, necessitated the provision of adequate municipal services and as a consequence of public pressure, the society management arranged garbage collection at the expenses of the households. This service was limited to irregular door-to-door waste collection, with no arrangement for regular cleaning of common areas and haphazard open-air waste disposal in the nearby open spaces.

The Solution
In order to fill this gap, the society management approached the AHKMT, and signed an agreement for door-to-door waste collection, safe transportation and disposal of the garbage at an affordable price in the year 2012. At the initial stage, there was agreement between the society management, the client and E-Guard, a subsidiary of AHKMT, the service provider for a period of three years, which has been extended for another term of six (6) years till 2021.

CASE STUDY # 1

INTEGRATED RESOURCE RECOVERY CENTER ISLAMABAD (2012-21)

The services provided include door-to-door municipal waste collection, segregation, waste transportation and its disposal at CDA designated waste disposal site and it does not include street sweeping and cleaning of open areas in the case project area. Charges for these services are Rs.250 per household.

Learning from the field experience of working with communities for handling the household waste, the establishment of Integrated Resource Recovery Centre (IRRC) at sector G-15 on 3R's strategy was agreed, for which land-measuring 800 square meters (1.5 kanals) was provided by the society management.

Establishment of IRRC at sector G-15 is first such an initiative of its kind in Pakistan and therefore, there were fears and doubts about its operation and sustainability, revolving around the issues like availability of land, fears of odor from the compost setup, approvals of the government such as EIA and financial viability issues on account of lower quantities of municipal waste attributed to less number of constructed housing units in the sector G-15.

Municipal Waste Collection

Municipal solid waste is collected by sanitary staff- and fleet of three lorries. The households in the project area are provided with two color bins, one for organic waste and one for other waste. The workers collect, segregate and process the waste.

The segregation of collected waste is undertaken at IRRC facility primarily into three categories such as organic/bio waste/green waste, recyclables and other waste. Organic waste is major component of collected waste that is about 60% which is processed at IRRC facility.

Processing of Organic Waste

After segregation, organic waste is collected in perforated boxes specifically designed for waste composting thus allowing easy access of oxygen and drainage of excess water. It also requires lesser space as compared to other composting techniques. There are 12 perforated composting boxes where the waste remains for 45–50 days prior to its transfer to maturing boxes. The waste is kept for another 15 days in mature boxes within controlled temperature, observed and noted carefully by the specialist staff. After this entire process, the dry compost is debased through a manual strainer drum and fine compost is packed for sale in the market after its quality testing by Arid Agriculture University Rawalpindi.

Leachate Management System

A considerable amount of wastewater is produced during the composting process and cleaning of the premises. This wastewater is stored in an underground tank instead of discharging into open drains. This wastewater is later on reused to maintain the moisture level in new piles and enrich the decomposition process by mixing it with fresh water, thus saving the ground water resources.

CASE STUDY # 1

INTEGRATED RESOURCE RECOVERY CENTER ISLAMABAD (2012-21)

Economic Benefits

Recovery of recyclables and conversion of organic component of municipal waste into compost results in diversion of large quantity of solid waste from landfill. Presently, out of total municipal waste collection of 5 tons in the project area, 60% organic component (3 tons) is converted into compost, 25% municipal waste in terms of recyclables (1.25 tons) are recovered and only 15% (0.75 tons) is transported to the waste disposal site. This situation results in long life of existing landfills, reduces the need of new landfill, saves the waste handling cost of this major portion and therefore, saves money in the long term.

Social Benefits

Establishment of IRRC from the stage of waste collection to sale of recyclables and fine compost creates employment opportunities as well. Currently, 12 people have been employed as manager, supervisor, coordinator, mali, security guard, sanitary worker, 2 e-guard workers, 3 drivers with three vehicles and one supervisor, with a safe working environment and a safe and secure livelihood.

