Valuing Urban Waste

The need for comprehensive material recovery and recycling policy.

Pinky Chandran, Kabir Arora, Marwan Abubaker and Nalini Shekar Hasiru Dala, June 2018

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The need for comprehensive material recovery and recycling policy.

Pinky Chandran, Kabir Arora, Marwan Abubaker and Nalini Shekar

Hasiru Dala, June 2018

Supported by Indian Institute of Human Settlements (IIHS) Bengaluru, Wipro Limited and Kagad Kach Kashtakari Panchayat

"The more highly developed waste recycling becomes, the more valuable is this very diversity of materials. The aim must be to get all the waste possible into the system- not only those that are already valuable at a given stage of development, but also those that are only beginning to become useful and those that are not useful but may become so.

A type of work that doesn't now exist, if thus necessary: services that collects all waste, not for shunting into incinerators, gulches, but for distributing to various primary specialists from whom the material will go to convertors or reusers"

- The Economy of Cities by Jane Jacobs

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List of Abbreviations

3Rs : Reduce, Reuse, Recycle 5Rs : Reduce, Reuse, Recover, Recycle and Remanufacture ABS : Acrylonitrile butadiene styrene ADB : Asian Development Bank BBMP : Bruhat Bengaluru Mahanagara Palika **BDC** : Business Development Centres BIS : Bureau of Indian Standards **BMP** : Bangalore Mahanagara Palike CAF : Composite Application Form CAG : Comptroller and Auditor General CAGR : Compound Annual Growth Rate **CCTV** : Closed Circuit Television CD : Compact Disc C & D : Construction and Demolition Waste CHF: The Cooperative Housing Foundation CMC : City Municipal Council **CIPET : Central Institute of Plastics Engineering** and Technology **CPCB** : Central Pollution Control Board CRT : Cathode Ray Tube CSD : Centre for Sustainable Development DDA : Delhi Development Authority DIC : District Industries Centre DMA : Directorate of Municipal Administration **DPR** : Detailed Project Report DTI : Department of Trade and Industry DWCC : Dry Waste Collection Centre **EMPRI : Environmental Management & Policy** Research EPR : Extended Producers Responsibility EPS : Expanded polystyrene EWM : E- Waste Management FGD : Focus Group Discussion FICCI : Federation of Indian Chambers of Commerce and Industry FMCG : Fast Moving Consumer Goods FY : Financial Year GAIA : Global Alliance for Incineration Alternatives GoI : Government of India GIZ : Deutsche Gesellschaft für Internationale Zusammenarbeit GNCTD : Government of National Capital Territory of Delhi

GPS : Global Positioning System

- GPRS : General Packet Radio Service
- GST : Goods and Services Tax
- GTZ : Gesellschaft für Technische Zusammenarbeit (German Organisation for Technical Cooperation)
- HDPE : High density polyethylene
- HPEC : High Powered Expert Committee
- ICRA : International Credit Rating Agency
- IIHS : Indian Institute for Human Settlements
- IMaCS : ICRA- Management Consulting Services Limited
- IMSWM : Integrated Municipal Solid Waste Management
- ISR : Informal Sector Recyclers
- ISWA : International Solid Waste Association
- IT : Information Technology
- **ITI : Industrial Training Institutes**
- IWB : Itinerant Waste Buyer
- KSAPCC : Karnataka State Action Plan on Climate Change
- KSPMA : Karnataka Seed Producers and Marketers Association
- KSSIDC : Karnataka State Small Industries Development
- LCA : Life Cycle Analysis
- LDPE : Low density polyethylene
- LLDPE : Linear low density polyethylene
- Moef : Ministry of Environment and Forests
- Moef and CC : Ministry of Environment and Forests and Climate Change
- MoSJE : Ministry of Social Justice and Empowerment
- MoUD : Ministry of Urban Development
- MRF : Material Recovery Facility
- MSSS : Mythri Sarva Seva Samithi
- MSW : Municipal Solid Waste
- MSWM : Municipal Solid Waste Management
- Mt : Metric Tonnes
- MTPA : Million tonnes per annum
- NA : Not Applicable
- NAPCC : National Action Plan on Climate Change NCEUS : National Commission for Enterprises in
- the Unorganised Sector
- NEERI : National Environmental Engineering **Research Institute** NICE : Nandi Infrastructure Corridor Enterprises Road NIMZ : National Investment Manufacturing Zones NITI Aayog : National Institute of Transformation of India NGO : Non-Governmental Organisation NGT : National Green Tribunal NRP : National Recycling Program NSKFDC : National Safai Karamcharis Finance and **Development Corporation** OECD : Organisation for Economic Cooperation and Development **OBC** : Other Backward Classes PE : Polyethylene PET : Polyethylene terephthalate PMMA : Poly (methyl methacrylate) PNRS : Política Nacional de Resíduos Sólidos (National Solid Waste Policy) **PP** : Polypropylene PPP : Public Private Partnership **PS** : Polystyrene PUR : Polyurethane PVC : Polyvinyl chloride **PWM : Plastic Waste Management** R& D : Research & Development **RWC : Recyclable Waste Collection Centre** SEZ : Special Economic Zone SHG : Self Help Group SINIR : Sistema Nacional de Informações sobre a Gestão dos Resíduos Sólidos (National Information System on Solid Waste Management) SME : Small and Medium Enterprises SWM : Solid Waste Management SWMRT : Solid Waste Management Roundtable TPD : Tonnes per day TMC : Town Municipal Council

NEP : National Environment Policy

- TPA : Tonnes per annum
- TSMG : Tata Strategic Management Group
- UEN : Unique Enterprise Number
- ULB : Urban Local Bodies
- WTE : Waste to Energy

Abstract

The statement 'Cities are engines of growth' is an old cliché. In the name of economic growth and social wellbeing cities consume resources sourced from faraway lands and release matter that is inadequately termed "waste". Thus, it is imperative to frame the discourse of sustainability in cities around the questions of 'flow of matter' i.e. where is the material coming from and where is it going after use? A city's waste is often not perceived as a valuable resource, and hence wasted in dump yards. The dichotomy between what is resource and what is waste is not very clear. Waste too becomes a resource. It has inherent value which can be recovered and reclaimed. Recycling, up-cycling and down cycling are all ways of transforming waste into value, and providing raw materials for industries dotting urban -rural landscapes.

The paper traces the actors involved in the informal recycling economy of Indian cities and attempts to move away from the binary definitions of waste as "Use and throw", and to appreciate waste as a resource, setting the tone to contextualize the informal economy in Bengaluru with special reference to Nayandahalli, the plastic recycling hub of Bengaluru. The paper looks at the various policies and rules that govern the management of non-biodegradable waste and the informal actors involved in the waste economy. The paper also looks at a comparative analysis of policy frameworks of other countries, and in conclusion looks at opportunities and recommendations for a Recycling Policy in India.

Keywords: Waste, Informal waste economy, Recycling, Nayandahalli, Waste recycling clusters



Acknowledgement

In the opening sentences of the book 'Lost Enlightenment' historian S. Frederick Starr stated 'This book was written not because I knew the answers to the questions it poses, or even because I had any particular knowledge of many subjects and fields it touches upon, but I myself wanted to read such a book. It is a book I would have preferred someone else to have written so I could enjoy reading it without the work of authorship.' Same sentiment holds true for us. We undertook this task of learning about the informal waste economy of Bengaluru and what are the possible ways to push for their inclusion as a matter of curiosity. Deep down in our hearts we believe that this is the report which should have been written by many of informal recyclers, if not written, they have narrated almost everything in this document. And it is their stories and desire for inclusion that we chose to compile together, in this process, if we are anything but note-takers. Thus the ownership of this report lies with the narrators, faults will be ours.

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Note: Some of the notes in this report are published on Hasiru Dala's blog www.wastenarratives.com and part of it is out as a chapter in a book on South Asian cities and in the Seminar Magazine's June 2017 issue Bangalore's Great Transformation.



Preface

'Just as, to understand poverty, we must study the very rich: so, to understand value, we must study rubbish', wrote anthropologist Michael Thompson, way back in 1979 in his widely acclaimed book 'Rubbish Theory'. And rightly so! The inspiration for this study was a natural progression of our work at Hasiru Dala. Hasiru Dala is an organisation of waste pickers and informal waste collectors in Bengaluru, working since 2010, though officially registered in 2013.

The year 2010 was significant, as on ground organizing of waste-pickers gained momentum, and that led to the formation of Hasiru Dala (meaning Green Force), an organisation of waste pickers and informal waste collectors. The organisation was conceived with the idea that for sustainable solid waste management of any city in developing countries, the integration of waste pickers and informal waste workers is vital.

In 2013, we at Hasiru Dala along with Jain University, Bengaluru and SWMRT decided to look at the contribution of the waste-pickers of the city. The findings revealed that the four thousand, one hundred and seventy-five registered waste-pickers save the city about twenty-three crores annually, which would otherwise cost the BBMP to spend an additional twenty-three lakhs of the budgeted four hundred and fifty crores. Extrapolating the data for the estimated fifteen thousand waste-pickers that city harbours, the study revealed that the savings were about eighty-four crores annually.

Following the study on waste-pickers from mid-2014 to September 2015, another study was undertaken by SWMRT to look at the contribution of the informal sector workers managing the Dry Waste Collection Centres (DWCC), from the point of view of inflow of waste into the DWCC and the savings to the municipality. The six months (January to July 2015) Waste Diversion Data from thirty-two Dry Waste Collection Centres revealed that the centres had made exceptional progress in waste diversion and retrieval of dry waste of over 23, 73,908.8 kilograms, with an annual savings is about Rupees 48.79 lakhs. Throughout our work on the ground and continuous interaction with policy makers in Bengaluru, we realised that there was no focus on the actors within the recycling value chain. While waste-pickers had gained visibility, as the municipality had issued occupational identity cards, they were still not recognised as small scale entrepreneurs, or seen as someone adding value to waste through their skill in sorting and grading.

At a different level, questions were being asked about where is the waste going? What happens to the waste after the waste-picker sells it to a scrap shop? Who were the actors involved? Just as Rubbish Theory, highlights the creativity of social actors in creating the conditions for value to emerge, and so for us following became a habit, the moment we spotted trucks or tempos stacked with recyclable waste, collecting stories became another practice. Our journey has taken us around Bengaluru in Karnataka, Dharavi in Mumbai, Maharashtra and Mundka, Tikri Kalyan, Bawana in Delhi. Much as we would like to travel to all the recycling hubs, across India the lack of funds is the only impediment. And so we did invite recyclers from different parts of the country for a consultation and the discussions that ensured make a case in point - The need to reevaluate the waste management rules from a circular economy point of view, taking in view the contribution of all the actors in the informal recycling value chain. This report is largely a reflection of what is happening and to the recyclers waste is not devoid of value.

Pinky Chandran March 2018

Chapter 1: Introduction

"The city of Leonia refashions itself every day: every morning the people wake between fresh sheets, wash with just-unwrapped cakes of soap, wear brand-new clothing, take from the latest model refrigerator still unopened tins, listening to the last-minute jingles from the most up-to-date radio. On the sidewalks, encased in spotless plastic bags, the remains of yesterday's Leonia await the garbage truck. Not only squeezed tubes of toothpaste, blown-out light bulbs, newspapers, containers, wrappings, but also boilers, encyclopedias, pianos, porcelain dinner services. It is not so much by the things that each day are manufactured, sold, bought, that you can measure Leonia's opulence, but rather by the things that each day are thrown out to make room for the new..."

- Italo Calvino, Invisible Cities



The popular saying 'nothing is waste until it is wasted' is seldom heeded in contemporary societies. Today, our cities are marked not only by novel forms of decadence, but also striking social inequities that encourage unencumbered wastefulness. In this way, the concrete relationships that we build with the waste produced in our urban centre bears a striking resemblance to those imagined in Calvino's fictional cities. The world over, garbage has been the focus of increased social, political, economic and scientific attention; (Moore 2009); (NSF 2009), given its increased quantities and the novel forms in which it manifests itself. According to a 2012 World Bank report, "world cities generate 1.3 billion tonnes of solid waste (MSW) and this figure is expected to rise to 2.2 billion tonnes by 2025' (Hoornweg and Bhada-Tata 2012). An ISWA (2012) document states that, "the global value of the waste industry was estimated in US\$433 billion annually", and these figures grow corresponding to waste generation.

India is part of a global trend towards increased urbanization. Currently 54% of the world's population lives in cities, a proportion that is only expected to grow. In the last 68 years, there has been significant growth in the number of towns and corresponding increase in urban population. Known as the IT capital of India, Bengaluru not only mirrors but exemplifies this trend. Bengaluru's estimated waste generation in 2013 was about 4000 tonnes per day (BBMP 2013). It is estimated that by the year 2047, the total waste quantity generated in India will be about 260 million tonnes per year, with a market value of over 3.6 billion euros (EBTC n.d.). It comes as no surprise then that with population increase, economic growth and changing consumption patterns, solid waste generation—a by-product of increasing urbanization—is accelerating. Simultaneously, this growth brings into light the necessity of and increased potential for the reuse of urban waste materials.

Therefore, though waste is a global problem, it is a local phenomenon. Moreover, as social scientists have remarked, waste is largely a social construct, with varying meanings and practices attached to it across history and society (Douglas 1966/ 2002). This report analyses how various societal actors, particularly including those from the "informal waste economy" engage and deal with waste, - an important research subject, critical to the crafting of sound waste management policy.

Informal Waste Economy

Informal waste economies, sprung up in the early 18th century as a result of industrialisation and urbanisation, mainly in Europe, though in India waste collection dates back to the 17th century through the collection of bones, rags and paper. With the growth of cities, urban waste began to see spills on to streets, and hence the people working in waste, began collecting, sorting, aggregating, processing and eventually recycling.

Developed countries streamlined the waste collection processes and further criminalised the informal waste economy, thereby removing the scope for informal waste collection. At the same time informal waste workers in developing countries like India, China, Pakistan, Brazil, Egypt, Cambodia, Philippines were compensating for the inadequacies of municipal waste collection systems. In the recent times the number of people making a living from the urban waste has increased significantly and is expanding.

The informal waste economy in India documented in various writings, state that the informal waste sector is socially stratified in a pyramid with the waste-pickers/scrap collectors at the base and the re-processors perched at the apex (Gerdes and Gunsilius 2010), officially unrecognised, even though they operate at no cost to the government. Quantification of the informal waste economy is difficult, given their large base and spread. Kaveri Gill's Of Poverty and Plastic: Scavenging and Scrap Trading Entrepreneurs in India's Urban Informal Economy (2009) provides insights into the recycling value chain from the informal waste sector perspective and the complex pattern of organisation and linkages with the market economy and employment.

On the surface the informal waste economy might look disorganized but, within the hierarchy of the pyramid, the layers are organised. These actors operate in the fringes. Most policies and legislations related to waste management, livelihood regeneration of the Government are fragmented and sometimes contradictory. Two things go against the informal waste economy the push for the use of incinerating waste and second the lack of comprehension by the policy makers on the need for resource recovery and recycling policy from a circular economy and sustainability framework.

Given that most countries are moving or have moved to adopt the circular economy framework, India still drags its feet. Brazil has gone a step forward to integrate the informal waste sector workers in the larger scheme of the city's waste management by encouraging and incentivising the waste workers to establish and develop cooperatives and other forms of association of recyclers.



Rationale of the study

The informal recycling economy is an integral part of Indian cities, and though different lenses are used to view them, the entrepreneurial and productive one is always overlooked given the emblematic association of waste with "dirt". So what protects and legitimises the spaces that members of the informal sector rent and use to carry out the process of value addition to the waste they buy? Is the denial of representation, read invisibility correlated to the visual cleanliness and aesthetics that a city aspires to? Who are the people involved in the material recovery process? Does act of recovering material merit a policy instrument, such as a Recycling Policy?

The study attempted to document the actors involved in the recycling process in Bengaluru, with special reference to plastic waste. The study is indicative and provides an opportunity for deeper investigation.

In addition visits were undertaken to Mumbai and Delhi to understand the informal recycling process.

The specific aim of the study is to :

- To map the actors in the informal recycling value chain in Bengaluru and document the material resource recovery process with special reference to plastic waste in Nayandahalli. Recyclers, in this study are defined as all actors involved in recycling with waste pickers on one end and re-processors in the other.
- Explore options for policy engagement with the government.



Methodology

Work on this research project started in May 2015. An informal meeting with the recyclers of Nayandahalli and scrap dealers, DWCC operators paved the way, to develop the process of research. Salma and Siddique, residents of Nayandahalli volunteered to drive the research by way of introduction to other recyclers. It was also decided that the local community radio station- Radio Active CR 90.4MHz would be extensively used in documenting stories, given that the Radio Jockeys were residents of the area.

At level two, the need to visit other recycling spaces was also felt and waste markets in Mumbai and Delhi was chosen given its label as the recycling nodes of India. At level three, literature review was undertaken of existing policies in India and policies of other countries. At level four, one national roundtable was held with recyclers on the need for recycling policy, followed by a group discussion with local scrap dealer, DWCC operators and recyclers from Jolly Mohalla and Nayandahalli.

Limitations

- The study is limited in nature as the yearlong field visit was confined to Bengaluru.
- The visits to Delhi and Mumbai were exploratory
- Recyclers were reluctant to respond to query on data, accounts, process of recycling which stemmed from the fear about competition, loss of livelihood and general harassment that one would encounter in the name of pollution or visual cleanliness
- There are no accurate data available on the waste generated in the cities, and are at best to be treated as estimates. The existing numbers available in literature must at best be considered as estimates as within the waste industry- both municipal collection, processing and informal recycling waste is not counted in a precise or formal manner, given the complexities that of the scale, the mixtures, the moisture and the method.

Overview of the report

The report contains seven chapters, including the introductory and concluding chapters.

Chapter two compares waste management policies of four countries with a view to understand the contours and content of a progressive resource recovery and recycling policy that promotes a circular economy and integrate the informal waste workers.

Chapter three traces the legislative instruments available in India and attempts to analyse the application of them, from a point of view of a concrete policy framework.

Chapter four is a compilation of available statistics on plastic waste generation in the country in general and Bengaluru in particular, which demonstrates that official record on waste generation in the city or country does not currently exist.

Chapter five, focuses on Waste Markets and Recycling Hubs, starting with Case Study of Dharavi, Mumbai and Tikri Kalan, Delhi, followed by the Case of Nayandahalli, Bengaluru. We also have a photo essay of Bengaluru's Re-Use Sunday Market and a note on the Vulnerabilities of informal waste supply chain.

Chapter six is the Report on the National Consultation with Recyclers.





Chapter 2: Legislating for a Recycling Policy -

A Comparative Analysis of Policy Framework in Other Countries

"Pollution is nothing but the resources we are not harvesting. We allow them to be dispersed because we've been ignorant of their value"

- R. Buckminster Fuller



Many countries across the world are moving away from waste management to material recovery policies to implement the concept of circular economy. A framework which is "restorative and regenerative by design, and aims to keep products, components, and materials at their highest utility and value at all times" (Ellen MacArthur Foundation 2015). The motivation for this shift stems from rising concerns over resource constraints and environmental impacts faced under linear economic growth which emphasises extraction of raw materials, their use in manufacturing finished products and quick disposal, (ibid). It is a cradle to grave model, where revitalization of used material is not undertaken. The shift heralds a new paradigm: 'cradle to cradle', that transform discards as raw materials to be absorbed in production cycle. This is a change from the previous attitudes where society viewed waste as something of no value.

This section looks at three countries where material recovery and circular economy is the base for the policies of waste management. It focuses on Japan, China, and Brazil for particular reasons. Japan is cited as an example of a resource constrained nation-state. The country faced rising oil prices and industrial pollution before the emergence of major economies. It implemented a series of comprehensive recycling laws.

Chinese policies are discussed both for its similarities with India—it is an economically vibrant and populous nation with growing consumer markets—and for the way it has legislated the concept of the circular economy. The Chinese government first integrated the circular economy into the legal framework in 2002, and since then has developed seven foci: 1) Comprehensive use of resources 2) Demonstrate a recycling system for old waste products 3) 'City Mineral Resource' Pilots 4) Vitalize remanufacturing industries 5) Exploit kitchen waste resources 6) Transform Industrial/Economic Zones to the circular model 7) Promote the demonstration of circular resource recovery techniques.

Brazil is a key example of a growing industrial power integrating informal recyclers in national policy frameworks and production cycles. Incentives are given to recyclers (including waste-pickers) to form cooperatives with the intention of increase the use of recyclables in manufacturing. Financial institutions have recognized 'recycling' as a viable industry. These practices have reduced the costs, as well as provided an institutional framework for social welfare and emancipation.

Japan

In the early fifties, Japan's policies were designed towards maintenance and improvement of public hygiene. The Public Cleansing Law enacted in 1954, was geared towards a secure and hygienically sound living environment. In the sixties, increasing industrial pollution, leading to mercury and cadmium poisoning, pushed the government to enact the Waste Disposal and Public Cleansing Law in 1970. Japanese government introduced the Polluter Pays Principle which acknowledged industrial waste as a separate category. This placed the onus on private enterprises to manage their own waste. Given that the oil crisis was at its peak around the same time, Japanese policy makers made serious attempts to reduce their dependency on oil for manufacturing and increased their industrial efficiency through recycling.

Japan has a history of engaging in 'resource regenerative industry' since 12th century. Rag pickers [sic] have been the backbone of the given industry. In 1878, licensing for recyclables collection by rag pickers was initiated to regulate and incentivized the industry. Tokyo is possibly the first city in the world to engage with waste pickers (rag pickers) and encourage resource extraction from discards.

In the nineties, several progressive laws were enacted like the Law for Promotion of Utilization of Recycled Resources 1991, Containers and Packaging Recycling Law 1995 and the Home Appliance Recycling Law 1998. These laws contributed to strengthening the discourse on recycling and moving towards the goal of sustainable consumption and production. This shift in political and legislative focus was encapsulated in the concept of the 3Rs – Reduce, Reuse and Recycle, as well as the introduction of policies such as Extended Producer's Responsibility⁴. Manufactures are expected to follow Life Cycle Assessment approach for products produced to minimise negative impacts.