Environmental Benefits

Environmental benefits of establishment of IRRC include reduction of greenhouse gas emission by treatment of organic fraction of waste; which can evade spread of bad odor, as well as formation of leachate water and spread of diseases in open dumps. According to IRRC management, IRRC is a tested model in various countries like Cambodia, Sri Lanka and Viet Nam. IRRC model is tested as pilot project in Islamabad and its replication is expected in other cities of Pakistan.

Sustainability of the IRCC Initiative

The financial sustainability of the initiative has been ensured through waste collection charges of Pak Rupee 250/= per household in G-15 sector, the area served by IRRC. Moreover, revenue is collected through sale of material recovered from recycling. The high quality natural manure that is produced from composting is sold to horticulturists and farmers. It also makes up one of the good revenue sources. Income generated from the above mentioned sources is sufficient enough to meet all the expenses to run the social business and make it financially sustainable.

The society management is satisfied with the improvement of municipal waste management in the scheme at a lower price and the reduced number of complaints from the residents regarding the door-to-door waste collection but worried about increasing number of complaints for inappropriate street sweeping. And the society management is working to broaden the scope of the project, adopting a total solution approach to address complete range of municipal waste management issues. According to the program manager of Akhtar Hameed Khan Memorial Trust (AHKMT), NGO custodian of IRRC operation, the initiative is a success story to the extent of its defined domain in terms of door-to-door waste collection, recovery of recyclables (25%), composting of organic waste (60%) and reduction of waste quantities transported to the waste disposal site in addition to economic, social and environmental benefits of Integrated Resource Recovery Centre (IRRC).

CASE STUDY # 1

INTEGRATED RESOURCE RECOVERY CENTER ISLAMABAD (2012-21)

Conclusion and Recommendations

High percentage of organic waste in Islamabad and availability of compost as a replacement of expensive chemical fertilizer makes the waste composting a cost effective and environment friendly option for sustainable solid waste management.

This model may be replicated with modified local arrangements with holistic approach to address the subject of municipal waste management, especially in the areas where there is no arrangement for provision of urban services in public sector. These areas are developments situated in the suburbs of Islamabad and planned, developed and to be maintained by private sector. Provision of urban services, including municipal waste management in these settlements is usually inadequate and inappropriate, so the residents are more vulnerable on account of non-existence of formal arrangement for provision of urban infrastructure and poor monitoring of the concerned authorities. This state of affairs creates space for social enterprise or third sector to perform at competitive costs ensuring provision of sustainable urban services and experiment resource generating models.

In order to fill this gap, IRRC model experimented in a settlement in private setup in the hand resource generating provision of urban services in the settlements around the city where there is no formal and regular provision of urban services or supplement the existing substandard urban services. However, the model Need to be modified taking into consideration the local situation in terms of institutional arrangement for provision of municipal services, availability of funds, institutional monitoring, existing arrangements and will for innovations. Necessary legislation should be made immediately, if is warranted to ensure cost effective and sustainable municipal waste management in the settlements at larger scale where there is no regular public service.

Replicability

A similar project for composting of organic waste has been initiated in the city of Mardan by AHKMT, which is still in its initial phase. In this project, composting is done on the waste collected by the Waster & Sanitation Services Company, Mardan, but segregated and processed by the project staff. The project caters for a maximum of 5 tons per day, while the city generates around 200 tons.

Lessons

The IRRC Islamabad and Mardan are success stories, but at a pilot scale. In Pakistan, there is hardly any example, where a similar project has been successful at a city level, even if for a small one.
The Model is a decentralized system of waste management. Adopting this model for a city like Kasur means we need around 20-25 such units, each requiring 1-2 kanals of land. The provision of this kind of land at appropriate places in an old and ill planned city would be a challenge. In addition, the presence of such facilities in residential areas may not be well taken and we would face the NIMBY phenomenon.
In a private housing society in Islamabad, charging a fee of Rs 250 might be possible, for a door-to-door collection service, but could be a challenge at the city level in Kasur.

The environmental benefits of segregation and composting are usually well managed, even at city level, in cities of the size of Kasur. Indore Municipality case study is an example. In Sahiwal city, a city scale project has been developed for segregation and composting. The plant has been built by the Urban Unit on behalf of the Local Government and is in testing phase.