It's been said that the 3Rs concept promoted by Japan, is a cultural reflection and practice of "mottainai", conveying a sense of regret concerning waste (precious resources turning into waste, without reaching its full usefulness)

Waste Management and Public Cleansing Law

This law is enacted for the purpose of preserving the living environment and improving public health through the restriction of waste discharge, appropriate sorting, storage, collection, transport, recycling, disposal, or the like of waste and conservation of a clean living environment

Source: "http://www.env.go.jp/en/recycle/ basel_conv/files/Waste_Management_and_Public_Cleansing.pdf"

1.According to the OECD definition, Extended Producer Responsibility (EPR) is "an environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle". OECD (2001) Extended Producer Responsibility: A Guidance Manual for Governments, OECD, March, Paris, 164p

Law for Promotion of Utilization of Recycled Resources, 1991

The purpose of this Act, in light of the circumstances in Japan, a country largely dependent on imports for major resources and where, along with the recent development of the national economy, the heavy use of resources generates an enormous amount of Used Products, etc. and By-products, a considerable part of which are disposed of the Recvclable Resources and Reusable Parts are not utilized but also disposed of, is to ensure the effective utilization of resources and to take necessary measures to reduce the generation of Used Products, etc. and By-Products and promote the utilization of Recyclable Resources and Reusable Parts in order to contribute to waste reduction and environmental preservation, thereby contributing to the sound development of the national economy.

The law also defines:

Used Product as products that are collected or disposed of after being used or without being used (excluding radioactive substances and articles contaminated thereby).

By Products as products generated as by-products from the manufacture, processing, repair or sale of products, supply of energy or construction work for civil engineering or building (hereinafter referred to as "Construction Work") (excluding radioactive substances and articles contaminated thereby)

"Recyclable Resources mean such Used Products, etc. or By-products that are useful and are available or can be made available as raw materials

"Recycling shall mean to change the condition of the whole or part of such Used Products, etc. that are useful, so as to make them available as Recyclable Resources or Reusable Parts

Designated Resources-Reutilizing

Industry means an industry that the utilization of Recyclable Resources or Reusable Parts is technically and financially possible and is particularly necessary for ensuring the effective utilization of the Recyclable Resources or Reusable Parts. **"Specified Labeled Product** means a product specified by Cabinet Order in the respect that it is particularly necessary to label the product for Sorted Collection (which means collecting products by sorting them by type; hereinafter the same shall apply) so as to use the whole or part of the product as Recyclable Resources after it is collected or disposed of after being used or without being used, with the aim to ensure the effective utilization of the Recyclable Resources.

"Specified Resources-Recycled Product means a product (including those products that are used as parts of other products) specified by Cabinet Order in the respect that it is technically and financially possible for a person who operates a business of manufacturing, processing, repairing or selling the product (with respect to those products used as parts of other products, the respective products or such other products) after it is collected or disposed of after being used or without being used, to implement Voluntary Collection (which means collecting by oneself or entrusting collection to another party; hereinafter the same shall apply), it is also technically and financially possible to implement the Recycling of the whole or part of the product after Sorted Collection, and such Recycling is particularly necessary for ensuring the effective utilization of relevant Recyclable Resources or Reusable Parts.

The policy also provides for targets regarding the rationalization of the use of Raw Materials, etc. for the respective types of products and of By-products, targets regarding the utilization of Recyclable Resources and Reusable Parts for the respective types thereof, matters regarding the promotion of long-term use of the respective types of products, matters pertaining to dissemination of knowledge on the meaning of the promotion of Effective Utilization of Resources that contributes to environmental preservation, and other matters concerning the promotion of Effective Utilization of Resources, by taking into consideration the technical level related to the Effective Utilization of Resources and other circumstances

http://www.meti.go.jp/policy/recycle/main/english/pamphlets/ pdf/cReEffectLe_2006.pdf

Containers and Packaging Recycling Law, 1995

The purpose of this Act is, by taking measures to promote reduction of waste containers and packaging discharged and the sorted collection thereof as well as the recycling of waste containers and packaging which are obtained through sorted collection, etc., that conform to the sorting standards, to ensure proper management of waste and effective use of resources through reduction of municipal solid waste and adequate use of recyclable resources, thereby contributing to the preservation of the living environment and the sound development of the national economy.

"containers and packaging mean containers and packaging of goods (including the cases where containers and packaging of goods are paid for) which become unnecessary when the said goods have been consumed or when the said containers and packaging have been removed from the goods.

"sorted collection shall mean collecting waste separately, and sorting and compressing the collected waste and conducting other acts specified by the Ordinance of the Ministry of the Environment, where necessary "recycling shall mean the following acts with regard to waste containers and packaging that conform to the sorting standards.

Further it states that The competent minister shall set a five-year plan for recycling of waste containers and packaging that conform to the sorting standards every three years (hereinafter referred to as the "Recycling Plan") in line with the Basic Policy and pursuant to the provision of the ordinance of the competent ministry. (2) The Recycling Plan shall set out the following matters with regard to each kind of waste containers and packaging that conform to the specified sorting standards. (i) Prospective amount of the waste containers and packaging that conform to the specified sorting standards, which are recycled in each fiscal year (ii) Matters related to the establishment of a facility for recycling the waste containers and packaging that conform to the specified sorting standards (iii) Matters related to specific measures for recycling the waste containers and packaging that conform to the specified sorting standards (iv) Other important matters concerning the implementation of recycling of the waste containers and packaging that conform to the specified sorting standards.

http://www.meti.go.jp/policy/recycle/main/english/pamphlets/pdf/cReCont_2006.pdf http://www.japaneselawtranslation.go.jp/law/detail/?id=88&vm=02&re=02

Home Appliance Recycling Law, 1998

The law provides for a collection and recycling system in which home appliance retailers take charge of collecting used home appliances and home appliance manufacturers take charge of recycling collected appliances.

- Television sets (limited to CRT-types)
- Refrigerators, freezers** Freezers become subject to the regulation from April 2004.
- Washing machines

Responsibilities of parties concerned

Consumers (Those who use home appliances shall pay for recycling costs.)

Home appliance retailers (Those who sell home appliances shall collect and transport them.)

- Taking back home appliances, which they have sold, from businesses that dispose of them
- Taking back home appliances at the request of consumers who buy new ones to replace old ones and proper delivering of collected home appliances of the manufacturers and importers
- Issuing home appliance recycling coupons to manufacturers and the designated body and sending copies to dischargers
- Displaying the costs of collecting and transporting in shop windows

Home appliance manufacturers and import-

ers (Those who manufacture home appliances shall recycle them.)

- Taking back home appliances, which they have manufactured or imported, from retailers
- Recycling these home appliances
- Publishing the costs for recycling these home appliances (recycling fees)

Designated body (Association for Electric Home Appliances)

- Recycling home appliances whose manufacturers are unknown or those entrusted by specific manufacturers (manufacturers whose production volume is less than 900,000 units for air conditioners, 900,000 units for television sets, 450,000 units for refrigerators, and 450,000 units for washing machines)

Municipalities:

Delivering home appliances, which they have collected, to manufacturers and the designated body, as well recycling them

Note.1:Recycling

"Recycling" means removing parts and materials from used home appliances and reusing them as parts or raw materials for new products or transferring them, with or without charge, to those who will reuse them. "Recycling" includes thermal recovery or using waste as fuel. However, it is currently required to satisfy the designated recycling rates* only in terms of recycling of waste as parts or raw materials of new products. Recycling rate = Weight of materials recycled/Weight of units treated for recycling http://www.meti.go.jp/policy/recycle/main/english/law/home.

http://www.meti.go.jp/policy/recycle/main/english/law/nome. html In the 2000's, Japan ushered a new benchmark with the ratification of the Law for the Promotion of Efficient Utilization of Resources, the Fundamental Law for Establishing a Sound Material-Cycle Society, the Law Concerning the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities (Green Purchasing Law), Construction Material Recycling Law and the Law on Re-utilization of End of Life Automobiles.

The Law on Re-utilization of End of Life Automobiles, mandates that, everyone who buys a new vehicle must pay a recycling charge at the time of purchase, and came into effect from January 2005. This process is closely tracked, as targets are set. The Japanese government provides for incentives for the promotion of the 3Rs- by way of setting up 'cluster facilities area' and providing business know-how. In addition, the Eco Town project scheme, is aimed at creating towns that practice 'sound material-cycle society'.

Fundamental Law for Establishing a Sound Material-Cycle Society

The purpose of this Law is to facilitate the policies for the transformation into a sound material-cycle society comprehensively and systematically and thereby contribute to ensure healthy and cultured living for both the present and future generations of the nation, through articulating the fundamental principles on the establishment of a sound material-cycle society, in conformity with the fundamental philosophy of Fundamental Environmental Law

"a Sound Material-Cycle Society" means a society where the consumption of natural resources is minimized and the environmental load is reduced as much as possible, by restraining products, etc. from becoming wastes, etc., promoting appropriate recycling of products, etc. when they have become recyclable resources, and securing appropriate disposal of the recyclable resources not recycled, which means the disposal as wastes

"recyclable resources" are those useful among wastes, etc. "recycling" means reuse, regeneration, and heat recovery. "reuse" refers to the actions listed below: (1) To use recyclable resources as products as they are (including the use of them after repair); (2) To use the whole or part of recyclable resources as component or part of products.

"regeneration" means the use of the whole or part of recyclable resources as raw materials. It also states that efforts must be made to Restrain Raw Materials, Products, etc. from Becoming Wastes, etc, recyclable resources must be recycled as much as possible, Recycling and disposal of recyclable resources must be appropriately made so as not to cause obstacles to environmental conservation,

It further states that "in making policies for establishing a sound material-cycle society, necessary consideration shall be taken into so that their mutual organic linkage with other policies for environmental conservation, such as policies for securing proper circulation of matter in the nature, may be promoted"

The law also emphasis on the State's role in the following:

In order to contribute to the increase in demand for recycled articles, the State shall take the lead in making use of recycled articles and take necessary measures so that the use of recycled articles by local governments, businesses and the public may be promoted

The State shall take technological support and other necessary measures to help businesses, in manufacturing, processing or selling of goods or in other business activities, make their own evaluation beforehand- The matters relating to the durability of the products, containers, etc. involved in their business activities; (2) The matters relating to the difficulty in recycling and disposing of the products, containers, etc. involved in their business activities when they have become recyclable resources; (3) The matters relating to the weight or volume of the products, containers, etc. involved in their business activities when they have become recyclable resources; (4) The matters relating to the kinds and quantities of the substances contained in the products, containers, etc. involved in their business activities, feared to cause damage to the human health or life environment (including properties closely related with human life, and animals & plants and their habitats closely related with human life), and the matters relating to the degree of environmental load by the disposal of such products, containers, etc. when they have become recyclable products.

The State shall take regulatory and other necessary measures to control the discharge of substances causing environmental pollution (pollution as defined in the Article 2, Paragraph 3, of Fundamental Environment Law), in order to restrain raw materials, etc. from becoming wastes, etc. and prevent obstacles to environmental conservation in recycling and disposing of recyclable resources.

(Construction of Public Facilities) Article 24. The State shall take necessary measures to promote the construction of public facilities (including mobile facilities) available for the recycling, disposal, collection or transport of recyclable resources, and other public facilities contributing to the establishment of a sound material-cycle society.

http://www.gdrc.org/uem/waste/japan-3r/3-basiclaw.pdf

China

China moved towards the adoption of the concept of circular economy in the late nineties. The ten- year trial period, through pilots, propaganda and research culminated in a formal adoption in 2002. This was accepted as sustainable development strategy, by the National People's Congress. Further, The Cleaner Production Promotion Law, came into effect in 2003. As per Article 2 of the law

"Cleaner production as used in this Law means the continuous application of measures for design improvement, utilisation of clean energy and raw materials, the implementation of advanced processes, technologies and equipment, improvement of management and comprehensive utilisation of resources to reduce pollution at source, enhance the rates of resource utilisation efficiency, reduce or avoid pollution generation and discharge in the course of production, provision of services and product use, so as to decrease harm to the health of human beings and the environment." (Mol 2005)

This law laid the legal foundation, for the promotion of the 3Rs (Reduce, Reuse and Recycle) concept in production. In 2004, the Chinese Government enacted the Prevention and Control of Environmental Pollution by Solid Wastes, which came into force on April 1, 2005. The law had key components of actualising the 3Rs by introducing extended producers' responsibility and gave impetus to the resource recycling industry.



Community Recycling in China Photo by the China Zero Waste Alliance
Law of the People's Republic of China on the Prevention and Control of Environmental Pollution by Solid Wastes, 2004



Article 3 : The State shall, in preventing and controlling environmental pollution by solid wastes, implement the principles of reducing the discharge amount and harmfulness of solid wastes, fully and rationally utilizing solid wastes and making them through non-hazard treatment so as to promote cleaner production and the development of recycling economy.

The State shall adopt economic and technical policies and measures in favor of the comprehensive use of solid wastes, and carry out the fully recovery and rationally utilize to the solid wastes.

Article 5 For the prevention and control of environmental pollution by solid wastes, the State implements the principle that any entity or individual causing the pollution shall be responsible for it in accordance with law.

The manufacturers, sellers, importers and users shall be responsible for the pollution prevention and control to solid wastes produced by them

Article 19 The State encourages scientific research and production institutions to do research on and manufacture plastic-sheet covering and packages of commodities that are easy to be recycled and used, easy to be treated, or easy to be degraded in the environment.

Entities and individuals that use agricultural films shall take measures like the recycling for utilization so as to prevent or reduce the environmental pollution by agricultural films.

http://tradeinservices.mofcom.gov.cn/en/b/2004-12-29/8246.shtml http://globalrec.org/wp-content/uploads/2014/03/Solid-and-hazardous-waste-law-2004.pdf The year 2009, marked a new beginning, as the Circular Economy Promotion Law of the People's Republic of China, which was adopted at the 4th session of the Standing Committee of the 11th National People's Congress of the People's Republic of China on August 29, 2008, came into force on January 1, 2009. The law was formulated for promoting the development of the circular economy, improving the resource utilization efficiency, protecting and improving the environment and realizing sustainable development. In the 12th Five-Year Plan (2011–15), the circular economy was upgraded to a national development strategy. Chapter 23, of the plan states that the government will "vigorously develop circular economy" by identifying seven key areas for the circular economy model, mentioned below:

"Summary: Vigorously develop the circular Economy. We will aim to improve the output efficiency of resource utilization, strengthen planning guidance, support fiscal and monetary policies, perfect the laws and regulations, implement extended producer responsibility and propel all links between production, circulation and consumption. We will speed up the development of the resource recycling industry, comprehensively utilize mineral resources, encourage the recycling of industrial waste, upgrade recycling systems and waste separation and recovery of renewable resources, and advance the industrialization of renewable resource recycling. We will encourage low carbon consumption models and lifestyles among the people and government. Our development model should adopt resource reduction, recycling, remanufacturing, zero emissions and industry links and popularize the classical recycling economic model. (Government of People's Republic of China 2011)"



Circular Economy Promotional Law

Article 2 : The term "circular economy" as mentioned in these Measures is a generic term for the reducing, reusing and recycling activities conducted in the process of production, circulation and consumption.

The term "reducing" as mentioned in these Measures refers to reducing the consumption of resources and the production of wastes in the process of production, circulation and consumption.

The term "reusing" as mentioned in these Measures refers to using wastes as products directly, using wastes after repair, renewal or reproduction or using part or all wastes as components of other products.

The term "recycling" as mentioned in these Measures refers to using wastes as raw materials directly or after regeneration

Article 29 : The people's governments at or above the county level shall make overall plans on the geographical distribution of the different sectors of the economy in their respective regions, reasonably readjust the industrial structure and compel enterprises to cooperate in such areas as the comprehensive utilization of resources so as to realize the efficient utilization and recycling of resources.

An industrial park or zone shall organize the enterprises in the park or zone to make comprehensive utilization of resources so as to promote the development of circular economy.

The state encourages enterprises in various industrial parks and zones to exchange wastes for purposes of utilization, cascade utilization of energy, intensive utilization of land, classified and recycled utilization of water, and joint use of infrastructure and other relevant facilities.

Article 36 : The state upholds producers and operators to set up an industrial waste information exchange system for enterprises to better exchange information about industrial wastes.

Article 37 : The state encourages and advocates the construction of a waste recovery system.

The local people's governments shall, according to the urban and rural planning, reasonably position the waste recycling outlets and trading markets, and support waste recycling enterprises and other organizations in the collection, storage, transport and information exchange of wastes.

Waste trading markets shall conform to the state provisions on environmental protection, security and fire control.

Closed Recycling Plant in Wenan County, Hebei Province, China (March2018) Photo by the China Zero Waste Alliance



Article 39 : Any recycled electric apparatus or electronic product to be sold after repair must meet the standards for reutilized products and be labeled it as a reutilized product at an eye-catching place.

Any recycled electric apparatus or electronic product which needs to be dismantled or reutilized shall be delivered or sold to a dismantling enterprise with corresponding conditions.

Article 40 : The state upholds enterprises to reproduce the parts and components of motor vehicles, engineering equipment, machine tools, etc. and to renew tyres.

Any reproduced or renewed product to be sold shall satisfy the prescribed quality standards of the state and be labeled as a reproduced or renewed product at an eye-catching place.

Article 41 : The people's governments at or above the county level shall make overall plans on building facilities for the sorting collection and recycle of domestic wastes in urban and rural areas, and set up a sorting collection and recycling system and constantly improve it so as to improve the rate of recycling domestic wastes

Article 44 : The state shall offer tax preferences to industrial activities promoting the development of circular economy, and use tax measures to encourage the import of advanced energy-saving, watersaving and material-saving technologies, equipment and products and limit the export of products with high energy-consumption or serious pollution. The specific measures shall be formulated by the public finance department and the tax department under the State Council.

Enterprises using or producing the technologies, techniques or products listed in the catalogue of clean production, the catalogue of comprehensive utilization of resources or any other encouraged catalogue shall enjoy tax preferences in accordance with the relevant state provisions.

http://www.amcham-shanghai.org/NR/rdonlyres/4447E575-58FD-4D8E-BB0F-65B920770DF7/7987/CircularEconomyLawEnglish.pdf



Brazil

Brazil's first ever national waste management legislation titled "Politica Nacional de Residuos Solidos n. 12305 (PNRS) or National Solid Waste Policy", came in to force in 2010, after twenty years of discussion. The fundamental principles and objectives of the policy include prevention and precaution, polluter pay principle, the shared responsibility for a product life cycle, principles of waste hierarchy, encouraging recycling industry to encourage the use of raw materials and inputs derived from recyclable and recycled materials, integration of the *catadores of reusable and recyclable materials* (recyclers) in actions involving the shared responsibility in the product lifecycle, among the others.

Product life-cycle is defined as "any series of steps involving product development, obtaining raw materials and inputs, the process of production, consumption and final disposal"

Shared responsibility is defined as "Shared responsibility for the product lifecycle: any set of individualized and chained assignments of manufacturers, importers, distributors and traders, consumers and holders of public services of urban cleaning and solid waste management, to minimize the volume of solid waste and refuse generated, as well as to reduce the impacts to human health and environmental quality arising from the product life-cycle in accordance with this law". The policy outlines a number of actions under this:

• Stimulate the development of the market, the production and consumption of products derived from recycled and recyclable materials.

• Fixes the responsibility and goals of manufacturers, importers, distributors and merchants to enable environmentally adequate destination for post-consumer goods; and whose manufacture and use generate the lowest amount of solid waste.

• The policy mandates disclosure of information regarding ways to prevent, recycle and eliminate waste associated with their respective products.

• The policy seeks commitments, in the form of signed agreements with the municipalities to participate in the integrated municipal solid waste management plan. Irrespective of the products not yet included in reverse logistic system explained ahead.



Reverse Logistics

The policy goes beyond setting recycling targets, but purposes circular economy, by introducing reverse logistics.

"Reverse logistics is defined as any instrument for economic and social development characterised by a set of actions, procedures and means for facilitating the collection and reuse of solid waste in the business sector, to reuse in its lifecycle or other productive cycles, or other environmentally appropriate final disposal"

Article 32 specifies the following:

That Packaging should be manufactured from materials that allow reuse or recycling.

It further stipulates that responsible parties must ensure that packages are restricted in volume and weight to the dimensions required for content protection and commercialisation of the product. It must be designed to be reused in a technically feasible manner, and recycled if reuse is not possible.

Article 33, puts the onus on the manufacturer to ensure that reverse logistics is put in place, independent of the Municipality, upon return of the products, after consumer use. It calls for providing reusable and recyclable waste delivery station.

The responsibility lies with the consumer to return the products and the packaging for Batteries, Tires, Lubricating oils, fluorescent bulbs; sodium and mercury vapour bulbs, mixed light bulbs, electrical and electronic products and their components and any other products or packages subject to reverse logistics.

Policy Instruments

The policy assigns equal responsibility to the generator and to those who generate actions related to the waste plan. In addition, the policy is very clear on the importance of visioning for a twenty-year period. With revisions and course correction every four years. And they include :

- · Assessment of the current situation of the solid waste,
- Projection of international and macroeconomic trends,
- · Goals to follow waste hierarchy
- Set the targets for programs, projects and goals.

Among the policy instruments listed, the National Solid Waste Information System (SINIR) is an important database for the subject. It provides for incentives to establish and develop cooperatives and other form of associations of catadores of reusable and recyclable material. It incentivises adoption of the consortia or other forms of cooperation, with a view to increase sales of recyclable materials. The other key direction emerging from the rules is to deploy cooperatives or other forms of association of catadores for segregated collection of reusable and recyclable materials formed by low income individuals. The plan provides for social inclusion and economic emancipation of the recyclers.

http://wiego.org/sites/wiego.org/files/resources/files/Pereira-Brazilian-Waste-Policy.pdf

Facing page : WIEGO, 2005 Photo by Asmare Association in Belo Horizonte, Brazil

A snapshot of four other countries and their approaches

Australia

Legislation : National Waste Policy: Less Waste More Resources

Key Elements :

The policy sets Australia's waste management and resource recovery direction to 2020.

One of the aims is to manage waste as a resource, with one of the priority strategy of "Product stewardship framework legislation to allow the impacts of a product to be responsibly managed during and at end-of-life".

New Zealand

Legislation : Waste Minimisation Act 2008

Key Elements :

The act encourages a reduction in the amount of waste we generate and dispose of in New Zealand. A key component of the act is to accredit product stewardship scheme that recognise businesses taking responsibility for their products.

In terms of a strategic approach to handling waste, one of the goals is to improve the efficiency of resource use.

Philippines

Legislation :

Ecological Solid Waste Management Act of 2000 RA 9003

Key Elements :

The act directs the Department of Trade and Industry (DTI) to publish an inventory of markets for recyclable materials and stimulate a demand for production of recycled materials and products. They also have to give out a coding system for ecolabeling.

The Local Government units are mandated to establish Materials Recovery Facility (MRF) in each cluster to receive, sort, process and store compostable and recyclable materials efficiently The act also specifies the need to "develop safety nets and alternative livelihood programs for small recyclers and other sectors that will be affected as a result of the construction and/or operation of a solid waste management recycling plant or facility

Germany

Legislation :

Act Reorganising the Law on Closed Cycle Management and Waste of February 24th 2012

Key Elements :

The act is to promote circular economy and safeguard the environmentally compatible management of waste. The main objective is to achieve a recycling based economy, with optimum utlisation of raw materials and maximize recovery quotas.