CASE STUDY # 2

SAHIWAL SOLID WASTE SEGREGATION AND TREATMENT PLANT

Sahiwal's solid waste management (SWM) system is in a state of disarray. Of the 120 tons per day of municipal solid waste generated, only 40 - 50% enters the municipal waste system, leaving the rest of the population without waste collection. However, Government of Punjab has provided enough solid waste collection machinery that will project the existing solid waste collection to 90%. Practically all municipal waste is either burned, dumped or buried illicitly on vacant land throughout the city, causing significant environmental damage and threatening human health. Solutions are needed urgently.

For the purpose of solving the solid waste disposal problems, the Urban Unit had taken the initiative to build the project of a Segregation, Treatment, Disposal Facility (STD) for Sahiwal City. The STD Facility directly addresses the Need, striking a balance between the current constraints and capacity limitations on one hand, and the urgency to transform the sector and provide a basic level of service on the other. It is one of the first facilities that will be performing the functions of waste segregation, recovery of recyclable materials and composting to make use of waste as a resource.

The STD Facility consists of three main components: Segregation Plant, Windrow Area and Composting Plant. It consists of a semi-mechanized system that can be easily operated with trained staff. The segregation plant will segregate and recover the recyclables from the solid waste. All the recyclables other than organics will be sold to the buyers without any further processing. The recovered organics will be spread in the form of windrows over a period of 50-60 days for maturation.

As of June 2021, the construction of the plant has been completed and is being pilot tested. Institutionally, the plant is designed to be operated under a public private partnership basis, wherein the financial model and feasibility would suggest the per ton subsidy that might be needed to make it a commercial success. At present the concept of per ton subsidy (tipping fee) is not prevalent in Pakistan and is usually seen as a burden. However, a properly designed and managed Land fill site would also need a need tipping fee, while there would be no revenue, land would be wasted and there always remains the issue of GHG emissions. The proposed STD plant, not only addresses these issues but contributes towards circular economy, reduces GHG emissions and provides organic fertilizer, supporting the sector. In an agriculturally rich country like Pakistan, these treatment and disposal options make lot more sense than the LFS.

CASE STUDY # 3

ISWM SYSTEM DESIGN IN KP CITIES

The ADB is supporting the GoKP in improving urban services in the five cities of the province, i.e. Peshawar, Kohat, Abbottabad, Mardan and Mingora. The Project KPCIP (Khyber Pakhtunkhwa Cities Improvement Project). One of the key components of the Project is the development of Integrated Solid waste Management Systems for the cities. Except for Peshawar, the other four cities are more or less the same size as that of Kasur. The KPCIP Project ISWM includes vehicles and machinery for door-to-door collection from all the residential properties in the city. On the treatment and disposal side, the Project includes a four-step process.

Step 1: A semi-automatic waste sorting facility that separates not only the organic and inorganic components, but all recyclables are separated and collected in separate boxes for return to industry.

Step 2: The organic fraction is designed to be taken to an anaerobic bio digester facility, that produces biogas and digestate, which is taken for further processing to step 3

Step 3: In this step, the digestate from Bio-Gas plant is transformed into compost, a process that takes around 2 weeks, against the traditional technology of windrow composting that takes up to 60 days. Thus, the land requirement is significantly less.

Step 4: In the last step, all the residue and inert materials from all stages is taken to the Landfills site, which is an engineered sanitary landfill site, designed for a period of 10-20 years.

The project is in the procurement stage, and it is assumed that this would be the first city wide system of comprehensive Integrated solid waste management and would form a real model for other cities to follow.

To ensure / improve the chances of sustainability, tariff adjustments for waste collection fee is being worked out, followed by a willingness to pay survey.

From an environmental point of view, the full system, especially the addition of Anaerobic digesters and the gas capture valves in the LFS are some of the features that make these environmentally friendly, since there is minimum release of GHG emissions, compared to open dumping, windrow composting, open burning and even traditional landfill sites.