Conclusion

In this chapter, brief about the policies and norms related to waste management and recycling of three major countries- Japan, China and Brazil has been presented along with a snap shot of four other countries – Australia, Germany, New Zealand and Philippines. It is evident that waste is viewed as a resource and a process. The policies implemented and focus on material recovery and a circular economy, rather than disposal and linear management. It is important to mention that in all these policy frameworks there is a significant focus on integrating the informal waste workers into legal, political, social, and economic frameworks.

Above : Waste pickers wait for a dump truck to unload waste collected from households in Tacloban City, Philippines. The City has announced plans to close the dump site as part of its Zero Waste program.

Photo by Sherma E. Benosa, GAIA

Chapter 3: Existing Indian Policy Instruments – Application, Analysis

"The filthy cities of history, which sat in clean country side, are succeeded by clean cities encircled at some distances by their wastes".

- Kevin Lynch, Wasting Away



India has many policy instruments for waste management spread across different Ministries. Lack of clarity about the laws as well as roadblocks in inter-ministerial and interdepartmental coordination makes the implementation of effective waste management difficult, often resulting in political and legal deadlock.

The National Environmental Policy (NEP) mentions that there should be efforts to, "give legal recognition to, and strengthen the informal sector systems of collection and recycling of various materials [and] in particular, enhance their access to institutional finance and relevant technologies" (2006). Some municipal bodies have made efforts on individual policies or rules; there are no comprehensive policies or laws at present to protect livelihoods in informal recycling. Existing legal and policy frameworks serve little or no purpose for the informal waste economy. They lack a synergistic strategy and buy in from different departments.

2016 marked a new chapter in the history of municipal solid waste management in India, as for the first time, the Union Government recognized the contribution of waste-pickers and defined "informal waste collectors" , in the notified Solid Waste Management (SWM)of 2016. The year also saw the release of Plastic Waste Management and Handling (PWM) Rules 2016, E-Waste Management and Handling (EWM) Rules 2016 among the others, with varying definitions and connotations. For our study, we decided to look at the following :

- **Existing Legislations on Waste Management:** We look at the legal framework as it stands currently, starting with the Indian Constitution and moving to existing Government policies, rules, and reports. After that we discuss the definitions used in three important rules SWM Rules 2016, PWM Rules 2016, EWM Rules 2016. This is followed by an analysis of what needs to be done from the informal waste economy perspective.
- **Government of India's New Initiatives:** The Government of India has announced several new missions and policies to boost manufacturing and skill development. In addition, there is increased focused on sanitation and usage of technology through Clean India (Swachh Bharat) and Smart City initiatives. All these developments have direct bearing on the informal waste sector.

The Legal Framework: Indian Constitution

Article 243W of the Constitution of India specifies the powers, authority and responsibilities of Municipalities to carry out the functions listed in the Twelfth Schedule of the Constitution. The functions that are relevant to the informal waste economy are:

Functions Relevant from Twelfth Schedule of the Constitution

Application or Relevance to the informal waste economy

 Urban planning including town planning. Regulation of land-use and construction of buildings. Planning for economic and social development. 	Spaces to be earmarked for recycling, and for the informal waste sector, across the recycling value chain.
6. Public health, sanitation conservancy and solid waste management8. Urban forestry protection of the environment and promotion of ecological aspects.	Access to waste needs to be built in the solid waste management policies across the country. In addition, access to technology for recycling.
9. Safeguarding the interests of weaker sections of society, including the handicapped and mentally retarded.	Welfare measures to be instituted by the munici pality across the recycling value chain.

11. Urban poverty alleviation





Government of India policies, initiatives and reports.

There are several rules and policies, government orders, and steering committee reports in India that clearly state the need to integrate the informal waste sector.

1990'S

1995

The Planning Commission constituted a High Power Committee on Solid Waste management under the Chairmanship of Prof. J.S. Bajaj, Member, Planning Commission, Government of India, 1995, which "Recognized waste-picker contribution, stressed the need to organize them into cooperatives and emphasized the need for them to be integrated into municipal solid waste management systems and also suggested the need to construct ward level recovery centre."

Source: https://swachcoop.com/pdf/Bajaj%20Committee%20Report%201995.pdf

1999 Recommendations For The Modernization Of Solid Waste Management In Class I Cities In India : By Report Of The Committee Constituted By The Hon'ble Supreme Court Of India (March, 1999), "Recommended that NGOs may be encouraged to organize waste-pickers for door to door collection"

Source: www.almitrapatel.com/docs/004.rtf



$2000^{\circ}S$

2000 Municipal Solid Waste (Management and Handling) Rules 2000 Note: Given that the 2016 rules have been notified, the discussions are listed below.

2002 The Report Of The Second Indian National Labour Commission-2002

One of the key points listed in the TOR was "to suggest an Umbrella Legislation for ensuring a minimum level of protection to the workers in the unorganised sector."

It is very difficult to make a list of all the employments and occupations that fall in the unorganised sector, but it is clear that the workforce in this sector covers a vast spectrum, extending from self-employed workers, part-time workers and domestic workers to workers in employments in the penumbra of the organised sector.

Source: http://www.prsindia.org/uploads/media/1237548159/NLCII-report.pdf

2006 National Environment Policy 2006, clearly states, "Give legal recognition to, and strengthen the informal sector systems of collection and recycling of various materials. In particular enhance their access to institutional finance and relevant technologies." (Section 5.2.8, point (e), Pg. 39)

Source: http://www.moef.gov.in/sites/default/files/introduction-nep2006e.pdf

2007 National Petrochemical Policy 2007 states the following :

Aim : Increase the competitiveness, polymer absorption capacity and value addition in the downstream plastic processing industry through modernization, research and development measures and freeing it from structural constraints

Facilitating investment in emerging areas of petrochemicals and achieve environmentally sustainable growth in the petrochemical sector through innovative methods of plastic waste management, recycling and development of bio-photo biodegradable polymers and plastics. (Continued)

The policy also notes that, the downstream plastic processing industry



is highly fragmented and consists of tiny, small, and medium units. Presently there are about 22000 plastic processing units of which about 75% are in the small scale sector. The small-scale sector, however, accounts for only about 25% of the polymer consumption. The industry also consumes recycled plastic, which constitutes about 30% of the total consumption. The structural constraints in the plastic processing industry relate to the reservation of articles of plastic for manufacture in small-scale sector. While there are no **quantitative restrictions on imports, incentives offered to remain small** have resulted in several suboptimal size plants operating with older generation technology. Plastic processed articles which are exported both to the developed and developing countries form about 1.2% share in the global export market even though it is one of the important foreign exchange earners of the country

Infrastructure: The Indian Petrochemical industry has been constrained by lack of adequate infrastructure.

Existing Industries: Presently plastic units are dispersed throughout the country due to incentives in the individual locations. There is a need to form clusters with provision of common infrastructure facilities to address constraints of common effluent treatment, transport linkages, power supply, water and facilities etc.

Plastic Parks: Government will evolve the feasibility of setting up dedicated Plastic Parks to promote cluster approach in the areas of development of plastic applications and plastic recycling. These would mainly benefit the downstream petrochemical industry in the areas of technology development, best practices, market development and recycling of plastic waste.

Plastic Export Parks: To enhance exports PEP would be considered to be developed as an integral part of PCPIR. In order to boost export of value added petrochemical products the existing petrochemicals export promotion bodies will be involved in the formulating appropriate strategies in the Market Access Initiatives and the market development assistance

Technology and Research and Development: The entire downstream plastic processing and fabrication industry needs major technological upgradation in the areas of scales of operation, core processing machineries, downstream finishing equipment, tools, moulds and innovations in end products to meet the emerging global and domestic market demands. **National Programme on Petrochemical Development** **Petrochemical Research and Development Fund :** The new scheme of the PRDF would cater to the projects of R & D, waste management, recycling and development of biopolymers and biodegradable polymers is proposed to be formulated. (A feasibility report of such fund was submitted in November 2010. No update on this is available on online)

Centres of Excellence in Polymer Technology: One of the focus area includes- focus of recycling process technology, innovative collection, segregation, cleaning and development of recycled products

Plastics and Environment: There is a need to develop awareness on recyclable properties of plastics.

Promotion of recycling technology for used plastics may be promoted as parallel industry. (The recycled plastics industry has also made a mark by providing employment in the manufacture of varied consumer products) Government, Industry and NGO are required for bringing awareness about the proper disposal of plastic waste and for suitable mechanisms for systematic waste collection, recycling and promote recycled products in the non-critical applications.

Initiatives on Waste Management :

Plastic Industry encouraged to take up community awareness. For curtailing indiscriminate littering efforts will be made to evolve mechanisms for industry contribution to the recovery and recycling of the post-consumer spent packages. Encouragement for the use of recycled plastic products in non-critical services will be given priority

An incentive scheme for the ULBs which contribute significantly towards plastic waste management/recycling would be formulated with the MPUD being nodal agency

Policy restrictions on import of plastic waste/Scrap reviewed in consultation with Moef and Department of Commerce.

Source: https://www.cipet.gov.in/national-policy-on-petrochemicals.php

2008

National Action Plan for Climate Change 2008 states,

"While the informal sector is the backbone of India's highly successful recycling system, unfortunately a number of municipal regulations impede the operation of the recyclers, owing to which they remain at a tiny scale without access to finance or improved recycling technologies" (3.3National Mission on Sustainable Habitat)

Source: National Action Plan for Climate Change, 2008 http://pmindia.nic.in/Pg01-52.



2008 The Performance Audit Report on Management of Waste In India submitted by the office of the Comptroller and Auditor General (CAG) (December 2008)

"MOEF/states should consider providing legal recognition to rag pickers so that recycling work becomes more organized and also ensure better working conditions for them." (Chapter 3, Section 3.5)

Source: http://saiindia.gov.in/english/home/Our_Products/Other_Reports/Study_Reports/Study_Report_Environment_Audit/Chapter_5.pdf

2008 The Unorganized Workers' Social Security Act 2008 has several definitions, schemes and acts relevant to the informal waste sector.

Employer means a person or an association of persons, who has engaged or employed an unorganised worker either directly or otherwise for remuneration

Home based worker means a person engaged in the production of goods or services for an employer in his or her home or other premises of his or her choice other than the workplace of the employer, for remuneration, irrespective of whether or not the employer provides the equipment, materials or other inputs

Self-employed worker means any person who is not employed by an employer, but engages himself or herself in any occupation in the unorganised sector subject to a monthly earning of an amount notified by the Central government or State Government from time to time...

Unorganised sector means an enterprise owned by individuals or self-employed workers and engaged in the production or sale of goods or providing service of any kind whatsoever, and where the enterprise employs workers, the number of such workers is less than ten



Unorganised worker means a home-based worker, self-employed or a wage worker in the unorganised sector and includes a worker in the unorganised sector who is not covered by any of the Acts mentioned in Schedule II of the Act

Wage worker means a person employed for remuneration in the unorganised sector, directly by an employer or through any contractor, irrespective of place of work, whether exclusively for one employer, or for one or more employers, whether in cash or kind, whether as a home-based worker, or as a temporary or casual worker, or as a migrant worker, or workers employed by households including domestic workers, with a monthly wage of an amount as may be notified by the Central Government or State Government, as the case might be

The Act also states that the State Government may formulate and notify, from time to time, suitable schemes for unorganised workers, including schemes relating to provident fund, employment injury benefit, housing, educational scheme for children, skill up gradation of workers, funeral assistance and old age homes.

The Act also lists about ten schemes such as the Indira Gandhi National Old Age Pension Scheme, National Family Benefit Scheme, Janani Suraksha Yojana, Janashree Bima Yojana, Aam Admi Bima Yojna and Rashtriya Swasthya Bima Yojna

The Schedule II lists the following Acts:

The Workmen's Compensation Act, 1923 (8 of 1923), The Industrial Disputes Act, 1947(14 of 1947), The Employees' State Insurance Act, 1948, (34 of 1948), The Employees Provident Fund and Miscellaneous Provisions Act, 1952 (19 of 1952), The Maternity Benefit Act, 1961 (53 of 1961), The Payment of Gratuity Act, 1972 (39 of 1972).

Sources: http://labour.tripura.gov.in/sites/default/files/The_Unorganised_Woekers_ Social_Security_Act_2008.pdf http://www.ilo.org/dyn/travail/docs/686/Unorganised%20Workers%20Social%20 Security%20Act%202008.pdf

2008

The High Powered Expert Committee (HPEC) for estimating the investment requirement for urban infrastructure services set up by the Ministry of Urban Development in May, 2008 stated that, "Cities and towns of India are visibly deficient in the quality of services they provide, even to the existing population The Committee believes that public services such as drinking water, sewerage, solid waste management, roads, and street lights must be accessible to one and all to achieve the goals of inclusion and to achieve both inclusion and economic growth will, however, require shifting the focus of policy from creating physical infrastructure to delivering services".

Source: http://icrier.org/pdf/FinalReport-hpec.pdf

2009 The Asian Development Bank (ADB) retained ICRA Management Consulting Services Limited (IMaCS) to develop the Toolkit for implementation of Public Private Partnerships (PPPs) in Municipal Solid Waste Management (MSWM) sector. The toolkit prepared on behalf of the Ministry of Urban Development Government of India (MOUD) and supported under the Government of India-ADB led initiative, jointly undertaken with the Department of Economic Affairs Ministry of Finance Government of India (DEA) for mainstreaming Public Private Partnerships (GoI-ADB-PPP initiative) across infrastructure sectors, lists :

> Rag Pickers: In the Indian context, rag pickers contribute a great deal in waste management as they scavenge the recyclable matter thereby saving the municipality of the cost and time of collecting, segregating and transporting garbage to the dumps. It is estimated that about 60 per cent of plastic waste gets recycled even in the absence of formal systems for waste collection. However, it is to be noted that rag pickers operating in an informal nature are often exposed to very poor working and living conditions... While MSWM efforts and planning by should leverage the presence of rag pickers, these efforts should also focus on formalising and building adequate safeguards for the same.

Source: http://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/documents/India_SolidWasteMgmt_PPP_Tookit-Volume-I_EN.pdf



2010'S

2010 Report of the Committee to Evolve Road Map on Management of Wastes in India, MOEF 2010

The scope of the committee was to examine the existing administrative and regulatory mechanism in Waste Management. The report emphasised that for Sustainable Waste Management , "Collection of segregated waste must be done by local agencies through NGOs/Association of rag pickers and self Help Groups (SHG) groups for making arrangements for collection of waste from: Households, Slums & Squatter settlements, Commercial areas, Industrial areas, Horticulture nurseries are parks, sites generating construction and demolition waste, office complexes, slaughterhouses and vegetable markets, Health Care establishments especially their non-infected waste. The inorganic/non-biodegradable waste should be channelized through informal sector workers like door-to-door collection workers, SHGs, waste worker associations..."

(contd.)

Under Recommendations, under each category the report lists :

MUNICIPAL SOLID WASTE MANAGEMENT: The inorganic/ non-biodegradable waste should be channelized through the informal sector workers like door-to-door collection workers, SHGs, waste worker associations and others to registered recyclers for recycling and only the remaining waste, which cannot be recycled should be taken to sanitary landfills by the registered recyclers or the municipality.

Plastic Waste : Inventory of plastic waste viz. waste generated, processed, recycled and disposed off in the country, including the details of manufacturers, processors, recyclers etc. with type and quantities of plastics being processed must be recorded; State-wise and city-wise data on plastic waste should be inventorised; This inventory would serve as the decision support system for formulating further policies and management rules.

Technical manuals for each type of plastics and end use applications for the benefit of all stakeholders should be prepared. Rules for manufacture, use, reuse and recycling of plastics and monitoring mechanisms for the regulatory and implementing agencies is to be facilitated; Understanding the safety issues involved in Plastics Waste Management (PWM) is to be promoted.

It further states, the responsibility of Manufacturers & Processors may include the following: · Paying for both recyclable & non-recyclable plastics and their ultimate waste management options · Setting up of safe and sustainable common plastic waste management units by plastics processors/re-processors in community areas or in designated common facility locations. · Providing incentives for adopting non-burn and novel technologies for non-recyclables · Providing incentive schemes for processors & recyclers adopting environmentally sound technologies. · Undertaking mandatory responsibility of producers for R&D activities on plastic waste mitigation.

The responsibility of the recyclers to include the following: · Recycling plastic waste into safe value-added products using environmentally sound techniques and adhering to food and health safety standards in an honest, self-regulatory manner. · Creating occupationally safe employment opportunities in recycling sector by providing safe and conducive environment for workers

The responsibility of the concerned authorities to include the following: · Capacity building for segregation of plastic waste at collection sites and safe handling by rag pickers. · Channelizing the waste collection through waste collectors associations who practice safe and environmentally sound option Coordinated approach for plastic waste management by manufacturers, consumers, collectors, re-cyclers as well as civic authorities. · Need to maintain separate waste bins designated for nonbiodegradable & biodegradable plastic waste both at residential and community level. Assuring and Ensuring involvement of the informal sector in segregated collection, sorting, storage, resale and safe reprocessing. (contd.)

Necessary infrastructure to be created for plastic waste management in various towns. Encouragement of involvement of various stakeholders especially the informal sector through self-help group formations and provision of required space and sorting facilities within the cities and towns and capability building to be initiated.





Packaging

A study should be initiated for estimating the quantity and characteristics of each type of packaging material in the waste stream, major sources of its generation and existing disposal methods being practiced.

A policy on packaging waste management system with the participation of all stakeholders should be developed.

Studies on a framework for promoting clean recycling policy for packaging waste should be developed by using Life Cycle Analysis (LCA) methods.

Guidelines/Rules should be brought out to involve large scale retailers and user industries from pharmaceuticals, processed food industries etc. in devising strategies for managing these wastes. Bureau of Indian Standards (BIS) should be requested to frame standards for manufacture and use of packaging with the idea that their reuse and recycling should not be hazardous to human health and the environment.

Plastic packaging material should be characterized and their processing recommended after proper hazard assessment as also material from other Packaging materials viz., tetra pack, paper, pharma, glass and metals. There is a need to prescribe standards for non-plastic packaging as well plastics.

Quantification and characterization of non-plastic packaging waste reaching landfill should be carried out and their recycling potential should be assessed and safe technologies for the same recommended. A comprehensive legislation on packaging waste should be initiated.

Handling of any post-consumer waste is an issue which has a collective responsibility for producers, consumers, regulators, policy makers and enforcement agencies. Therefore, conducting mass awareness programmes for manufacturers, consumers, regulators, policy makers and citizens would have to be initiated.

Strategies for recovering energy by incineration of packaging waste should be discouraged and banned.

Design safer packaging, sorting, separating, reuse, recycling and safe reprocessing should be encouraged and promoted.

 $Source: http://www.moef.nic.in/downloads/public-information/Roadmap-Mgmt-Waste. \ pdf$

2010 Report of the committee set up to frame National Sustainable Habitat Standards for the Municipal Solid Waste Management

The National Mission for Sustainable Habitat was approved by the Prime Minister's Council for Climate Change in June 2010.

LEGAL PROVISIONS

Municipal authority to identify & allocate suitable locations to facilitate sorting of recyclable waste- The Municipal Authorities may identify and allocate suitable pieces of land in 4 their Jurisdiction to facilitate sorting of various components of recyclable material collected by waste collectors and prevent such activities being carried out on the footpaths, road side, etc

http://mpurban.gov.in/pdf/MunicipalSolidWasteManagement.pdf

Report of the Committee to frame National Sustainable Habitat Standards for the Municipal Solid Waste Management

The Municipal authorities may identify & allocate suitable pieces of land in their jurisdiction to facilitate sorting of various components of recyclable material collected by waste collectors

National Action Plan for Climate Change- National Mission of Sustainable Habitat

The National Action Plan for Climate Change states that India has a significantly high rate of recycling in comparison to developed countries.

The National Mission on Sustainable Habitat which is a component of the National Action Plan for Climate Change will broadly cover the following aspects:

Recycling of Material and Urban Waste Management. A special area of focus will be development of technology for producing power from waste. The National Mission will include a major R&D programme, focusing on bio-chemical conversion, waste water use, sewage utilization and recycling options, plasma conversion of waste of biological origin to liquid fuels that can substitute for petroleum based fuels wherever possible

Report of the committee set up to frame National Sustainable Habitat Standards for the Municipal Solid Waste Management

Municipal authority to identify & allocate suitable locations to facilitate sorting of recyclable waste : The Municipal Authorities may identify and allocate suitable pieces of land in their Jurisdiction to facilitate sorting of various components of recyclable material collected by waste collectors and prevent such activities being carried out on the footpaths, road side, etc.

Duty of Municipal Authorities to provide temporary Waste storage depots

It shall be incumbent on the Municipal Authorities to either Provide and hygienically maintain adequate covered waste storage depots in the city or place at such depots large mobile covered Containers / receptacles of green colour for Separate storage of Organic/ bio- degradable waste collected from households, shops and establishments and black containers for storage of waste collected from streets and public spaces until the waste is transported to processing and disposal sites or arrange for direct transportation of such segregated waste from the source of generation to the treatment or disposal site. They shall also make adequate provision for the safe deposition of domestic hazardous waste material by the citizens as may be notified and arrange for their collection and safe disposal.

Source: http://mpurban.gov.in/pdf/MunicipalSolidWasteManagement.pdf

2010

The Ministry of Urban Development circular dated March 2010 Circular Directs the principal secretaries to include waste pickers into solid waste management and further articulates the principles on which the integration of waste pickers should occur.



2011 Plastic Waste (Management and Handling) Rule, 2011 And E-Waste (Management and Handling) Rule, 2011 Note: Given that the 2016 rules have been notified, the discussions are listed below.

2011 E Waste in India, RESEARCH UNIT (LARRDIS) RAJYA SABHA SECRETARIAT NEW DELHI, JUNE, 2011, recognising the contribution of the informal waste sector states

India has the label of being the second largest e-waste generator in Asia. According to a MAIT – GTZ estimate,83 India generated 330,000 lakh tonnes of e-waste in 2007, which is equivalent of 110 million laptops. More than 90 per cent of the e-waste generated in the country ends up in the unorganized market for recycling and disposal. The unorganized sector mainly consists of the urban slums of the metros and mini-metros, where recycling operations are carried out by the unskilled employees using the most rudimentary methods to reduce cost.

The unorganised sector consists of an assortment of small and informal businesses not governed by any stringent health and environmental regulations

In Bengaluru, the Silicon capital of India, e-waste recycling is a multicrore market where e-waste is received in Gowripalya and Nayandahalli. The e-waste scrap dealers send the segregated and dismantled e-waste parts to Delhi and Mumbai every alternative day. The e-waste recyclers earn around Rs. 2-3 lakhs a month from selling the dismantled e-waste to Delhi.

Source: http://rajyasabha.nic.in/rsnew/publication_electronic/E-Waste_in_india.pdf





2013 Ministry of Urban Development Government of India Advisory on Improving Municipal Solid Waste Management Services

Specifies the need to incorporate the '3Rs' principle (Reduce, Reuse, Recycle), decentralisation of waste and incorporation of a MIS system and also makes a mention of the importance of recycling and integrating waste-pickers.

"It is essential to save the recyclable waste material from going to the waste processing and disposal sites and using up landfill space. Profitable use of such material could be made by salvaging it at source for recycling. This will save national resources and also save the cost and efforts to dispose of such wastes. This can be done by forming a habit of keeping recyclable waste material separate from food wastes, in a separate bag or a bin at the source of waste generation. This recyclable waste can be handed over to the waste collectors (rag pickers) at the doorstep. Local bodies may mobilize voluntary organizations, Non-Governmental Organizations (NGOs) or co-operatives to take up the work of organizing street rag-pickers and elevate them to door step "waste collectors" by motivating them to stop picking up soiled and contaminated solid waste from streets, bins or disposal sites and instead improve their lot by collecting recyclable clean materials from the doorstep at regular intervals of time. Local bodies may, considering the important role of rag pickers in reducing the waste and the cot of transportation of such waste, even consider extending financial help to NGOs and co-operatives in providing some tools and equipment to the rage pickers for efficient performance of their work in the informal sector.

Local Bodies may actively associate resident associations, trade & Industry associations, Community Based Organizations (CBOs) and NGOs in creating awareness among the people to segregate recyclable material at source and hand it over to a designated waste collector identified by NGOs. The local body may give priority to the source segregation of recyclable wastes by shops and establishments and later concentrate on segregation at the household level. The upgraded rag pickers on becoming doorstep waste-collectors, may be given an identity card by the NGOs organizing them so that they may have acceptability in society. The local body may notify such an arrangement made by the NGOs and advise the people to cooperate"

Source: http://moud.gov.in/pdf/57f1f0a614e7aAdvisory%20on%20Improving%20 Municipal%20Solid%20Waste%20Manageemnt%20Services08.pdf

2014



Report of The Task Force on Waste to Energy (Volume I), Planning Commission, in the context of Integrated MSW Management (May 12, 2014)

The purpose was to identify technically feasible, financially affordable and environmentally sound processing and disposal technologies for Municipal Solid Waste (MSW) and assess, evaluate and recommend systems, processes, technological options, financial mechanisms and institutional arrangements to enhance resource recovery and promote Waste to Energy (W to E) technologies while ensuring integrated management of MSW in India. However, the report stated that, "the thrust of the task force is therefore to minimize the quantum of waste for disposal by optimal utilization of the potential of all components of MSW by adopting the "concept of 5-R" – Reduce, Reuse, Recover, Recycle and Remanufacture - and through integrated Municipal Solid Waste Management, derive energy and other useful products and ensure safe disposal of residual waste. The ultimate objective should be zero waste going to landfills". It is strongly felt that citizens and municipal authorities need to change their attitude towards waste, make serious efforts to reduce the waste and recover recyclable materials, return nutrients to the ecosystem The report also acknowledged that of the 62 million tonnes of waste generation reported, annually, the data did not include wastes picked up by kabadiwalas from households and from the streets by waste-pickers. It also stated that there are "conflicting data about the quantum of waste actually generated in urban areas in the country, principally because there is no system of periodically collecting and updating country wide data base on quantity and composition of waste".

Under Appropriate Approaches, Systems and Technological options- Integrated approach towards management Integration of kabadiwalas and rag pickers into MSWM system:

For efficient utilization of untapped resources, source segregation of MSW, recycling enabled through the informal institution of kabadiwalas and ragpickers be appropriately integrated into the system through recognition and strengthening of this sector.

The municipal authorities may support association of rag pickers or NGOs in setting up **Recyclable Waste Collection Centres (RWC)** on municipal land where the rag pickers can sell for a price the recyclable materials (not otherwise purchased by kabadiwalas) collected by them. The municipal authority may also involve the rag pickers (there are an estimated 1 million rag pickers in the country) through NGOs or private sector for picking plastic and other recyclable materials from the streets in a designated area for making the cities "litter free" and preventing the useful material going to landfills. Such rag pickers could be paid incentive money for carrying out the task satisfactorily. While protecting the interest of rag pickers care needs to be taken to prevent child labour.

To facilitate sorting of recyclable materials collected by informal sector and supporting recycling industry, the municipal authorities should set up waste sorting facilities at suitable locations and permit the informal sector to use the facility for segregation of recyclables.

It also recommends that Following national policies be framed for the implementation of action plan :

The MoUD should come out with national policy outlining the coun-

try's intentions about handling waste of all types and clearly demarcating the role of central government, states and local authorities. The national goal should be clearly stated, specifically indicating what will be achieved by the end of each Plan. ii. **A National Policy on "Recycling, Resource Conservation and Preventive Environmental Management" notified.**

Strategy National Recycling Programme (NRP): The NRP will be an overarching framework to create and mainstream the organized waste management and recycling industry. Under the NRP structured frameworks and guidelines for recycling industry should be developed to integrate it with the existing waste management rules & guidelines. Industry and sector specific recycling standards, including recycled product standards be developed under the NRP.

As a strategy, it would be prudent to make efforts to motivate the waste generators to reduce generation in the first place and reuse the waste to the extent possible, guide and enable industry and commerce to enhance recovery of materials and intermediates during manufacturing, promote segregation of recyclables at source and re-use the material in remanufacturing of products and intermediates, transitioning towards achieving the goal of optimum utilization of recyclable material

In Conclusion, It focuses it emphasizes that recovering resources and energy from the MSW must not be the sole aim , but, promotes conservation of energy and encourages minimization of waste and promoting recycling of waste in all possible manner by adopting the "concept of 5-R" i.e. **Reduce, Reuse, Recover, Recycle and Remanufacture**. vii. It recognizes the role of kabadiwalas and ragpickers and incorporates this informal sector in IMSWM. It facilitates sorting of recyclable materials collected by informal sector and support recycling industry by permitting the informal sector to use designated storage and transfer station facility for segregation of recyclables

Source: http://planningcommission.nic.in/reports/genrep/rep_wte1205.pdf





2015

Report of the Sub-Group of Chief Ministers on Swachh Bharat Abhiyaan, October, 2015, constituted by NITI Aayog as per decision taken at the first meeting of the Governing Council of the NITI Aayog chaired by the Prime Minister on 8th February, 2015

In urban areas, rag pickers form the backbone of the informal waste recycling set-up, where they collect, segregate, and sell waste to earn livelihood. Emerging approaches of waste management lay emphasis on modernisation, privatisation and mechanisation of waste management which can result in loss of livelihood for rag pickers as the formal ownership of waste may change from being openly accessible resource to a private good. In the new arrangement, only formal participants of the waste management process may have access and ownership to waste, denying the informal sector access to waste, which use it as a resource. In addition, lack of formal recognition, absence of social security, working without safety equipment and contemptuous treatment by the society, are some important issues which impinge the status of rag pickers. For efficient utilization of untapped resources and source segregation of MSW, the informal institution of kabadiwalas and rag pickers may be appropriately integrated into the system through recognition and strengthening of this sector.

They are working in unhygienic condition. By integrating them into the system, they will get accessories so that their health conditions may not get adversely affected. At the same time dignity will be accorded to their work. The municipal authorities may support association of rag pickers or NGOs in setting up Recyclable Waste Collection Centres (RWC) on municipal land where the rag pickers can sell for a price the recyclable materials collected by them. The municipal authority may also October, 2015 38 involve the rag pickers through NGOs or private sector for picking plastic and other recyclable materials from the streets in a designated area for making the cities "litter free" and preventing the useful material going to landfills. Such rag pickers could be paid incentive money for carrying out the task satisfactorily. To facilitate sorting of recyclable materials collected by informal sector and supporting recycling industry, the municipal authorities should set up waste sorting facilities at suitable locations and permit the informal sector to use the facility for segregation of recyclables.

Source: http://niti.gov.in/writereaddata/files/coop/Report%20of%20Sub-Group%20 of%20Chief%20Ministers%20on%20Swachh%20%20Bharat%20Anhiyaan.pdf

2015 National Urban Sanitation Policy

The vision for Urban Sanitation in India is: All Indian cities and towns become totally sanitized, healthy and liveable and ensure and sustain good public health and environmental outcomes for all their citizens with a special focus on hygienic and affordable sanitation facilities for the urban poor and women.

Preparatory Actions- City Sanitation Task Force

Mobilize Stakeholders: The first step in making the cities 100% sanitized is to elevate the consciousness about sanitation in the mind of municipal agencies, government agencies and most importantly, amongst the people of the city

Constitute a multi-stakeholder City Sanitation Task Force comprising representatives from

NGOs working on water and sanitation, urban development and slums, health and environment. Representatives of unions of safai karamcharis, sewerage sanitary workers, recycling agents / kabaris, etc.

Source: http://www.indiaenvironmentportal.org.in/files/nusb.pdf

2016 Note, a detailed comparison of existing Waste Management Rules 2016 have been provided below.

2016 "The National Action Plan for Municipal Solid Waste Management", [In compliance with Hon'ble National Green Tribunal Order Dated 5th February, 2015 in the Matter of OA No. 199 of 2014, Almitra H. Patel &Anr. Vs Union of India &Ors.] by Central Pollution Control Board.

Source: http://www.cpcb.nic.in/wast/municipalwast/Action_plan.pdf



2016

National Safai Karmachari Finance & Development Corporation (NSKFDC) has decided to include waste pickers as target group for providing financing and self-development skills. This decision was taken on the direction of Union Ministry of Social Justice and Empowerment (MoSJE)

The schemes related to financing and skill development are undertaken by NSKFDC, an apex corporation set up by Government of India and channelized through state channelizing agencies nominated by state and union territory governments, nationalised and regional rural banks. In Karnataka and Maharashtra, Dr B. R. Ambedkar Development Corporation and Mahatama Phule Backward Class Development Corporation are respective channelizing agencies. Similar agencies are nominated in other states by the state governments under the aegis of Social Welfare Development.

The schemes extended include financing: cheap credit at an interest rate 4 % per annum for expanding livelihood and higher educational opportunities; technical, vocational entrepreneurial training. Schemes particularly related to financing i.e. cheap credit will be beneficial for wastepickers as they are entrepreneurs and require credit to expand their micro-enterprises. An additional 10 percent of total allocation of NSKFDC for financial year 2016-2017 has been made for wastepickers, without diluting the benefits of another target group.

Reference: https://wastenarratives.files.wordpress.com/2016/11/letter1.pdf







Waste Management Rules 2016

The Ministry of Environment, Forests and Climate Change (MoEF & CC) notified the Municipal Solid Waste (Management and Handling) Rules 2016, Plastic Waste (Management and Handling) Rules 2016, E-Waste (Management) Rules, 2016, Bio-Medical Waste Management Rules 2016 Construction and Demolition Waste Management Rules 2016, Hazardous and Other Wastes (Management and Transboundary Movement) Rules 2016 replacing the earlier rules. However, for the purpose of our study, we chose three rules that have a direct impact on the informal waste economy.

A comparison of existing Waste Management Rules 2016 and implications for a Recycling Policy

In the first part we compare definitions across the three rules, to highlight the divergence and ambiguity that exists within the three policies and the need for a consolidated framework to govern the rules, to enable recognition and integration of the informal waste economy.

The Solid Waste Management & Handling Rules 2016 is a matter of celebration, as it for the first time acknowledges the contribution of waste pickers in keeping our cities clean. It also makes prescriptions for the inclusion of waste pickers and informal waste workers (identified as informal waste collectors) in waste management services. The Plastic Waste Management Rules 2016 and the E- Waste Management Rules 2016 on the other hand fail to recognise the role of the informal recyclers by way of definition, though the Plastic Waste Management Rules recognise the need for integration, the E-Waste rules effectively term the informal waste sector illegal, criminalizing their occupations.

The chart provides a cursory view on the definitions for quick and easy reference and also serves to compare basic definitions across the different rules.

Definitions across SWM, PWM, EWM Rules 2016

Term	Authorisation	Brand Owner
Solid Waste Management & Handling Rules	means the permission given by the State Pollution Control Board or Pollution Control Committee, as the case may be, to the operator of a facility or urban local authority, or any other agency responsible for processing and disposal of solid waste;	means a person or company who sells any commodity under a registered brand label.
Plastic Waste Management & Handling Rules	NA	means a person or company who sells any commodity under a registered brand label
E-Waste Management & Handling Rules	means permission for generation, handling, collection, reception, storage, transportation, refurbishing, dismantling, recycling, treatment and disposal of e-waste, granted to manufacturer, dismantler, refurbisher and recycler;	NA


means a centre or a collection point or both established by producer individually or as association jointly to collect e-waste for channelising the e-waste to recycler and play such role as indicated in the authorisation for Extended Producer Responsibility granted to the producer and having facilities as per the guidelines of Central Pollution Control Board, including the collection centre established by the dismantler or refurbisher or recycler which should be a part of their authorisation issued by the State Pollution Control Board where the facility exists;

means one of the parts of a subassembly or assembly of which a manufactured product is made up and into which it may be resolved and includes an accessory or attachment to another component; means to direct the path for movement of e-wastes from collection onwards to authorised dismantler or recycler. In case of fluorescent and other mercury containing lamps, where recyclers are not available, this means path for movement from collection centre to Treatment, Storage and Disposal Facility;

Term	Dry Waste	Decentralised Processing		
Solid Waste Management & Handling Rules	means waste other than bio- degradable waste and inert street sweepings and includes recyclable and non-recyclable waste, combustible waste and sanitary napkin & diapers, etc;	means establishment of dispersed facilities for maximizing the processing of biodegradable waste and recovery of recyclables closest to the source of generation so as to minimize transportation of waste for processing or disposal;		
Plastic Waste Management & Handling Rules	NA	NA		

E-Waste Management ど Handling Rules

NA

NA

Dismantler	Extended producer responsibility (EPR)		
NA	means responsibility of any producer of packaging products such as plastic, tin, glass		

and corrugated boxes, etc., for environmentally sound management, till end-of-life of the packaging products;

means the responsibility of a

producer for the environmentally sound management of the product until the end of its life;

Extended producer

NA

E-waste

NA

means any person or organisation engaged in dismantling of used electrical and electronic equipment into their components and having facilities as per the guidelines of Central Pollution Control Board and having authorisation from concerned State Pollution

Control Board;

NA

means responsibility of any producer of electrical or electronic equipment, for channelisation of e-waste to ensure environmentally sound management of such waste. Extended Producer Responsibility may comprise of implementing take back system or setting up of collection centres or both and having agreed arrangements with authorised dismantler or recycler either individually or collectively through a Producer **Responsibility Organisation** recognised by producer or producers in their Extended Producer Responsibility -Authorisation;

means electrical and electronic equipment, whole or in part discarded as waste by the consumer or bulk consumer as well as rejects from manufacturing, refurbishment and repair processes;

Term

Handling

Facility

Solid Waste Management & Handling Rules

includes all activities relating to sorting, segregation, material recovery, collection, secondary storage, shredding, baling, crushing, loading, unloading, transportation, processing and disposal of solid wastes; means any establishment wherein the solid waste management processes namely segregation, recovery, storage, collection, recycling, processing, treatment or safe disposal are carried out;

Plastic Waste Management & Handling Rules

NA

means the premises used for collection, storage, recycling, processing and disposal of plastic waste;

E-Waste Management & Handling Rules

NA

means any location wherein the process incidental to the collection, reception, storage, segregation, refurbishing, dismantling, recycling, treatment and disposal of e-waste are carried out;

Informal waste collector

Manufacturer

Materials Recovery Facility (MRF)

includes individuals, associations or waste traders who are involved in sorting, sale and purchase of recyclable materials; NA

means a facility where noncompostable solid waste can be temporarily stored by the local body or any other entity mentioned in rule 2 or any person or agency authorised by any of them to facilitate segregation, sorting and recovery of recyclables from various components of waste by authorised informal sector of waste pickers, informal recyclers or any other work force engaged by the local body or entity mentioned in rule 2for the purpose before the waste is delivered or taken up for its processing or disposal;

NA

NA

means and include a person or unit or agency engaged in production of plastic raw material to be used as raw material by the producer.

NA

means a person or an entity or a company as defined in the Companies Act, 2013 (18 of 2013) or a factory as defined in the Factories Act, 1948 (63 of 1948) or Small and Medium Enterprises as defined in Micro, Small and Medium Enterprises Development Act, 2006 (27 of 2006), which has facilities for manufacture of electrical and electronic equipment; NA



Term	Pre - processing	Plastic		
Solid Waste Management & Handling Rules	NA	NA		
Plastic Waste Management & Handling Rules	NA	means material which contains as an essential ingredient a high polymer such as polyethylene terephthalate, high density polyethylene, Vinyl, low density polyethylene, polypropylene, polystyrene resins, multi-materials like acrylonitrile butadiene styrene, polyphenylene oxide, polycarbonate, Polybutylene terephthalate		
E-Waste Management & Handling Rules	means the treatment of waste to make it suitable for co- processing or recycling or for any further processing;	NA		



Plastic waste

NA

Processing

means any scientific process by which segregated solid waste is handled for the purpose of reuse, recycling or transformation into new products;

Producer

NA

"means any plastic discarded after use or after their intended use is over;

NA

means persons engaged in manufacture or import of carry bags or multilayered packaging or plastic sheets or like, and includes industries or individuals using plastic sheets or like or covers made of plastic sheets or multilayered packaging for packaging or wrapping the commodity;

NA

NA

NA

Term	Recycler	Refurbisher	
Solid Waste Management ප Handling Rules	NA	NA	
Plastic Waste	NA	NA	
Handling Rules			

E-Waste Management & Handling Rules

means any person who is engaged in recycling and reprocessing of waste electrical and electronic equipment or assemblies or their components and having facilities as elaborated in the guidelines of Central Pollution Control Board; for the purpose of these rules, means any company or undertaking registered under the Factories Act, 1948 or the Companies Act, 1956 or both or district industries centre engaged in refurbishment of used electrical and electronic equipment;



Recycling	Secondary storage	Sorting	
means the process of transforming segregated non- biodegradable solid waste into new material or product or as raw material for producing new products which may or may not be similar to the original products;	means the temporary containment of solid waste after collection at secondary waste storage depots or MRFs or bins for onward transportation of the waste to the processing or disposal facility;	means separating various components and categories of recyclables such as paper, plastic, cardboard, metal, glass, etc., from mixed waste as may be appropriate to facilitate recycling;	
means the process of transforming segregated plastic waste into a new product or raw material for producing new products;	NA	NA	
NA	NA	NA	



Term	Target	Waste		
Solid Waste Management & Handling Rules	NA	NA		
Plastic Waste Management 양 Handling Rules	NA	NA		
E-Waste Management & Handling Rules	means the quantity of e-waste to be collected by the producer in fulfilment of Extended Producer Responsibility;	NA		

Waste-picker

Waste management

NA

means a person or groups of persons informally engaged in collection and recovery of reusable and recyclable solid waste from the source of waste generation the streets, bins, material recovery facilities, processing and waste disposal facilities for sale to recyclers directly or through intermediaries to earn their livelihood.

NA

means the collection, storage, transportation reduction, re-use, recovery, recycling, composting or disposal of plastic waste in an environmentally safe manner;

NA

NA



A comparison across the rules reveals the lack of uniformity in definitions of these key terms, which in turn means that there are inconsistencies with respect to the recognition of the actors and processes in the informal waste economy.

An overarching Resource Recovery Framework, incorporating the various sub rules like those of the MSW 2016, PWM2016 EW2016 etc., would address this issue by identifying synergies across the different rules and eliminating contradictions.

What needs to be done from the informal waste economy perspective?

In this section, we look at the three Waste Management Rules 2016 that highlight the duties of the stakeholder – generators, authorities, producers and the responsibility of the state government. As highlighted earlier, while the SWMRules2016 and the Plastic Rules 2016 direct to hand over segregated recyclable waste to the waste-pickers, informal waste collectors, the E-Waste Rules only focus on channelising through formal system.

Solid Waste Management & Handling Rules 2016 (MSW Rules 2016)

The SWM Rules 2016 make it mandatory as part of the duty of the waste generator (including resident welfare associations, market associations, gated communities and institutions occupying more than 5000 square meters, hotels and restaurants) to segregate waste into three separate streams namely bio-degradable, non-bio-degradable and domestic hazardous wastes and specifies that segregated waste be handed over to authorised waste-pickers or waste collectors

- The Rules specify that the Ministry of Urban Development must formulate a national policy and strategy on Solid Waste Management, within six months of the notification of said rules. It further specifies that the state must prepare a state policy on solid waste management and strategy in consultation with stakeholders including representatives of waste pickers, self-help groups and others working in the waste management sector. The rules specify the importance of state policy and strategy to focus on the principles of waste hierarchy – waste reduction, reuse, recycling, recovery and optimum utilization.
- The rules mention that state policies and strategies should acknowledge the primary role played by waste pickers; waste collectors and recycling industry in reducing waste and provide broad guidelines regarding integration of waste picker or informal waste collectors in the waste management system.
- Direct the town planning department of the State and local bodies to ensure that a separate space for segregation, storage, decentralised processing of solid waste is demarcated in the development plan for group housing or commercial, institutional or any other non-residential complex exceeding 200 dwelling or having a plot area exceeding 5,000 square meters





- Direct the developers of Special Economic Zone, Industrial Estate, Industrial Park to earmark at least five percent of the total area of the plot or minimum five plots or sheds for recovery and recycling facility.
- Start a scheme on registration of wastepickers and waste dealers.
- Setup material recovery facilities or secondary storage facilities with sufficient space for sorting of recyclable materials to enable informal or authorised waste pickers and waste collectors to separate recyclables from the waste and provide easy access to waste pickers and recyclers for collection of segregated recyclable waste such as paper, plastic, metal, glass, textile from the source of generation or from material recovery facilities;
- Provide training on solid waste management to waste-pickers and waste collectors;
- The need for inclusion of one representative from reputed non-governmental organisation or civil society working for the waste pickers or informal recycler or solid waste management and one representative from a body representing Industries at the State or Central level and one representative from waste recycling industry as part of the State Level Advisory Body to be constituted by the State Government or Union territory.

Note: Hon'ble NGT in OA No 199 of 2014 (Almitra H. Patel Vs Union of India) on 5th February, 2015 directed that "The Central Pollution Control Board shall submit its independent comment in relation to formulation of a national policy with regard to collection and disposal of a municipal solid waste as a National policy to be adopted The Hon'ble NGT also directed CPCB on 25.05.2016 to submit comments on Action Plan prepared for Bhatinda Solid Waste Management Plan".