CASE STUDY # 4

SWACH COOPERATIVE, PUNE [15]

INTEGRATING THE INFORMAL SECTOR IN MUNICIPAL SOLID WASTE MANAGEMENT

SWaCH since 2007 is a wholly worker-owned cooperative to provide front end waste management services to the city of Pune and recover user fees. Since 2008, they have entered into a formal memorandum of understanding with PMC for door-to-door collection of waste. The SWaCH cooperative is the direct result of the advocacy of KKPKP (established in 1993).

The SWaCH Model: SWaCH is the success story of how thousands of waste pickers in Pune, India came together to get first and rightful access to recyclable waste. Private contracts to Waste management companies threatened the livelihood of waste pickers who depend on recyclable waste (paper, metal, plastic, and glass) to sell and make a living.

The Cooperative has 2300 members (and growing) who are engaged in doorstep collection of waste in Pune. Members are not paid by municipality for this work but collect user fee for doorstep collection from citizens. Sale of scrap is their other source of income. The Municipality saves approx. Rs.12 crores (120m) each year in this model.

How it works - Pairs of members of the cooperative are in charge of door-to-door waste collection for 250-350 households. Waste pickers segregate waste - wet or organic waste and dry wastes such as plastics, glass, paper, etc. Waste pickers sell recyclables in the market. Waste pickers drop off non-recyclable waste at city-run feeder points.

The Pune Municipality pays for Equipment and Management Costs

Benefits: The model encourages segregation by citizens, provides better conditions of work for waste pickers, result in cleaner waste for recycling industry and at the same time there is a reduction in municipal expenses for waste management.

Negative Press: Recently (May 2021) media has reported differences between the Pune Municipality and SWaCH over long term contract and plans of the Municipality to outsource collection to the corporate private sector.[16]

Waste pickers have decided to stage a protest against the PMC, after the civic body shied away from signing a formal long-term agreement with SWaCH. The PMC has, once again, given only a month's extension to the waste pickers and proposed a contract system for waste collection.

"The waste pickers, who are members of SWaCH, are organizing protests as the PMC has proposed to contractualise their livelihoods after false promises to protect their rights," read a statement by SWaCH.

Lessons for Kasur: A similar model, though at a smaller scale was pilot tested in Lahore Metropolitan Corporation in year 2001, which was managed at the Union Council level and waste pickers were engaged for door to door collection, in return for a fee that they could collect from households and proceeds from recyclables sale. Unfortunately, the new Local Government System was introduced, while the pilot was less than a year old and was wrapped up prematurely.

A similar model can be pilot tested in Kasur (May be for a few selected Union councils), since there are many waste pickers, who make their earning from recyclables. The success of this system also requires a robust secondary collection system where the pickers dump their remaining waste, the citizens would only pay, if the city gives a clean look.

[15] https://swachcoop.com/

[16] HTTPS://INDIANEXPRESS.COM/ARTICLE/CITIES/PUNE/SWACH-TO-PROTEST-PMCS-DECISION-TO-ESTABLISH-CONTRACT-SYSTEM-FOR-WASTE-COLLECTION-7328531/

CASE STUDY # 5

DOOR TO DOOR COLLECTION & SEGREGATION IN INDORE INDIA

Indore. Indore is the 9th largest city in India with a population of 2.5 million. SWM improvement in the city began with door-to-door collection in January 2016 as a pilot, which extended from two to all the 84 wards in the city. In approximately 12 months 100% door-to-door collection with segregation at source was achieved. Door-to-door collection system is done using tri-partitioned vehicles, all of which are fitted with GPS to enable tracking and monitoring. The technologies adopted for municipal solid waste management in Indore cover: recycling, landfill, composting, incineration, and gasification.

Door to door collection is most efficient and effective system in managing municipal waste, even in large cities. The system has been adopted in Pakistan, only in posh and selected areas of many large cities, but not at the full scale. The common perception that this is suitable on for developed countries has been refuted by the success story of Indore Municipality. Kasur city can follow the same approach and model.

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