"There are unaccounted generation of recyclable materials collected by waste pickers at source. These recyclable materials reach custody of informal sectors leaving behind the waste of less calorific value that cannot be utilize in waste-to-energy projects"

"Local bodies do not have long term action plan for managing their city waste. Whatever scheme they implement for waste management, those are worked out on day-today requirement basis or for a short term remedial measures".



Plastic Waste Management and Handling Rules 2016

The Plastic Waste Management Rules, that were notified on 18th March, 2016, clear a lot of ambiguity which was governing the management of plastic waste management in the previous years. The aim being " to give thrust on plastic waste minimization, source segregation, recycling involving waste pickers, recyclers and waste processors in collection of plastic waste fraction either from households or any other source of its generation or intermediate material recovery facility and adopt polluter's pay principle for the sustainability of the waste management system".

It further specifies that responsibility of the local body: Every local body shall be responsible for development and setting up of infrastructure for segregation, collection, storage, transportation, processing and disposal of the plastic waste either on its own or by engaging agencies or producers. (2) The local body shall be responsible for setting up, operationalisation and co-ordination of the waste management system and for performing the associated functions, namely: - engaging civil societies or groups working with waste pickers;

While the rules make a mention that the local body must engage with organisations working with waste-pickers, it fails to recognise the other actors in the informal recycling chain. The rules also state that "Every person recycling or processing waste or proposing to recycle or process plastic waste shall make an application to the State Pollution Control Board or the Pollution Control Committee, for grant of registration or renewal of registration for the recycling unit.

In both cases, the given provision leaves a lot of space for interpretation. It says that the segregated waste (plastic in this case) should be handed over to registered waste pickers' and recyclers. Karnataka High Court in its verdict given in mid-December clearly mentioned that the right over recyclables is of waste pickers. The onus of registration is not very clear in the PWM Rules. Precedent of issuance of occupational identity cards to waste pickers in Bengaluru and other cities should be regarded as the registration process for waste pickers. Municipal corporations should walk an extra mile to enumerate waste pickers and other informal waste workers with or without the help of civil society organizations, as reflected in SWM Rules 2016 Similarly, the State Pollution Control Board is mandated to carry out registration of recyclers. The existing informality in recycling has to be recognized, therefore pollution control board has to take an empathetic approach and i.e. support in organising of informal recyclers and frame a user friendly registration/inclusion mechanism, failing which the entire informal recycling chain will be rendered illegal. This will help in better implementation of rules especially in the cities and areas where extensive organizing work of waste pickers and informal recyclers has not been undertaken.

New Government Initiatives and Implications for Recycling Policy

The Government of India's flagship programs such as Make in India, Swachh Bharat, Smart City and the National Policy on Skill Development and Entrepreneurship 2015 have much to contribute to a robust recycling policy for India, integrating the informal waste economy.

Swachh Bharat and Smart Cities

The vision of Swachh Bharat (Clean India) was articulated in the address of the President of India in his address to the Joint Session of Parliament on 9th June 2014:

"We must not tolerate the indignity of homes without toilets and public spaces littered with garbage. For ensuring hygiene, waste management and sanitation across the nation, a "Swachh Bharat Mission" will be launched. This will be our tribute to Mahatma Gandhi on his 150th birth anniversary to be celebrated in the year 20109."

While the ambit of Swachh Bharat is fairly large, for our purpose we are only looking at solid waste management and integration of informal waste workers.

The document states that the integration and enumeration of waste pickers should be done. But it doesn't appreciate the role they play in recycling the generated waste. Nowhere in the guidelines had union government recommended either strengthening recycling industry or enforcing Extended Producers' Responsibility. It subtly and in places explicitly suggests 'waste to energy' as a worthy technology to deal with dry waste. For wet waste it suggests large scale composting.

The mission costs for both sanitation and solid waste management is Rs. 62009 crores as mentioned in the outlay. Government of India earmarked support is Rs. 14623 crores. States are to contribute 25% of the overall costs. Other sources have been listed in the outlay. Those are user charges, Swachh Bharat Kosh, market borrowing, corporate social responsibility and other forms of external assistance.

Mission recommends preparation of 'city sanitation plan' and 'state sanitation strategy'. Many states have undertaken the daunting task, others are lagging behind. The state governments shall pursue the following in their efforts to streamline and formalise SWM systems. It shall be the endeavour of the ULBs that the informal sector workers in waste management (rag pickers) are given priority to upgrade their work conditions and are enumerated and integrated into the formal system of SWM in cities.



Sanitation plan includes preparation of detailed project report (DPR) for solid waste management in consultation with citizens. "The Manual on Municipal Solid Waste Management, 2000 published by M/o UD and revised from time-to-time, may be referenced for DPR formulation and implementation."

There is a vague mention of litter control interventions in the mission guidelines. Most of the litter on the streets is packaging material of Fast Moving Consumer Goods (FMCG). To keep the cities litter free enforcement of Extended Producers' Responsibility on FMCG companies is must. Guidelines clearly shy away from mentioning it.

Instead the mission guidelines suggest subsidization of waste to energy projects. "In order to promote projects of waste to energy, it is clarified that the central government Grant / VGF may also be used for such projects, either upfront or as generation based incentive for power generated for a given period of time."

After explicitly suggesting incentive mechanism for waste to energy, guidelines leave the states to freely choose the technology for SWM projects, toilets and street sweeping. One wonders why such incentive mechanisms are not created for recycling industry and which will help to unleash its true potential. In the section – 'Clarification on Grant v/s Viability Gap Funding' revenue streams such as compost from organic waste, recycled construction material from C & D (Construction & Demolition) waste, Power from waste to energy plants are recommended for viability gap funding.

Ironically, it is the only reference to the word 'recycle' in the whole document. Otherwise there is no mention of it.



The guidelines are oriented towards technological solutions which will have severe implications on informal waste workers, whose integration has been asked for in the beginning of the document.

Going 'waste to energy' way is a flawed approach. It will throw many informal waste workers out of business and their numbers are not small. 25000- 30000 waste pickers, 20,000 sorters and other workers in informal waste stocking units, more than 5000-7000 scrap dealers all will go out of business in just one city i.e. Bengaluru (Arora 2015). Imagine how much loss of livelihood will happen at national level! According to one study conducted in Bengaluru, more 15000 waste pickers send around 1050 tonnes of dry waste for recycling every day, saving Rupees eight- four crores to Municipal Corporation annually (Chandran, Shekar, et al., Informal Waste Workers' Contribution in Bangalore 2014). According to a recently published paper in Economic & Political Weekly, waste pickers collect more than 10,000 MTs of waste daily for sale to recyclers. The informal waste economy centered on recycling amounts to more than \$280 million (Rs 1726 crore) annually. The robustness of recycling industry in India is recognised all over the world. There are many environmental and social benefits of informal waste economy which are yet to be accounted. In this context the subsidy to 'waste to energy' plants and silence on recycling comes out to be very odd.

Solid Waste Management and Handling Rules 2016 and Swachh Bharat: Need for realignment

While the SWM Rules 2016 clearly outline the duty of the waste generator to "segregate and store the waste generated by them in three separate streams namely bio-degradable, non-bio-degradable and domestic hazardous wastes in suitable bins and handover segregated wastes to authorised waste pickers or waste collectors as per the direction or notification by the local authorities from time to time", the Swachh Bharat's 2017 campaign promotes two way segregation, diluting the entire process in the bargain.

The 'Swachh Survekshan', a survey conducted to rank cities on various sanitation and cleanliness parameters, an initiative through the Ministry of Urban Development (MoUD) allots a maximum of 29 marks for a city of the Municipal Corporation have integrated waste-pickers in the city's solid waste management.

Smart City

"Cities are growth escalators, but smart cities are more than that. Smart cities make urbanization more inclusive, bringing together formal and informal sectors, connecting urban cores with peripheries, delivering services for the rich and the poor alike, and integrating the migrants and the poor into the city. Promoting smart cities is about rethinking cities as inclusive, integrated, and livable."

-Abha Joshi-Ghani, urban sector manager at the World Bank (2012).

The objective of Smart Cities Mission- India "is to promote cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of 'Smart' Solutions." And accordingly, the core infrastructure elements in a smart city would include: sanitation, including solid waste management.' Within this framework though, under the illustrative list of smart solutions, the mission guidelines is very suggestive of 'Waste to Energy & Fuel'.

Waste to compost, Recycling and Reduction of C&D waste are other two areas mentioned in it. It appears that recycling and the enforcement of Extended Producers Responsibility (EPR) are not smart solutions for the Ministry of Urban Development responsible for the two given missions. The mention of informal sector inclusion is made in the annexure referring to 'scope of work for Smart City Consulting Firm' which will make submission on behalf of selected city by state government, thereby undermining the contribution made by the sector and encouraging a linear method of waste management- that of use- throw-dispose.



Make in India and National Manufacturing Policy

The policy is the first of its kind for the manufacturing sector as it addresses areas of regulation, infrastructure, skill development, technology, availability of finance, exit mechanism and other pertinent factors related to the growth of the sector. Given that the vision of the policy is to create 100 million additional jobs by 2022 in the manufacturing sector, it is interesting to note that the policy has no mention of a circular economy of closed loop system to aid the sector, nor does it offer any incentives or creates a framework for the business to adopt the same.

Countries across the world are engaged in significant policy innovation by adopting circular economy. The European Commission's policy - Towards a circular economy: A zero waste programme for Europe is a step in the right direction for it covers "the full lifecycle of products: from production and consumption to waste management and the market for secondary raw materials" (European Commission 2014).



Towards a circular economy: A zero waste programme for Europe

In order to boost the economic, social and environmental benefits gained from the better management of municipal waste, the Commission proposes to:

• Boost reuse and recycling of municipal waste to a minimum of 70% by 2030;

• Increase the recycling rate for packaging waste to 80% by 2030, with interim targets of 60% by 2020 and 70% by 2025, including targets for specific materials;

• Ban the landfilling of recyclable plastics, metals, glass, paper and cardboard, and biodegradable waste by 2025, while Member States should endeavour to virtually eliminate landfill by 203025;

• Further promote the development of markets for high quality secondary raw materials, including through evaluating the added value of end-of-waste criteria for specific materials.

• Clarify the calculation method for recycled materials in order to ensure a high recycling quality level.

Source: "http://www.eukn.eu/fileadmin/Files/News/2014/towards_a_circular_ economy.pdf" http://www.eukn.eu/fileadmin/Files/News/2014/towards_a_circular_economy.pdf A few salient features that are listed in manufacturing policy could merit the informal recycling industry:

- "The National Investment and Manufacturing Zones are being conceived as giant industrial Greenfield townships to promote world-class manufacturing activities. The central government will be responsible for bearing the cost of master planning, improving/providing external physical infrastructure linkages including rail, road, ports, airports and telecom, providing institutional infrastructure for productivity, skill development and the promotion of domestic and global investments. The identification of land will be undertaken by state governments. State governments will be responsible for water requirement, power connectivity, physical infrastructure, utility linkages, environmental impact studies and bearing the cost of resettlement and rehabilitation packages for the owners of acquired land.
- Simplification of Regulatory Environments, which includes single window clearance, web enabled facilities, common application form and common register
- Acquisition of Technology & Development, including new mechanisms to introduce green technologies
- Special Benefits to SMEs, including the inclusion of lending to SMEs in manufacturing as part of priority sector lending; easier access to bank finance through appropriate bank lending norms, the setting up of a stock exchange for SMEs.
- Industrial Training & Skill Up gradation Measures: Relevant vocational and skill training through establishment of Industrial Training Institute (ITI) in Public Private Partnerships (PPP) mode; Specialized skill development through the establishment of polytechnics.; Establishment of instructors' training centre in each NIMZ."





Conclusion and Recommendations

The three existing waste management rules need to be relooked at from informal economy point of view. The same need to extend for wider discussion on circular economy in India. The rules treat waste as a problem that needs to be disposed, rather than a resource that needs to be recovered. In reviewing the law and policy framework pertaining to the informal waste economy across the value chain in the country, it may be noted that waste-pickers and informal waste collectors find a mention, their contribution acknowledged. Yet, the other actors in the recycling value chain often go unnoticed. There is a dire need for a comprehensive and inclusive policy that is complementary and progressive. The policies need to move beyond waste as a problem to waste as a resource securing the livelihoods of the people who work in the informal waste economy.

There needs to be an overall convergence within the different rules released in 2016 - Municipal Solid Waste Management and Handling Rules 2016, Plastic Waste (Management & Handling) Rules 2016, E-Waste Management and Handling Rules 2016, with common definitions of actors and stakeholders.

Key takeaways from review of the legislative framworks:

- The need for an overarching framework pertaining to Recycling and Resource Recovery, with emphasis on the informal actors in the waste economy.
- Convergence of the different rules on the need to recognise waste as a material and accord similar status across the different streams to the informal actors involved in recovery of the waste- in different streams and definitions within the rules to be in conjunction across Solid Waste, Plastic Waste, E-Waste.
- Countries all over the world developing and developed are moving towards circular economy, breaking away from the trajectories of linear economy (waste to be disposed). Circular economy is closing the loop (nothing goes as waste). Indian manufacturing policy needs to orient itself towards circular economy to catch up with the rest of the world.

Chapter 4: A Note on Statistics of Plastic Waste Generation

ED

"Often when you think you're at the end of something, you're at the beginning of something else."

- Fred Rogers, Television Personality

A note on numbers

For the study, statistics related to plastic waste production, generation and consumption were looked in. There is little or no clarity on the quantity of plastic waste generated in India and the amount sent for recycling. The government data has not been updated and at its best are estimates. The industry report is inconclusive. We have quoted briefs and summaries of various reports produced by various committees, industrial association, master plan, annual reports etc. An independent analysis has not been carried out, as we believe that the quotes themselves present enough evidence on the contradictions with the various statistics over the year.

Summary of literature available on plastic wastes generation and recycling :

Working Group on MSW, Plastic, Demolition and Packaging Waste, constituted by the Committee of MoEF to evolve Roadmap for Management of Wastes in the country- 2008, under the Chairmanship of Shri K J Dadoo, Secretary (Environment), GNCTD

"The presentation by the Sub-group on Plastic waste under the Chairmanship of Dr. R K Khandal in the second meeting of the committee held on 4th September 2009 stated the following: Plastic Waste generated is an estimated quantity of 10,000 TPD i.e., 9% of MSW. The per capita generation of plastic waste is 5.7 kg per annum. The groups documented that 90% of the plastic types are recyclable. There is a need for exact quantification of such wastes. The working was of the view that since the plastic waste generation is bound to grow, therefore the implementation of regulatory system need to be made more effective."

Source: http://www.moef.nic.in/downloads/public-information/Roadmap-Annexures.pdfhttp:// www.delhi.gov.in/wps/wcm/connect/e47984804eed8625abb9bbfe99daf05a/MINUTES+MSW_ 08Dec08.pdf?MOD=AJPERES&CACHEID=e47984804eed8625abb9bbfe99daf05a

Planning Commission Note 2011

As per 2011 census, the 377 million people living in 7,935 urban centres (with 4,041 statutory municipal authorities and 3,894 town with more than 5,000 people of which 75% are male involved in non-agricultural activity), generate 1, 70,000 TPD and 62 million tonnes of MSW per year which is based on an average per capita generation of 450gm per person per day. It needs to be noted that 62 million tonnes of waste generation reported, annually, does not include wastes picked up by kabadiwalas from households and from the streets by rag pickers. As per MoUD, 70 million tonnes of waste is generated currently in urban centres. There are thus conflicting data about the quantum of waste actually generated in urban areas in the country, principally because there is no system of periodically collecting and updating country wide data base on quantity and composition of waste.

Source: http://planningcommission.nic.in/reports/genrep/rep_wte1205.pdf



Report of the Sub-Group on "Environment" for 12th Five Year Plan (Dated October 2011)

As per CPCB estimates, around 57 million tonnes per annum of MSW is presently generated in the country. Based on its physico-chemical characteristics, the MSW generated in Indian cities is suitable for composting. At present, the country has a rated capacity of processing around 6000 tonnes per day of mixed waste into compost. However, the efficiency of the compost plants needs to be enhanced for them to become competitive. Although nearly 60% of plastic waste is recycled, the management of certain types of plastics like thin polythene bags and PET bottles still remains a matter of concern due to low collection efficiency.

Source: http://planningcommission.gov.in/aboutus/committee/wrkgrp12/enf/wg_envr.pdf

Central Pollution Control Board Report 2013

According to CPCB report 2013, India generated about 56 lakh tonnes of plastic waste annually which is about 689.5 tonnes a day. And the total plastic waste collected and recycled was estimated at around 9,205 tonnes per day (approximately 60% of total plastic waste) and 6,137 tonnes remain uncollected and littered).

Source: http://www.cpcb.nic.in/divisionsofheadoffice/pcp/management_plasticwaste. pdf

A TOI article, stated the four metros are major culprits in generating such waste, with Delhi producing 689.5 tonnes a day, followed by Chennai (429.4 tonnes), Kolkata (425.7 tonnes) and Mumbai (408.3 tonnes). Bengaluru was ranked eighth with 144.21 tonnes.

Source: http://timesofindia.indiatimes.com/home/environment/pollution/Plastic-waste-time-bomb-ticking-for-India-SC-says/articleshowprint/19370833.cms?null

Report on Indian Plastic Industry 2013-2017 Edition 2 (November 2014), by Plastic India Foundation provides an overview of the industry.

It states that India's per capita consumption of virgin polymer is around 9.7 kg, lesser than that of USA (109kg), China (45kg), Brazil (32kg) and per capita consumption of recycled material was at 3.3 kg, which put the per capita consumption in 2013-14 of virgin +recycled plastic at 13kg.

The exports of plastic raw material and processed goods were valued at USD 7.9 billion in 2013-14.

With Plastic Recycling, the report states that the last industry study on recycling was published in 2008. The report estimates the number of organised recycling units at 3500 and unorganised recycling units at 4000. It details out major type of plastics recycled such as PET, HDPE, PVC, LDPE/LLDPE, ABS, PMMA etc. It further estimates the manpower directly involved in plastic recycling at about 6,00,000 and manpower indirectly involved in plastic recycling around 10,00,000.

The report states the quantum of plastics recycled per annum at about 4 million metric Tonnes, based on the following estimates: 70% of PET bottles are recycled, Large imports of plastic scrap and waste pairings, waste generated by plastic industry, industrial plastic waste, recycling including plastics from household, furniture etc. applications and plastic products going into municipal solid waste.

The main plastic recycling clusters in the country that were listed were Dhoraji, Vapi, Gujarat, Daman, Malegaon (Dyana) and Solapur, Dharavi and Bandup in Maharashtra Indore, Madhya Pradesh and Delhi NCR region.

Source: http://www.plastindia.org/pi-status-report-pdf.html#book/

Potential of Plastics Industry in Northern India with special focus on Plasticulture and Food Processing – 2014 : A report on plastics industry, A FICCI Report

Recycling of plastics is one of the foremost steps towards innovation and sustainability in this industry. Currently in India, number of organized recycling units for plastics is ~3,500 along with additional ~4,000 unorganized recycling units. Most of the plastics (PE, PP, PVC, PET, PS,) etc. could be recycled via mechanical route. Whereas, engineering plastics like PBT, SAN and Nylon etc. are recycled by selected recyclers. In India, recycling of plastics is currently 3.6MnTPA and it provides employment to almost 1.6 Million people (0.6 million directly, 1 million indirectly).

Source: http://ficci.in/spdocument/20396/Knowledge-Paper-ps.pdf

The Report of the Task Force on Waste to Energy (Volume I) (In the context of Integrated MSW Management), Planning Commission, May 2014

"As per 2011 census, the 377 million people living in 7,935 urban centres (with 4,041 statutory municipal authorities and 3,894 town with more than 5,000 people of which 75% are male involved in non-agricultural activity), generate 1, 70,000 TPD and 62 million tonnes of MSW per year which is based on an average per capita generation of 450gm per person per day. It needs to be noted that 62 million tonnes of waste generation reported, annually, does not include wastes picked up by kabadiwalas from households and from the streets by rag pickers. As per MoUD, 70 million tonnes of waste is generated currently in urban centres. There are thus conflicting data about the quantum of waste actually generated in urban areas in the country, principally because there is no system of periodically collecting and updating country wide data base on quantity and composition of waste".

Source: http://planningcommission.nic.in/reports/genrep/rep_wte1205.pdf

Report of the Sub-Group of Chief Ministers on Swachh Bharat Abhiyaan, October, 2015, constituted by NITI Aayog as per decision taken at the first meeting of the Governing Council of the NITI Aayog chaired by the Prime Minister on 8th February, 2015

As per CPCB report of 2012-13, out of the 1,33,760 metric tonnes per day of MSW generated daily, only 91,152 TPD waste is collected and 25,884 TPD treated. The MSW, therefore, dumped in low lying urban areas is a whopping 1,07,876 TPD, which needs 2,12,752 cubic meter space every day and 776 hectare of precious land per year. The CPCB Annual Report 2013 reveals that only 68% of the MSW generated in the country is collected of which, 28% is treated by the municipal authorities. Thus, merely 19% of the total waste generated is currently treated. The remaining waste is disposed of at dump sites / landfill sites untreated. The collection efficiency ranges between 70 to 90% in major metro cities, whereas in several smaller cities it is below 50%. It has been estimated that the ULBs spend about Rs. 500 to Rs.1500 per tonne on solid waste collection, transportation, treatment and disposal. About 60-70% of this amount is spent on collection, 20-30% on transportation, and hardly any fund is spent on treatment and disposal of waste.

Report of the Sub-Group of Chief Ministers on Swachh Bharat Abhiyaan, October, 2015, constituted by NITI Aayog as per decision taken at the first meeting of the Governing Council of the NITI Aayog chaired by the Prime Minister on 8th February, 2015

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Source: Report of Task Force on Waste to Energy, 2014 * Andhra Pradesh includes Telangana Note: Municipal Solid Waste in Metric Tonnes/day for top 20 States/UTs which together constituted nearly 97% of total MSW generated in 2012.

Estimated Municipal Solid Waste Generation in India, 2012 (in metric tonnes/day)

Uttar Pradesh	19,180
Maharashtra	17,000
Tamil Nadu	14,532
Andhra Pradesh	11,500
West Bengal	8,674
Gujarat	8,336
Delhi	7500
Karnataka	6500
Madhya Pradesh	5079
Rajasthan	5037
Jharkhand	4450
Punjab	3853
Haryana	3490
Odisha	2383
Chhattisgarh	1896
Jammu & Kashmir	1792
Bihar	1670
Kerala	1576
Himachal Pradesh	1370
Uttarakhand	1251



Studies conducted by National Environmental Engineering Research Institute (NEERI) show that waste composition has changed rapidly during 1996-2011 and the proportion of high calorific value waste is increasing. The change in composition of waste is illustrated below:

Composition of Solid Waste in India

Year	Composition (in percentage)							
	Biode- gradable	Paper	Plastics	Metal	Glass	Rags	Others	Inerts
1996	42.21	3.63	0.60	0.49	0.60	Nil	Nil	45.13
2005	47.43	8.13	9.22	0.50	1.01	4.49	4.016	25.16
2011	42.51	9.63	10.11	0.63	0.96			17.00

Source: Report of Task Force on Waste to Energy, 2014

Plastic Waste

There is no authentic estimation of annual plastic waste generation in India, assuming 70 percent of total plastic consumed ends up as waste, approximately 5.6 million tonnes of waste plastic are generated annually. With 15,342.46 tonnes of plastic waste being generated daily, only 9,205 tonnes /day (60 percent by weight) is collected, while the remaining 6,137 tonnes/day remains uncollected and littered. A study conducted by Central Pollution Control Board (CPCB) and Central Institute of Plastics Engineering and Technology (CIPET), Allahabad, on assessment and quantification of plastic waste generated every day, with four big metros being the major contributors. Delhi was the highest producer (October, 2015) with 689.5 tonnes/day, followed by Chennai (429.4 tonnes/day), Kolkata (425.7 tonnes/day) and (Mumbai 408.3 tonnes/day).



A report on Plastic Industry-January 2016 by the Federation of Indian Chambers of Commerce and Industry (FICCI) and TATA Strategic Management Group (TSMG), presented at the Poly India 2016, Third Conference on Polymers and Plastics Under the theme Indian Plastic Industry: Challenges and Opportunities

- Plastic Industry has grown at 10% CAGR (Compound Annual Growth Rate) over the last five years to reach 13.4 MTPA (million tonnes per annum) in FY15 (Financial Year 2015). Plastic Industry is estimated to grow at ~10% in the near future reaching 21.6 MTPA by FY20.
- India's plastic manufacturing industry is worth approximately INR 90,000 crore in 2015
- India is presently the third largest consumer of plastics globally after the United States and China.
- The industry employs about 40 lakh people directly or indirectly and has more than 3000 processing entities that symbolize a promising manufacturing sector
- The downstream plastic processing industry is highly fragmented and consists of micro, small and medium units. Presently there are about 26000 registered plastic processing units of which 75% are in the small scale sector. The small-scale sector, however, accounts for only about 25% of polymer consumption. The industry also consumers recycled plastic, which constitutes about 30% of total consumption.
- India's Current per capita consumption is pegged at 9.7 kg way below U.S at 109kg and China 29kg
- The packaging industry in India is one of the fastest growing industries, with influences both direct and indirect across all industries, is worth about ~USD 15 billion, registering a CAGR of 16% in the last five years. The per capita consumption of packaging in India is only 4.3kg whereas neighbouring countries like China and Taiwan is about 6kg an 19kg respectively.
- The Indian Auto industry is one of the largest in the world with an annual production of 23.3 million vehicles in FY15, thereby stating the high potential for plastic usage to rise in the auto segment.





August 2, 2016 article in the Outlook: 15,342 Tne Plastic Waste Generated in India Everyday

It states, "More than 15,000 tonnes of plastic waste are generated in India every day, of which 6,000 tonnes remain uncollected and littered", quoting the government sources. Citing the Central Pollution Control Board report, the article says," As per the CPCB report in 2014-15, 51.4 million tonnes of solid waste were generated in the country, of which 91 per cent was collected, and 27 per cent was treated and remaining 73 per cent disposed of at dump sites". Central Pollution Control Board has estimated the generation of 15,342 tonnes of plastic waste in the country, out of which, 9,205 tonnes were reported to be recycled and leaving 6,137 tonnes uncollected and littered.

Source: http://www.outlookindia.com/newswire/story/15342tn-plastic-waste-generated-in-india-everyday/948788 http:// www.outlookindia.com/newswire/story/15342-tn-plastic-wastegenerated-in-india-everyday/948788

Insights Plastic Industry in Focus Newsletter October-December 2016, Vol -49

"Plastic consumption of India is set to increase from the current 12 million metric tonnes per annum to 20 million metric tonnes per annum. India will deploy one lakh eighty thousand machines by the year 2020 as compared to the current one lakh, thirteen thousand. The export of plastics finished goods alone is said to nearly double from \$7.9 billion currently to \$15 billion in next five years. The industry is determined to play significant role in executing government's vision of rising exports to \$900 billion by 2020"- Mr. Rajeev Chitalla, NEC Chairman, 10th edition of PlastIndia International.

Source: http://www.plastindia.org/insights-dec2016-pdfhtml#book/7

Karnataka-specific Reports

The Urban Waste Expertise Programme Report Plastic Recycling in Bangalore - India 1997 The estimated per capita demand of plastics in India is 0.800 Kgs. which is one of the lowest in Asia. The projected demand in 2000 A.D. is 2.16 Kgs. per capita (KSSPMA, 1992). A boom in the consumption of plastic is experienced with the economic liberalisation since 1991. Plastic consumption in India has more than doubled from 0.85 million tones during 1990-91 to 1.79 million tones during 1995-96. Demand for commodity plastics is growing at the rate of 15 % per year. As per the survey conducted by the All India Plastic Manufacturers Association the total capacity to produce PE, PVC, PP and PS was 1.39 million MT and demand was 1.55 million MT in 1995 which has increased to 1.8-1.9 million MT for 1996-97 (KSSPMA,1992). This is concentrated in three major sectors according to the Plast India figures: infrastructure (power, telecommunications, roads, bridges and construction) which is 30 % of the total, packaging is 25 % of the total and 24 % for agriculture and water (Nanavaty, 1997). Based on the end use consumption pattern the plastic waste generated has more than doubled to 0.8 million tones during 1995-96. It is estimated that at a macro level 50 % of the quantity of virgin raw material consumed reaches municipal waste stream annually. Although on weight basis the level of plastics waste in municipal waste stream is only 3 % to 4 %, they occupy 25 to 30% of the volume. It is projected that the plastic waste generation will reach the level of 1.6 million tones annually by year 2001-02 (Sundaresan, 1996)

There is no accurate data available on nature and number of plastic recycling units in India although various estimates are available. The current plastic recycling rate is estimated as 60% by Plast India Foundation (KSSPMA, 1992). But the discussions with knowledgeable persons reveal it to be anywhere between 80% to 93%. One estimate is that about 20,000 micro enterprises are engaged in reprocessing and recovery of plastic waste in addition to 180,000 of various sorting and washing units, 60% of which are unregistered (Harriman Chemsult, 1996). Delhi alone has estimated 53,400 units and Delhi and Bombay together process over 50% of India's waste plastics. There is heavy concentration of recycling units reported in Gujarat and Goa, which, as a whole, account for 40%. As per other estimates there are about 18,000 recycling units spread all over the country, with about 2500 palletizing units with an average output of 350 MT/ year and an over all output of over 875 kTA (Nanavaty, 1997). India nevertheless has some of the world's largest plastic waste markets. Notable among them are: Jawalapuri in Delhi for PVC, Nand Nagari in New Delhi where trading level reaches 1000 MT/day, Dharavi in Bombay and Jolly Mohalla in Bengaluru.



Each region is also specialized in one type of plastic, viz. North: PVC; South: HDPE; West: all types but more emphasis on LDPE and LLDPE; East: PP. It was suggested that one million tone of waste plastic would have been recycled or otherwise reused in 1996 - including 40% of 1995 consumption of virgin plastic and 30 % of pre 1995 production which had been reprocessed before.

The number of people engaged in recycling sector is unknown but vast. Some figures suggest that 750,000 people are employed including 86,000 rag pickers specialized in plastics (Harriman Chemsult, 1996). On an average 15 persons are required to process 240 MT/annum. Using this norm it is estimated that more than 54,000 people are employed in processing alone.

Recycling Industry in Bengaluru: As per an estimate, Bengaluru has around 300 reprocessing units with main thrust on recycling of all polyolefins and PVC although PVC recycling units are only 7 to 10. 70 % to 80 % of the collected, post-consumer waste is exported to Delhi, Bombay and Gujarat for reprocessing. Jolly Maholla is the center for the purchase of scrap material whereas the reprocessing units are spread all over Bengaluru with more concentration in Nayandahalli and New Timber Market on Mysore Road. In Nayandahalli itself around 100 pelletisation and product manufacturing units are located.

Amount of Plastic Waste Recycled: According to a study, 25,000 and odd number of waste pickers or chapparwalas as known in the local language, recover 15 % of the refuse, of which 4.08 % is estimated as plastic. On an average, a waste picker picks 8 kgs. of plastic waste and works for 17 days a month. That accounts to 136 kgs. of plastic waste picked by a waste picker in a month. If this is averaged out to 30 days of picking in a month, per day 25,000 waste pickers can collect 136 tonnes of plastic waste. In addition there are estimated 3000-4000 itinerant waste buyers in Bengaluru and if they collect average 10 kgs of plastic waste per day for 25 days of a month, 250 kgs of plastic waste is collected by a itinerant waste buyer in a month. If it is averaged out to 30 days of collection in a month an IWB collects 8 kgs per day of plastic waste. This amounts to total 28 tonnes of plastic waste collected by all itinerant waste buyers in Bengaluru. If 80% of total 164 tonnes of plastic waste traded is exported out of Bengaluru, remaining 20% i.e. 32.8 tonnes per day of postconsumer plastic waste is circulated in Bengaluru. Assuming 250 kgs per day of recycling capacity of a unit and estimated 300 such units in Bengaluru 75 tonnes of plastic waste is recycled everyday. Of which 32.8 (43%) tonnes is post consumer waste and rest is acquired through industrial sources.

Karnataka State Environment Report 2003

In Karnataka, there are about 2996 plastic industries producing about 600 metric tonnes of produce per day and generating plastic waste of 28 metric tonnes per day. Bengaluru district alone has about 1,199 plastic industries which generate about 11 metric tonnes per day of plastic waste. The plastic waste generated in household sector is estimated to be around 470 metric tonnes per day. Plastic waste in Bengaluru forms 176 metric tonnes of the total 2500 metric tonnes per day of waste generated. In Bengaluru around 300 plastic reprocessing units are functioning with a daily turnover of more than Rs. 28 lakhs while on an average 35 tonnes of non -recyclable plastic is being disposed indiscriminately every day in and around Bengaluru. Plastic recyclable wastes have a market value ranging from one rupee to fifty rupees per kilogram depending upon the type and source of plastic.

Recyclable Material

Market Value

Plastic Wires (PVC Based)	10-50
Plastic Bags and Packaging Material made out of virgin material	8-10
Buckets, Drums, Can Disposable Cups, Bottles, Rigid pipes, agricultural pipes, plastic crates, cassettes, pens, box straps, bobbins, shampoo bottles, woven sacks etc	2-16
Milk pouches	8-10
Electronic items like computer components, calculators, television housing	1-6
Car bumpers	1-6
Industrial waste like weaving wastes, cutting wastes, damaged items	5-8
Mixed colour polythene bags	2-3

Source: http://parisara.kar.nic.in/pdf/WasteMgmt.pdf

SWM Master Plan 2008

The SWM Master Plan (2008) formulated by the BBMP states that the quantity of MSW for 2009 was estimated at 3000 TPD and the per capita waste at 350 gms per day. And the composition of plastic waste in the total MSW was pegged at 12%.

Source: http://218.248.45.169/download/health/swm.pdf

State of Environment Report Karnataka 2011, by EMRI According to Directorate of Municipal Administration (DMA), Karnataka generated 8825 tonnes per day in 2009, with Bengaluru being the largest contributor 4500 tonnes per day.

Source: http://www.moef.nic.in/sites/default/files/SOER-Karnataka-2011-EMPRI(I).pdf

The Environment Report Card of Bangalore 2012 by the Centre for Sustainable Development (CSD) states the following :

Solid waste Rapid urbanization and drastic change in the culture and practices of people has led to huge generation of household Municipal waste. It is estimated that the quantum of municipal waste generated is about 3,000 to 4,000 MT/day. Roughly 60% is organic waste 20 Centre for Sustainable Development (CSD) Chapter 2 and 40% dry waste. The quantum of waste generated far exceeds the existing capacities of the waste treatment facilities at Mavallipura (600 TPD), Mandur (1000 TPD), Terra Firma (600 TPD), Seegehalli (200 TPD). The primary collection is carried out using 11,000 nos. of pushcarts and 650 nos. of auto tippers. During post collection from households, the waste is transported by about 600 vehicles which include compactors, tipper lorries, dumper placers and mechanical sweepers both by BBMP and private contractors.8 As per the MSW Management Rules 2000, BBMP is responsible for collection, handling and disposal of the MSW. In several areas BBMP has resorted to door to door collection of garbage. Street sweeping is manually done as well as mechanically in certain areas. BBMP has accorded permission to 4 major private agencies for handling the MSW based on the PPP model. It has adopted the GPS/GPRS based tracking system for 350 vehicles carrying MSW to various disposal sites. CCTV has been installed at all the processing sites including hand held devices connected to the central server for monitoring and analysis. In a few pockets of the city, there is a decentralized waste treatment system with a simple aerobic composting which reduces the burden on landfill. However, problems of collection and disposal of waste continue with garbage being thrown on roadside and into drains, and final disposal being still unsatisfactory.

E-waste Wastes generated from Electrical & Electronic Equipment (WEEE) are regarded as e-Waste. The change in lifestyle patterns and the growth of IT companies has resulted in huge e-waste generation as Bengaluru pays a price for being the Silicon Valley of India. Among the metropolitan cities of India, Mumbai ranks first followed by Delhi and Bengaluru in e-waste generation. The amount of e-waste generated in Bengaluru is approximately about 8,000 tonnes/year. It is essential to dispose of the e-waste in an environmentally sustainable manner. A few agencies authorized by KSPCB have undertaken reprocessing/recycling of e-wastes. Most of the e-waste is however handled in the informal sector. The e-waste (Management and Handling) Rules, 2011 have come into effect from 1st of May 2012.9 These rules not only covers WEEE but also rejects from manufacturing and repairing processes. The producers or manufacturers of the specified electrical and electronic equipments are liable under the principle of Extended Producer Responsibility (EPR) to take care of their goods beyond manufacturing i.e. until environmentally sound management of products' end-of-life. However the producer should ensure that e-waste is channelized to a registered recycler and also have a check on collection and channelization by authorized collection agencies.

BBMP Integrated SWM Policy 2012

Solid Waste Management has become a major environmental issue. Bengaluru city had 56.86 lakh of population in 2001 which has increased to 84 lakhs in 2011 including the newly merged area accounting to a population density of 10,500 persons/sq.km. The per capita MSW generated per day in Bengaluru is about 500 grams and MSW generation in the city has increased from 2500 tonnes per day to 5000 tonnes per day in a span of 10 years. (SWM Master plan)

Source: http://218.248.45.169/download/engineering/iswmp.pdf

Municipal Solid Waste Annual Report 2013-14 of Karnataka State Pollution Control Board As per the annual report submitted by the local bodies including the BBMP for the year upto 2013/2014, the Karnataka State generates about 8784 Tonnes/Day. Of which (1)BBMP generates 3500 T/D and collects 3000T/D (85%) (2)Other 218 local bodies generates 5284 T/D and collects 4602T/D (87%)

Source: http://kspcb.kar.nic.in/MSW%20Annual%20Report%20%202013-14%20.pdf


Comptroller and Auditor General (CAG) of India : Performance Audit of Solid Waste Management in BBMP 2013

A performance audit of 'Solid Waste Management in Bruhat Bengaluru Mahanagara Palike (BBMP)' was conducted (March-August 2013) as the city faced an unprecedented garbage crisis in August 2012 due to indiscriminate dumping of mixed waste, public protests and closure of some of its landfill sites/dump yards on account of non-compliance with MSW Rules

Assessment of quantum of waste generated: Proper assessment of quantity and characteristic of waste generated is essential for correct planning and successful implementation of SWM. It was, however, seen that BBMP did not have data about quantum of waste generated annually for the period under review. It is pertinent to mention that the Hon'ble High Court had directed (January 2013) BBMP to weigh, for one month, MSW collected from each ward, after it was transported to the filling stations and before it was unloaded. Accordingly, BBMP had weighed MSW collected from each ward for the month of February 2013 and average waste generation was reported as 3,600 metric tonnes (MT) per day. Scrutiny of this weighment statement showed abnormal variations in the quantum of waste collected on different days in the same wards, raising doubts about the reliability of data. The absence of complete and reliable data rendered waste management programmes ineffective and resulted in unscientific disposal of MSW, as discussed in succeeding paragraph. The State Government, while accepting the audit observation, stated (January 2014) that action would be taken to assess the quantum of waste generated and rectify the discrepancies pointed in audit.

As stated earlier, the quantum of waste generation for the year 2008 was projected at 5,033 MT per day. However, the processing capacity in BBMP was only 2,900 MT per day from four131 integrated facilities for processing and disposal of MSW (1 Bommanahalli (300 MT), Doddaballapur (1,000 MT), Mandur South (1,000 MT) and Mavallipura (600 MT)

Plastic waste comprises any plastic product such as carry bags, pouches or multi-layered packaging, which have been discarded after use or after their intended life is over. Under the Plastic Waste (Management and Handling) Rules, 2011, Municipal authority is responsible for regulating the usage of plastics and is responsible for setting up, operationalisation and co-ordination of the waste management system and associated functions to ensure safe collection, storage, segregation, transportation and disposal of post-consumer plastic waste. Audit observed the following in respect of plastic wastes: a) During joint physical verification of landfills, huge quantities of plastics were seen dumped at the sites without recovering the plastic for channelisation to recyclers. b) Segregation of waste was minimal and the processing of plastics was done only in two out of ten landfills. Chapter IV-Results of Audit 153 c) Under the principle of Extended Producer's Responsibility (EPR) plastic manufacturers should finance the establishment of plastic waste collection centre but no action was taken by BBMP in this regard. d) Plastic rules were not incorporated in the Municipal bye laws of BBMP. The State Government accepted (January 2014) the observations made by Audit and stated that action would be taken to get plastic manufacturers to finance establishment of plastic waste collection centres under EPR and that amendments would be made in KMC Act to incorporate plastic waste rules.

Source: http://saiindia.gov.in/sites/default/files/audit_report_ files/Karnataka_Report_5_2014_chap_4.pdf





Conclusion

It is evident from the existing literature that data quoted is dated. Discrepancies exist and hence any tabulation must be treated as estimates. One of the reasons for varying numbers is that no one tracks the waste, once it leaves the waste generator. Many cities are still following tipping fee model, where a contractor is hired to collect and dump the waste and he is paid according to the weight of the truck carrying waste at the dumping site. It is our assumption that some of these numbers were taken from the formally registered plastic manufacturing units. These numbers very rarely include the quantum of the waste retrived by informal waste recycling industry. There is requirement of due diligence to understand the scale of waste generated in India, for any solution to be put in place.

Chapter 5: Case Studies of Waste Markets & Recycling Hubs

10

1.9%





Glimpses of Recycling in *Dharavi, Mumbai*

A city within a city.

Multi-ethnic, dynamic and entrepreneurial are just few adjectives that describe Dharavi. "At three sq km land area and over one million inhabitants, Dharavi is hailed as Asia's largest slum or "jhopad patti", said Mohammed our guide, outside the walkway at Mahim West Railway Station. Though the tag the biggest slum is misnomer, given that other slums around have surpassed Dharavi, there is something distinctly unique about this mega slum – a city within a city, challenging the traditional notion of a slum.

Dharavi's location is of prime importance as it sits between two main suburban rail lines- Mahim West and Sion and near the Bandra-Kurla Complex, the new business district. In short "a real estate goldmine"! A once tiny fishing island, Dharavi soon became a dump yard for waste, the poor, the migrants and the creek that sustained fishing transformed into a sewage line. Excluded and isolated, Dharavi became a hub for informal economy post-Independence.

As you walk down the steps of the walk way the visuals of Dharavi stretches out like a hodgepodge of asbestos sheet structures, blue tarpaulins, wood and some concrete bricks which give way to the maze of matchbox buildings; the cranking sounds of plastic crushing machines and beating of tins, hammering & soldering provide the background music and the smell of vada pav quickly overpowers you. Mohammed quickly explains the photography policy and the tour segmentfirst the commercial area and second the residential area. Multi-ethnic, dynamic and entrepreneurial are just few adjectives that describe Dharavi. "At three sq km land area and over one million inhabitants, Dharavi is hailed as Asia's largest slum or "jhopad patti", said Mohammed our guide, outside the walkway at Mahim West Railway Station.

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The 13 Compound Industrial Area

Dharavi is home to over 10,000 small establishments that has transformed the place into a sustainable entrepreneurial hub. We are first taken to 13 Compound Industrial areas that house the recycling and scrap area of Dharavi, where everything is recycled – bottles, drums, paper, cardboard, soap, tin, iron. While over 1000 odd establishments have licenses, many small set-ups co-exists silently transforming trash.

Standing outside a small ten by ten godown, where computer keyboards are being disassembled, Mohammed directs us to climb up a narrow, creaky ladder and throws in a rope for a rail. On the first floor we are greeted with crushed / powered parts being sifted. Mohammed urges us up the ladder, with no support, you literally have to balance and hold on to the ladder to reach your way up to the roof top to see the overview of Dharavi.

On the roof tops of most buildings are different types of plastics piled up – on some plastic chairs, containers, trays take up the roof space, and in some plastic beads are left for drying separated by colour- white and black. In the periphery one can spot the high rises and other new construction.

Leading the City's green movement

After quick photographs, including selfies, we make our way down to meet the owner of the place who proudly tells us that, "Dharavi is a close knit community. We recycle 80 % of Mumbai's waste but not many recognize that recycling is important tool to fight global warming, conserve resources, reduce costs and is a source of employment to over a million people in the city".

He goes on to explain that "Dharavi is the recycling center of India. With increased consumerism, waste-pickers the poorest of the poor often make ends meet by picking up waste discarded by people and in turn sell it to local scrap dealers who sell it here to people in Dharavi. Their role, though indispensible, often escapes the narratives of a municipal waste management program". He further questions a world without informal recyclers, "What would happen to Mumbai's waste, if we did not exist?"

According to the BMC's (Brihanmumbai Municipal Corporation) Environment Status Report for 2011-12 the city generates 9,200 metric tonnes of garbage daily. For our study we assume that 27% of the total waste generated is dry waste, which is about 2484 tonnes per day and take into account two different statements on the recycling figures of Dharavi , in the absence of any official estimates and the numbers are staggering, equally so are the savings to the municipality.

Statement 1: If 80% of the total dry waste is recycled in Dharavi 80% of the total dry waste recycled is about 1987 tonnes per day | 59,616 tonnes per month | 7, 15,393 per year

Statement 2: If 80 % of plastic waste is recycled in Dharavi:

Given that the country has witnessed a substantial growth in the consumption of plastics, we have calculated 60% as plastic waste of the total dry waste, based on our field work in Bengaluru So of the 2484 tonnes of dry waste if 60% is plastic, it is about 1490.4 tonnes of plastic

If Dharavi recycles 80% of Mumbai's plastic, it will amount to 1192.3 tonnes per day| 35769.7 tonnes per month | 4, 29,235.2 tonnes per annum.



A 1986 survey of Dharavi by the National Slum Dwellers Federation recorded 722 scrap and recycling units and the largest in India, employing over 5000 people with an estimated turnover of Rs. 60 lakhs a year. Using 1986 survey data as the base, if we were to extrapolate the data to current year with a reasonable growth rate to existing numbers shop the current revenue will be estimated 34 crores a year (recovery value).

Given the above numbers, if we were to calculate savings for the municipality – again in absence of official figures, even if we assume that Mumbai spends Rs. 1500 per tonne on Solid Waste Management (SWM) collection, transportation, treatment and disposal, though Bengaluru spends higher, 80% of waste recycled will be saving the Municipality 107 crores and if we take 80% of total plastic recycled, the savings are about 64 crores a year.

So all in all we are looking at the same recyclable material having a potential of a revenue generation of 34 crores versus a sink of 64 crores to collect, transport and dump waste. As we make our way out of Dharavi, following the other areas and the residential block, the question lingers on...Why don't we have a recycling policy in India?

Note: Article written by Pinky Chandran and Marwan Abubaker, (Special acknowledgement to Mohammed's Dharavi Slum Tours and Sandya Narayanan) first published on https:// wastenarratives.com/2015/10/27/glance-ofrecycling-in-dharavi/







Waste Markets in *Delhi*

Have you ever experienced a feeling so strong that it engulfs, overpowers and leaves you feeling at loss for words? That's what happened to us, when we visited the informal waste markets of Delhi.

Our first stop was Mundka, given that it had an unofficial title of Asia's largest plastic market till 2010. The rumour that echoes around is that it was deliberately burnt down in an act of sabotage. Though we alighted at the Mundka Metro, the local taxi driver took it upon himself to show us around. After driving around for about five to six kilometers from the metro, we entered the new PVC Market -Tikri Kalan. The market seemed surreal. The various kinds of plastic waste spread out like a carpet for miles and miles together, some with huge mounds, mimicking a small hillock. From consumer goods like toothbrush, toys, helmet, cosmetics to car dashboard, pipes, keyboards, telephone, food packaging, to chairs, shoes, fans, and frames - the sheer range of discarded material lying to be sorted and graded was an eye-opener. Trucks parked at various intersections within the market, seemed an oddity. The people who worked there seemed dwarfed by the volumes of plastic that surrounded them. A good two hour of soaking in the stretch of the market, we stopped to chat with a few owners, who suggested that we meet at Mundka. After asking us to follow them, we reached our destination, the office of the President of the PVC and Plastic Recycling Association.

After the necessary greetings and introductions, he gently weaved the conversation around to safer topics like the need for integration of the informal waste recyclers and the importance of waste trading markets, before cautioning us about the photography policy. "Can you see anything burnt here?" he questions us. He goes on to explain that the waste trading markets have been branded as polluting, by people who are misinformed. "They don't understand the difference between a trading market and a processing one. A trading market also serves as an aggregation and a level of secondary sorting". He insisted that we visit Bawana, the industrial area on the outskirts of Delhi where units are engaged in re-processing.

We were then joined by other members of the association, occupying key positions and the conversation then shifted sources of materials, the flows, the organisation of waste markets and actors and the relationships, quantity of waste, overall gross income generated.

According to a member of the Association, Delhi can be easily termed as the largest plastic recycling hub in India. With approximately over 4000 units in Mundka alone (registered and unregistered), the units deal with all kind of plastic scrap and are strictly into secondary sorting and trading of waste. He went on to empahsise that though these places must be seen as a boon to the government and the general public, the concept visual cleanliness always drives these places to be treated as a nuisance or eye sore.

He goes on to criticize the lack of understanding about the process of recycling undertaken by the informal actor "It's all about livelihood. Entrepreneurship is the key driver, low start-up requirements, semi-skilled labour (someone who can be trained to distinguish the different types of plastic) is what makes many urban poor choose recycling as a profession, but who cares?", he questioned.

Terminology Used and Key Locations

The association members use the term recycling for re-processing, for fear of being treated as polluting, non-conforming and a liability. They add that at least over 1000+ units are involved in plastic processing. Though overall numbers of units engaged in plastic processing around Delhi could be as high as 10,000 units, a fraction of which engaged in grinding, moulding pellet making etc. Within Tikri Kalan, there are three distinct areas- PVC Market, Choti Tikri and Badi Trikri, and along with the formal plots there are a number of informal plots on which plastic trade takes place. Generalist and Specialist traders co-exist. Given that the PVC Market is a formal, traders can choose from different plot sizes available and the price per size of plot is normally fixed by the Delhi Development Authority. In one plot, there can be number of traders operating and structure within the plots can vary from open access, small sheds, semi-pucca, to concrete with gates for the shops. The major activity involves sorting, dismantling and to smaller extent grinding.

Closer to Bawana is another Hub, called Narela, also recognised as an industrial area and houses over 1000 plastic processing units. The member also mentions there also a number of godowns or sheds that just trade plastic scrap.

Overall the key locations include Mandoli, Okhla, Mayapuri, Najafgarh, Inderlok. They also mentioned about the interconnection of plastic and e-waste and the overlaps in areas like old & new Seelamapur, Turkman Gate, Beta Hazipur.

Fire Threats

A member of the association reminisced that his father had to start all over again, after fire broke out in Tank Road in the early eighties. "We moved to Jwalapuri to start afresh and a good 15 years later when again fire broke out in Jwalapuri it hit us bad".

Fire is a constant threat that we have to deal with given the lack of infrastructure that one would expect a market place to possess. Mundka also had a similar fate.

He continues, "We now have a large plot of land at Tikri Kalyan where we store our material with no protection". The irony of their location is that they are close to a fire station.





The Actors and the Value Chain

The members explain Delhi's recycling hierarchy from the plastic recycling and reprocessing sector. They impressed upon us that the chain was similar to that of other materials like paper, metal, glass etc. Migrants from West Bengal and Bihar account for most of the actors in the lower rung. A member adds, "They are extremely hardworking and they may or may not realise the importance of the work they are doing, by retrieving the materials but without them, Delhi will drown in its own garbage". He goes on to add that at least 20% to 40% of Delhi's municipal solid waste is retrieved by waste-pickers. But he cautions that there are no figures of actual waste generated or the composition of waste. And these are just estimates. According to the market association, over 30,000 people work in Tikri Kalan.

They also mentioned that over five lakhs people are engaged in the activity of segregation of plastic waste directly or indirectly and make their living, from the surrounding areas. The normal monthly wages for men would range from Rs. 5000 to 12000 and for women from Rs. 5000 to Rs. 8000/-.





Figure 1: Delhi's Informal Recycling Pyramid Source: Verbal Narration of Informal Traders at Tikri Kalan



The Quantity and Margins

Given the complexity involved in recycling – from the actors, materials, processes and supply chain from Municipal solid waste and Industrial waste it is hard to quantify the exact numbers of plastic recycled. Delhi receives plastic waste from all over the country. The attempt to arrive at an estimated quantity proved difficult as most members were cautious in revealing the waste inflows into their daily operations. According the association members, Tikri Kalan alone trades on an average between 1900- 3500 tonnes of plastic waste every working day, in an area spread over 1.5 square kilo meters.

Assuming that the market operates for 288 days in a year at 3500 tonnes per day – the amount traded works out to around 10,08,000 tonnes of plastic every year and growing The average rate depending on the seasons and markets could vary from Rs. 22-26/- per kilo gram. The association members are quick to point out, with each value addition the rates definitely go up in value within an average of Rs. 3 to 5 or more. Bargains are the norm and discounts offered to regular customers, margins though vary from Rs. 2 to Rs. 25 a kilogram.

By the end of the visit we reflected that places likes are a solution to the country's waste challenges, and we wondered why it is seen as a problem. And therefore existing rules are defined as Waste Management and Handling, rather than Resource Recovery and Recycling.

*Note: The authors Pinky Chandran and Marwan Abubaker spent a week in observation and shadowed the traders.



Bengaluru : A Case of Nayandahalli.

Introduction

Waste. The all-pervasive reminiscent *Of a love affair gone awry* Discarded without a thought... Lies on the road, on the footpath, on the beach Or tossed carelessly in the bin... Naked or Dressed, raw or ripe, frothing or fermenting, caked, coated or layered Waste. Is caught in the binary of dirty and clean and The fragility of trash and aesthetics... Implicating, threatening, surrendering But to those who make a living, Waste, is not void of value ...



Today, our cities are marked by novel forms of self-indulgence and striking social inequities that encourage unencumbered wastefulness. We happily discharge our duty of mass consumption to boost economic growth. The negative externality of this sanctimonious duty is generation of waste. 'Waste', the word used in common parlance is something that we discard or throw away as it carries no value. On the other hand, Bengaluru's waste workers often use the term 'maal', essentially meaning 'material', instead of waste to describe the contents that they work with. The term 'material' is usually described as an object or substance that has inherent value, with a potential to continue, change and transform. In this way, the concrete relationships that we build with the waste produced in our urban centre bears a striking resemblance to those imagined in Calvino's fictional cities.

The city of Leonia refashions itself every day: every morning the people wake between fresh sheets, wash with just-unwrapped cakes of soap, wear brand-new clothing, take from the latest model refrigerator still unopened tins, listening to the last-minute jingles from the most up-to-date radio. On the sidewalks, encased in spotless plastic bags, the remains of yesterday's Leonia await the garbage truck. Not only squeezed tubes of toothpaste, blown-out light bulbs, newspapers, containers, wrappings, but also boilers, encyclopedias, pianos, porcelain dinner services. It is not so much by the things that each day are manufactured, sold, bought, that you can measure Leonia's opulence, but rather by the things that each day are thrown out to make room for the new. (Calvino 1974/1997) Figure 2 : Map of Nayandahalli Courtesy: Beula Anthony



Garbage has been the focus of increased social, political, economic, and scientific attention given its increased quantities and the new forms in which it manifests itself. Moreover, as social scientists have remarked, waste is a social construct, with varying meanings and practices attached to it across history and society (Douglas 1966/2002). This makes an analysis of how various societal actors engage and deal with waste an important research subject, critical to the crafting of sound waste management policy.

Bengaluru, like most cities in developing countries, has an 'infra-economy'. 'Infra-economy' denotes, on the one hand an economy that is denied recognition and on the other hand one that is critical to the production of urban space. In our context, it is a place where waste (material) is recycled, repurposed and reprocessed and operates in the shadows. In order to examine this economy more closely, we focused on Nayandahalli, a locality in Bengaluru also informally known as the plastic recycling hub, as our research site for the period of one year. During this time, we approached this site as an ecosystem where waste is transformed into a resource. We tried to make sense of the many questions that remain unanswered regarding urban informality and the informal waste economy in particular. These included: who are the important actors in the informal waste economy? What role do they play? What is the value chain in the informal waste economy? Why and how are they vital to urban ecology? And what are the challenges faced by them?

Methodology

Work on this research project started in May 2015. An informal meeting with the recyclers of Nayandahalli and scrap dealers, and dry waste collection operators contributed to the development of the research process. Salma and Siddique, residents of Navandahalli volunteered to initiate the research by introducing the research team to other recyclers. It was also decided that the local community radio station, Radio Active CR 90.4MHz, would be extensively used in documenting stories, given that the radio jockeys were also residents of the area. The methodology involved both primary and secondary data collection and analysis. The primary data included qualitative data and was complemented by quantitative data. Walking around the recycling hub once in three weeks for 15 months to build appreciation of the informal spaces, observe, and seek historical narratives of the place, in addition to seeking out a more lived experience of Nayandahalli. Participant observation was also used with field notes recorded in audio and written form in a logbook. Photo-documentation was done extensively. Formal surveys in the form of questionnaires were administered to 100 godown [storehouse] owners, 18 factory owners and 10 home-based workers. Informal and semi-structured focus group discussions were conducted in batches with godown owners, waste sorters, truck/tempo drivers and home-based workers. Separate radio interviews with godown owners, sorters and factory owners were also conducted. Furthermore, visits were undertaken at different informal recycling spaces in Bengaluru, Delhi and Mumbai.

A two-day national roundtable was held with recyclers to consolidate the understanding on the hierarchies within the informal waste economy, on the need for recycling policy, followed by a group discussion with a local scrap dealer, dry waste collection operators and recyclers from Jolly Mohalla and Nayandahalli. Both the primary researchers are part of Hasiru Dala—a collective of waste-pickers and informal waste collectors. Thus the orientation towards the research is empathetic and participatory. In many ways, this research project is community-led, with collective generation of knowledge on the basis of day-to-day lived experiences.



This case study is a reflection on the flow of matter where waste becomes a valuable resource, stories of people who are a part of the process of transformation is central to it. There are poems, first-hand narratives and pictures used to make what is generally invisible, visible. The poems are written by Pinky Chandran and appear after the title of each sub-heading to sets the introductory tone for each section. It begins with the question of the identity of the informal waste workers of Bengaluru. It describes the material flow chain and maps the important actors. It provides a brief insight on the socio-economic profile of the recyclers in Nayandahalli and displays the centrality of place in the urban infra-economy, which is threatened by the process of gentrification, with large-scale infrastructure projects like that of the metro-rail and the widening of roads resulting in large-scale real estate development. It concludes with a sense of hope as recent policy directions have recognised the role played by the actors in the infra-economy.

The City of Bengaluru

Bengaluru is the third largest city in India, after Delhi and Mumbai spread over an area of 2196 sq kms (Census 2011). With a history of over 450 years, the city has grown from a tiny village in the 12th century, to a city with many different facets. From a garden city to pensioner's paradise, from the Silicon Valley of India to a Network city, the transition has been rapid. The population growth in Bengaluru has increased by 47% in the past decade; the number of people living per square kilometer in the city has increased to 4,378, lured by developments in India's Silicon Valley (Census, 2011).

The act of planning is not new to Bengaluru, can be traced to Kempe Gowda- I, who built a town of 1.5 kms. Following the advent of the British, bipolar growth was registered in the old city and the new area now called Cantonment (Civil and Military { C & M } Station). Following the plague in 1898, which killed 10 percent of the Cantonment and 13.5 percent of the native 'pete' (Nair 2005: 45), new extensions such as Basavanagudi and Malleshwaram (1898), Sankarapuram (1908), Gavipuram and Srirampuram (1915-1916) were built with new attention given to sanitation measures and planned infrastructure (Nagendra 2016: 53). By the beginning of the 20th century, these extensions would add 1,654 acres to the city (ibid).

After independence, the Bengaluru City Corporation Act (1949) brought the Bengaluru City Municipality and the Bengaluru Civil and Military Station under one municipal body consisting of seven wards. Since then, the number of wards has been increasing due to continuing incorporation of surrounding areas into the city limits. In 1971, it increased to 63 wards, in 1991 to 87, and in 2001 to 105 wards. Present-day Benngaluru boasts of 198 wards.

In the year 2007, following a state government notification, the Bruhat Bengaluru Mahanagara Palike (Greater Bengaluru Municipal Corporation- BBMP) was created, by merging the existing areas under the then Bengaluru Mahanagara Palike (BMP) with 7 City Municipal Councils (CMC), 1 Town Municipal Council (TMC) and 111 villages around the city.

The given expansion brought forward a new set of problems i.e. unequal infrastructure development, water problems, and the most pressing of all, garbage dumping.





The problems of waste and the identity of informal waste workers

Even as we face a lack of reliable figures on solid waste generation in the city, the estimates quoted in various public documents, literature, and media range from 3000 tonnes to 4500 tonnes (EMPRI 2011, BBMP 2008, N., et al. 2012). Bengaluru always followed a centralized approach to waste management, that of collection, transportation and disposal. The waste collection to disposal service was given as contract through tenders. Recycling within households and institutions were limited to selling newspapers and other high value waste to itinerant buyers or local neighbourhood scrap shops. Little or no thought was given to the informal waste worker. They operated in the margins.

It was in late 2009 that citizens groups began to campaign for community based and decentralized approaches to solid waste management. Most significantly, they promoted waste segregation at source, a good twenty years after the first attempt was made by citizens in early 1989 to promote the recycling and retrieval of dry waste (Chandran, Shekar, et al., Informal Waste Workers' Contribution in Bangalore 2014). The citizens group called themselves the Solid Waste Management Roundtable (SWMRT).

There is scant knowledge of the size and importance of the informal recycling sector in developing and transition economies. But some recent estimates suggest that its economic impact is larger than previously believed.

• In Mumbai more than 30,000 waste pickers recover reusable and recyclable items from the waste stream. They have created more than 400 microenterprises that process waste materials and make consumer products from them. The economic impact of these activities: an estimated \$650 million-1 billion a year.

• In Buenos Aires more than 40,000 waste pickers recover cardboard and other recyclables on the streets. Their economic impact is estimated at \$178 million a year.

• In Jakarta 37,000 waste pickers recover 25 percent of the city's waste (378,000 tonnes a year), saving the city \$300,000 a month and producing an economic impact of more than \$50 million a year.

Source : Medina, The World's Scavengers: Salvaging for Sustainable Consumption and Production 2007)

In 2010, Bengaluru, known as the 'Silicon Valley of India', was warming to the concept of decentralized management of waste, as the citizens group, SWMRT, had appealed to the Lok Adalat (People's Court) a non-adversarial alternative dispute resolution system, set up under the Legal Services Authorities Act, 1987 from mid-2010, which led to a shift in direction for the Bruhat Bengaluru Mahanagara Palike (Greater Bengaluru Municipal Corporation-BBMP), the institution responsible for implementing decentralised waste management across the city, including the construction of Dry Waste Collection Centre, (DWCC). This was further endorsed by the Karnataka High Court in 2012. DWCCs, which were first set up in Bengaluru (Chandran and Narayanan 2016), are an important aspect of decentralized waste management. The concept was modeled around neighborhood recycling centre. The DWCCs are charged with facilitating the collection/purchase of all recyclable waste from residents, sanitary workers and waste pickers or scrap dealers.

Installation of DWCCs also included the integration of waste pickers and informal waste collectors in the operations of these centre and encouraged extended producers' responsibility for packaging materials that are not being recycled presently. Thus, these centre were intended to serve as models for sustainability.

Given the acknowledgment for decentralised facilities, the Alliance of Indian Waste Pickers, a national coalition of waste pickers organizations and the Mythri Sarva Seva Samithi (MSSS), a member of SWMRT appealed to the Lok Adalat to recognize the efforts of waste-pickers, sorters and itinerant buyers (Chandran, Shekar, et al., Informal Waste Workers' Contributon in Bangalore 2014). Following directives from the Court, the Commissioner of BBMP issued a circular to enumerated waste-pickers, scrap dealers and itinerant buyers.

This decision helped the BBMP become the first local body to initiate the process of registration as per recommendations of the Audit Report on Management of Waste in India (CAG 2008).



3. Dry waste in Bengaluru includes recyclables including low/no value waste.

4. "Extended producer responsibility" (EPR) means the responsibility of any producer of packaging products such as plastic, tin, glass and corrugated boxes, etc., for environmentally sound management. (Municipal Solid Management and Handling Rules 2016)



So, thus began the recognition of the waste-pickers in Bengaluru.

The city's dirty secret Scattered on the streets, A faceless figure, in unkempt clothes Wanders around searching, rummaging, picking; Empty bottles, discarded teacups, crumpled paper, Dirty plastics bags and empty shampoo bottles; From the rubbish pile of rotting food, egg shells and sanitary napkin A passerby frowns in disdain and covers his nose Unconcerned, she goes about picking With the growls of the dogs for company, amidst the blaring horns Unconcerned she meticulously goes about the business of picking Oh you thief, says the lady of the house, I don't want you nearby Halt, who goes there, says the cop *I* know not who *I* am, for the city does not identify me, she says Unconcerned, she continues picking, silently keeping the city clean She is the waste-picker!

The informal waste economy is heterogeneous and multi-faceted (Gill 2010; Chikarmane & Narayan 2000). It consists of an economically dynamic population that forms a vital link in the solid waste management system of any city in a developing country. This economy incorporates a range of activities from waste-picking, to the marginal operations of petty scrap dealers, to those linked with large-scale enterprises. Most operate without significant legal recognition or protection. The World Bank estimates that 1 to 2 percent of the urban population in developing countries earns a living through work in this sector (Medina, The Informal Recycling Sector in Developing Countries 2008). In 2012, The International Solid Waste Management Association established a Task Force (TFGSWM) to study the linkages between Globalization and Solid Waste Management. The report released subsequently estimated that Informal Sector Recyclers (ISR) are around 20 million worldwide, with almost 50% of the labour force involved in waste management (ISWA 2012).

Entry into this sector for newcomers is usually a last resort survival strategy, and for some a family affair passed down from generations (Chikarmane and Narayan 2000). Further up the ladder, entrepreneurial drive is the hallmark of scrap dealers/traders. These economies are socially constructed based on market principles. Often unregistered, these entrepreneurs have limited access to credit, infrastructure and other facilities, although their economic output is much higher (Chikarmane, et al., unpublished). Very little data exists on the actual contribution of the sector as most of its activities go unrecorded.

A 2013 study titled "Informal Waste Workers Contribution", documented the BBMP's role in formally recognizing the role of waste-pickers in the city, along with providing a demographic profile of waste-pickers and highlighting the economic contribution of informal recycling to the city's economy. The study revealed that 15,000 waste-pickers were retrieving about 1,050 tonnes of recyclable waste, saving the municipality about 84 crores annually (Chandran, Shekar, et al. 2014).



Figure 3: Traditional Recycling Pyramid

Bengaluru's Material Flow Value Chain

We first met Salma and Siddique at an informal gathering of waste-pickers assembled to discuss the formation of a membership based organization of waste-pickers in Bengaluru in 2011, which was called 'Hasiru Dala', meaning 'green force'. Confused and shy at the gathering, they kept to themselves. Salma used to work as a waste sorter at a godown segregating plastics in Nayandahalli, and Siddique used to drive a truck that transported 'material' (waste).

At the second gathering of waste-pickers, the vision for the organization was taking shape. The mood was jubilant. Salma and Siddique were eager to participate and be a part of the mobilization process. They also wanted to apply to operate Dry Waste Collection Centre allotted to waste pickers and other informal waste collectors. They became a part of Hasiru Dala. Later, they started hosting a daily radio programme titled "Kasa Shramika Parisara Rakshka" ('Waste-pickers are the Saviors of the Environment'), on Radio Active CR 90.4 MHz, Bengaluru's community radio station.

In the two-year period, from 2012-2014, Salma and Siddique profiled a number of waste pickers, waste sorters, scrap dealers, godown owners, waste picker colonies and migrant workers. Soon we in Hasiru Dala realized that there is a world beyond waste pickers about which we need to learn. Salma and Siddique became our mentors to explore the wider informal waste economy in Bengaluru. With them we visited Nayandahalli, and made it our field site for many months to come.

What if your trash could talk? From the worn out sneakers that ran marathons, To the bottles that held lavender infused body wash, The neatly sorted, categorised, graded, bundled and stacked stock Tell stories... But does one pause to ponder, The journey of the meandering trail, It takes to reach the destination for aggregation...

Bengaluru's dry waste chain is a complex emergent network that both spans and blurs the line between the formal and informal economy. It is interconnected at different levels, converging at the recycling markets or the recycling hubs like that of Nayandahalli. The destination of aggregation in Bengaluru is Nayandahalli .The two figures presented below represent the complexity and diversity of the informal economy and its actors.



Figure 4: Bangalore's Material Flow Value Chain. Source: Primary Author - Pinky Chandran



Figure 4: Value Chain interpreted. Source:Participants in the brainstorming exercise.

First level actors in the recycling value chain – Waste pickers and Itinerant Buyers

From the source of generation, the waste travels along through multiple agencies and formal and informal actors termed 'collectors'. Though within collectors, each actor can be easily differentiated from the source of collection, method and type of collection and the process of selling.

While the free roaming waste-pickers operate purely by picking waste from the streets, the itinerant buyers usually go house-to-house. Given the small quantities they collect, they then sell it to the local neighbourhood scrap shop.

The waste pickers that collect waste through cycles normally sort, grade and aggregate within the colony. They work about 20 days a month collecting waste and about ten days to sort and sell the material they have collected. Once aggregated the material is sold weekly to their landlords who in turn sell it to trading markets or to the factories, and sometimes through the use of intermediaries transport to Delhi. It is estimated that over hundred thousand waste-pickers live in these colonies spread across the city. Given the nature of the work the number varies, as there is constant movement during seasons of harvest and festivals.

Waste-pickers

- Traditional : Waste-pickers (Free-roaming, bags on shoulder) sell to local scrap shop.
- Waste-pickers (cyclewallahs, bags on tricycle, colony-based) aggregate the waste within the colony and sell material to the thekedaar (equivalent of a landlord) who, in turn, sells it to wholesalers..
- Waste-pickers (specialist) involved in hair-picking/ bone collection.

Itinerant Buyers

- Traditional : Itinerant Buyers (Only newspapers, magazines, books) sell to local scrap shop.
- Home-based workers : Itnerant Buyers (cartwallahs, also engage in a barter system or direct purchase) sell at scrap shops, waste markets or processors.

Figure 6: First level actors in the recycling value chain

"My name is Zakhir Hussain. I am from Uttar Pradesh. My family is very poor. My father is a carpenter. I ran away from home, as we always had problems with food. I travelled to many places and whenever I remembered my family, I would go back. The reason I ran, is because of the lack of food. I would do odd jobs only to eat food. I dropped out of Class two. I can understand English."

The itinerant buyers who use a cart also double up as Home based workers, engage in a barter system.

"We trade plastic wares, for plastic waste, old clothes, metal. We take it based on the material for exchange with the product we are selling. We don't weigh the items as such and seal the bargain based on our experience. We work from about 9am to 6.00pm every day." - Illiazh

Even though home-based workers trade small quantities, depending on the material they sell to small scrap shops or their personal contacts at the waste market or directly to the re-processor. Note There are other specialist types of waste-pickers engaged in hair picking and bone collection in Bengaluru. They follow similar methods of barter system or pay cash in exchange.





Top : Free-roaming Waste-picker Right, top : Cart-based waste-pickers Right, middle and bottom : Cycle-based waste-pickers







Waste-picker Colonies : A Photo Essay






































Second level actors in the recycling value chain – Scrap Dealers

The scrap dealers range from petty, marginal, and medium to specialist within the locality. A CHF & MSSS sample study of informal scrap dealers and recyclers in Bengaluru revealed that on an average each ward houses about 20 scrap dealers per ward (2011).

Within this chain, the municipal corporation in Bengaluru has set-up Dry Waste Collection Centre (DWCC). Many former waste-pickers and scrap dealers operate some of the DWCCs.

Given the diversity in the dry waste stream, and based on high value and low value material, rates for the materials vary per scrap shop at the ward level, and higher up the aggregator levels. While medium and large scale aggregators, located within the city, have tie-ups with re-processors, for specific material, majority of the material are sent to the informal waste clusters for aggregation, trading or processing.

Jolly Mohalla and Nayandahalli have been two such markets in the city, with a history of over fifty years and thirty years of operations respectively as Bengaluru's major waste markets. Following finer secondary sorting and grading the materials depending on the type goes into primary processing. The process includes bailing, washing, beating, and grinding .Secondary process includes other steps such as melting, granulation, and pulping.

Small scrap dealers

- Newspapers only, housed in a shop space as apart of a residential layout.

- Buys mixed material.

Medium scrap dealers

- Buys mixed material
- Specialist

Top : Figure 7 - Type of scrap dealers

Below : Jayanagar DWCC Photo Credit - Marwan Abubaker





Jolly Mohalla, A Waste Trading Market

Jolly Mohalla, situated in the heart of Bengaluru, is a hub of recyclingaggregation and trading. The place took birth, after the shops around the area like Cottonpet, Avenue Road, Mamulpet, Majestic and Chickepet, began throwing out gunny bags or thaila, from the packaging. Jolly Mohalla grew from the need to accumulate the discarded materials, as the entrepreneurial informal waste economy, saw an opportunity in recycling. Initially the area recycled only gunny bags and later paper, however, as newer packaging materials invaded the market, the place embraced the discards and began recycling. Jolly Mohalla stretches up to South Mysore Road.

"Given the expanse of the city, markets like Jolly Mohalla, a traditional waste market is facing the pinch. Many medium scrap dealers are directly taking the materials to the recycling hub like Nayandahalli or the industrial estate in Kumbalgod. The migrant colonies also aggregate the waste and take them directly to the recycling hubs. Five years ago, there was just no space here, the business was in full swing, and we could not even stand. Now we just have to sit and stare as the volumes have gone down. We do have our godown in Nayandahalli, otherwise we could not survive".

- Focus Group Discussion with the traders in Jolly Mohalla

In the 50 years of its existence, Jolly Mohalla has seen different kind of materials- from paper, plastic metal, glass and jute and the diversity in each of the material, led to shops specializing in aggregation of materials differently. The materials are sourced from scrap shops all over the city, DWCCs, factories, shops and sometimes waste-pickers. The main activities are secondary sorting, with only a few shops bailing the materials and a lone shop grinding plastic and other separating layers of laminates. Some of large shops have reprocessing facilities located in Nayandhalli.



Destination Nayandahalli

Scrap—a byproduct of something Rarely counted, usually unaccounted, In the official records, Once aggregated, Moves up the invisible trail of trash In tempos and trucks... To the enterprising place in the fringes of the city, To the godowns of Nayandahalli

"Nayandahalli, 25 years ago, was a jungle. There was no electricity, water, or roads. On a vacant plot, the landlord gave us permission. We put up a hut, as my husband found a job as a watchman. Originally from Mulabagal, Kolar, after marriage I moved to Mandya. Following a family dispute, my husband and I moved to Bengaluru. Living here, my children were always in my thoughts, I worked as an incense stick maker, but the money was hardly anything. A crisis in the family made me decide that I must look for work and I joined the godown and started my career as a waste-sorter. If I worked, I would get money, if I did not, I would not get any. In my work, from glass pieces, to needles everything pricks. I often get hurt. There is no social security, if we fall sick. As long as you're healthy, you have work. Worked there for 20 years, and then we decided that we need to move up the ladder and start a godown. But now we have been asked to move out, a notice has been issued by the government. That is the story of my life " (Zarina 2015)

Twenty five years ago, it was a vast open land, and hence called Nayandahalli (Halli means village). The area found itself within the city limits of Bengaluru after the agglomeration in the 1970s. Located along the Mysore Road, on the State Highway No. 17, it has the Vrishabawathi River, a tributary of the Arakavati on one side-a river that seems more like a historical relic than active water body given its current form as the location for the city's sewage streams. It shares borders with Banshankari, Rajarajeshwarinagar and Bengaluru University campus. Navandahalli boasts of a railway station connecting Bengaluru and Maddur, and a passenger train connecting Bengaluru to Mysore. Today, Nayandahalli is districted as Bengaluru Municipal Ward No. 131 and is spread over 2.07sqkms. The ward consists of the following localities: Navandahalli town, Chandra Layout Extension, Chandra Layout II stage, Metro Layout, and Dr. Ambedkar Nagar. The area is dominated by single dwelling units, with both lower middle class and middle class households.

Far away in the city, Past the Vrishabhavati River, A tributary of the Arakavathy, Now, An open drain of green waters, Emitting pungent aromas... Way past the constructions of the metro and the tall buildings Nestled inside, are a gaggle of tins/asbestos sheet sheds...

In addition to carrying Bengaluru's sewage, the Vrishabhavathi River is also fed discharge from the surrounding industrial area, and the illegally dumped waste. It is also known as the 'Kengeri Mori'. The foul smell emanating from the river and the white froth bubbling inside has contributed to the image of Nayandahalli as an aesthetically unappealing place. The negative image of Nayandahalli, which is also home to a large number of informal waste workers, is intrinsically tied to the negative image of waste and waste workers in general.

"Dirt is a matter out of place, suggesting that the label dirt does not describe the nature of something, but instead implies an infringement on the boundaries of a social order" (Douglas 1966/ 2002). Public discourse often frames such areas as eyesores, bereft of any hope and disempowered. Such a perspective does much to camouflage the city's unencumbered consumption and glaring social inequities.

Is there anything more naked? Than the glinting tin shed Hiding the city's rubbish, In a cloak of anonymity Ever wondered, What transpires inside?

^{5. &#}x27;Mori' means drain and Kengeri is the name of the area adjacent to Nanyandahalli.





Bengaluru's waste, in particular its plastic waste, passes through the hands of different actors, as illustrated in Figure 4, to reach Nayandahalli.

As one makes their way to interior roads, one can spot miniature mounds of plastic bottles, milk covers, helmets, buckets, broken chairs, slippers, old CDs, wires, disposable cutlery, take-away boxes, discarded shoes, toothbrushes, helmets and more, spread out on blue tarpaulin or directly on the street. Alongside these items are plastic crates and plastic non-woven bags for storage. Upon closer inspection, one can discern in the clutter the industriousness of agile hands and observant eyes that organise, sort and aggregate materials into multiple categories of plastic, metal, paper, and cloth.

And within plastics categories includes polyethylene, polypropylene, PET, or poly-vinyl chloride (PVC)—categories inconceivable to lay people who perceive the discarded items mainly in "use and throw" terms.



"I did not know what 'plastics' was. But I learned! It took me a year! Now, I can proudly say that I can sort in about 60-70 varieties. But unfortunately, I do not have space, and so I sort at home. And when I do so, I cannot accumulate large quantities of each type of material, and so I do not get the right rate. On the flip side, working at home has more disadvantages, with children around, we have to be doubly careful, and as they think we are playing. We cannot afford to invest in a godown, as the down payment is huge. For a person earning Rs. 200-300 a day we cannot this is impossible." (Peersaheb)

We go about our lives, Understanding nothing about their world... Of, Working in and with waste... Of, Working with wrecked, damaged, bent, beaten stuff... Of, Working with dirty, dried, smelly containers... Of, Working with tattered, shattered and crushed pieces of materials... From twisted metals, to crumpled papers and broken glasses



The Makings of a Plastic Recycling Hub

"Rich people's garbage was every year more complex, rife with hybrid materials, impurities, impostors. Planks that looked like wood were shot through with plastic. How was he to classify a loofah? The owners of the recycling plants demanded waste that was all one thing, pure." (Boo 2012/2013)

Depending on the type of godown, materials are sorted into over 35 to 70 categories. Women and men sit with plastic trays in front of them and sort mixed plastics based on the resin or type: HDPE (High-density polyethylene) PP (polypropylene), polyvinyl chloride (PVC), polyurethane (PUR), polyethylene terephthalate (PET), and polystyrene (PS) polyethylene (PE), etc. The people who sort go a step further to sort them based on colour and grade (virgin, recycled once or multiple times). They are also skilled enough to perceive the hardness and softness of a particular material. Most sorters are experienced in identifying materials based on appearance, touch, sound, smell when burnt, and also by biting into the plastic. Further up the chain, larger godowns accept only specialized material from what has been sorted, which are further sorted based on colour. The sorters there work on separating the bottle lids from the bottles before they are thrown in the pile based on colours which are then taken away to be bailed or 'flattened'. Some of the godowns engage in further segregation, manual cleaning, cutting and grinding of the materials. The ones that cannot be processed are transported to the large godown known as "Delhi godown."

Many products that enter the market are a complex mix of plastic, metal, glass, paper, foam or rubber. Many sorters go the extra mile to sort these and isolate the plastic:

"The market is inundated with new and newer materials. It is tricky for a newcomer to decipher. However, having worked in this space for over five decades, one is trained to differentiate and we are trying to catch up." (Peersaheb)

Given the diversity in the dry waste stream, and based on high value and low value material, rates for the materials vary from scrap shop to scrap shop at the ward level and higher up the aggregator levels. While medium and large-scale aggregators, located within the city, have links with processors for specific material, the majority of the material is sent to the informal waste clusters for aggregation, trading or processing.

6. 'Delhi godown' is a local term used for materials aggregated to be sent to Delhi for further segregation and processing. 7. High value can defined as material that as high market value due to higher potential for recycling. The selling rate would be from Rs. 5 upwards. Low value waste will be below Rs. 5 to no value. Shailender Kumar, a plastics waste reprocesser, recounts how he got into the plastics recycling business:

"I started the godown (for aggregating and sorting plastic)/factory (for reprocessing plastic waste and make yarn out of it) about four years ago. My starting investment was about INR 5 Lakh and I gave one lakh in advance. The size of my godown/factory is about 30/40 square feet. I collect Grade A quality plastics from different factories (generated as waste), bring it my godown and segregate it, and then put it in machine to make yarn and sell it back to the factories that make plastic chairs, water drums, water pipes, carry bags, hand cover, suitcases, nursery covers , Syntax drums and other items. I go about six to seven times for collection in a month. And collect about eight to nine tonnes of plastic (waste) during that time.

There are two types of yarn that we make 1st quality and 2nd quality. It is filtered to make plastic items. Per month, we segregate between six-seven tonnes of plastic. Per day it will amount to 300-350 kilograms of plastic for re-processing. I run the machine weekly two or three times, depending on the load. After I send the yarn to the factory, they test it for quality, before paying me. On an average month, I send ten loads of yarn to different factories located in Tamil Nadu and Andhra Pradesh, and I decide my selling price for the yarn. However, the market is not stable and rates fluctuate severely. I have eight people under me. For men, I pay Rs. 300 per day and for the women I pay about Rs. 220 per day. I also provide lunch, coffee/ tea and bonus once a year. I also give them advance as and when they ask."





Digging deeper into the history of Nayandahalli, one begins to uncover an area that slowly began harboring the city's dirty secrets, silently transforming Bengaluru's detritus into raw materials, which were then sent to factories for processing. These recycling and reprocessing enterprises soon spilled over from Nayandahalli into surrounding areas such as JJR Nagar, Gowripalya, Deepanjalinagar, and Gangondanahalli. The area began developing during the late 1970s and early 1980s, when plastic waste made it to the streets from both industrial and municipal sources. Today, there are over 250 godowns scattered across Navandahalli and neighbouring wards. The recycling godowns and some factories situated there have no formal structure. Instead they are spread out quite sporadically, with godowns spread across Metro Layout, Telecom Layout, and Revanna Badavane. These exists a vague semblance of area-based specialization in Navandahalli. Across the town's main railway track, one comes across the areas that specialize in washing, drying, and de-inking. Areas that reprocess plastic are scattered primarily around Muthuchari Industrial Estate and Azeez Seth Industrial Estate, Metro Layout and Pipe Line Road. Other areas like Kamashipalya, Kumbalgod,

Sunkadakatte, Magadi Road, Peenya Industrial Estate, Bommasandra Industrial Estate, Hoskote Industrial Estate, Kengeri, J Marathahalli, Hegde Nagar, Nagavara, Bheemanakuppe, KSSIDC industrial area and Deepanjalinagar, host larger plastic manufacturing factories, along with the processing centre. When interpreting this economic geography, one can discern that formal and informal enterprises in Nayandahalli are intimately connected, with formal entities in close and persistent contact with informal ones while facilitating the smooth flow of materials.

Today, given its strategic location, Nayandahalli is housing several major infrastructural projects such as the NICE Road, the Mysore Road flyover, and the metro rail line. These developments have helped boost real estate speculation in the area and have suddenly transformed what was once thick forest into one of the most sought after property markets in Bengaluru. Slowly and steadily, gentrification is happening and many godowns and recycling units have been asked to move out. The informal waste workers of Nayandahalli are urban nomads who are now looking for other spaces to set up their units.

A snapshot : Type of plastics, quantities, process

Categories of plastic waste

Local Name	Type of Items		
ABS	Automotive bumper parts, TV Casings		
LD (White)	White smooth plastic (Milky finish) used to wrap consumer durable items		
LD (Colour)	Smooth colour plastics (Blue, green etc) used as packaging material		
HM (white)	Typical plastic bags with or without handle – grocery, hardware, retail shops		
HM (Colour)	Typical plastic bags with or without handle – grocery, hardware, retail shops		
HDPE	Hard plastics used to pack liquids, household cleaners, detergents, shampoos, water /juice jugs etc.		
PP (white)	Hard white plastics – food containers		
PP (Colour)	Typically given out in cloth stores, plastic woven gunny bags		
PP (Black)	Garbage bags		
Coating PP or Kurkure	Multilayered low value plastic items such as savoury, chips packet, biscuit packets etc.		
Phugga (white)	Food parcel containers, buckets, mugs		
Phugga (colour)	Coloured buckets, mugs		
PVC	Pipes, transparent files, plastic sheaths		
Super	Low quality, soiled plastics		
LLDPE or Milk Covers	Milk Covers		
Tooth Brush	Tooth Brush		
Palm Oil covers	Palm Oil covers		
Road waste	Road waste		
PET	Water bottles, medicine/chemical bottles,aerated drinks/juice bottles/oil containers		
EPS	Foam products (Thermocole, Styrofoam) – Only soft foam is collected, aggregated and processed.		

.



Item	Primary Processing	Secondary Processing	Areas/Location
Milk Covers	Washing and Drying	Melting into blocks	Kengeri, Nayandahalli
PET	Bailing	Grinding into chips	Kengeri, Nayandahalli
High value plastics	Cleaning and Grinding into chips or powder	Granulation to be made into granules	Nayandahalli
Low value plastics	Clean and Melting into blocks	Granulation to be made into granules	Nayandahalli
Kurkure	Bailing		Nayandahalli
EPS	Aggregation/ granules	Melting into blocks	Nayandahalli
Plastic woven bags	Bailing for transportation Or Melting for blocks	Grinding/Granulation	Nayandahalli
ABS	Aggregation		Nayandahalli

Process involved in recycling and Processing Areas





Data Analysis

In this study, the analysis is limited to data obtained from the godown owners.

Gender and Age Group of the Godown Owners

It comes as no surprise that though women are involved with the godowns, that 99% of the owners are male. Only 1% of those surveyed stated the ownership in women's name.

The age group reveals a fairly young population, with 35 percent in the age group of 31-40 years, 29 percent between 21 and 30 years and 19 percent between 41-50 and only 10 percent in the age group of 51-60 years.





Religion and Caste

Majority (79 percent) of the godown owners are Muslims. 21 percent of them are Hindus.

41 percent of those surveyed belonged to the Other Backward Classes (OBC) category and 4 percent to Schedule Castes and about 2 percent to Schedule Tribes. Most of the Muslim godown owners who were surveyed, had little or no information on castes and sub-castes, and with our little understanding of caste system in Indian Islam, the questions remained unanswered. The focus group discussion revealed that seven percent of the Muslim godown owners were Syed/Sayyid, about 10 percent were Shaikh/Sheikh/ Sheik and about 4 percent Pathans. In case of Hindus, 1 percent could articulate their caste within the OBC category that of "Gounder".



Education

27 percent of those surveyed didn't attend school, with about 25 percent completed grade 10, and 21 percent of them had schooling between Class 6 to 9 and about 9 percent of them are graduates.



The Scrap Business

For about 53 percent of those surveyed, the scrap business has in the family, and hence a natural progression into the family line of work. For about 14 percent the need to move up the ladder propelled them to get into the scrap business.





Entry level into the Scrap business

42 percent of them started off as a waste sorter and then moved into running the business. 8 percent of them started with a scrap shop. 97 percent of those surveyed owned one shop.

40 percent have been in the business between 2 to 10 years. 33 percent between 11 to 20 years and 11 percent between 21 to 30 years.




Godown Infrastructure

88 percent have temporary structures, as evidenced in the pictures above, made of asbestos sheets. 4 percent have semi-permanent structures and 4 percent of them also called Delhi Godowns (called Delhi godowns as these godowns send their material to Delhi), have permanent structures. 99 percent of the shops are on rented properties. 16 percent of the shops have registration, of some sorts. 57 percent of the shops have electricity. 37 percent have some sort of toilet facilities. Drinking water is purchased in all. 58 percent of the owners do oral accounts, there is no written record. They operate with estimates. 34 percent of them maintain books (of sorts). Most of them mention that unforeseen costs include infrastructure, rain induced losses- which can be attributed to the temporary nature of the sheds, police penalization, sales tax and medical emergencies. All the godowns have multiple sources for waste which include other scrap shops/DWCCs, factories, malls and itinerant buyers. Note: the source of waste includes residential, commercial, industrial and institutional





Informal Recycling Hubs and their contribution

The CHF International and Mythri Sarva Seva Samithi (MSSS) conducted a sample survey of informal and formal recyclers (scrap shops, whole sale dealers and re-processors). The study documented three hundred and ten scrap shops in sixteen wards across six zones, nine large scrap shops, eleven wholesale dealers, two re-processors and two companies, was undertaken to document the economics of waste retrieval/management by the informal sector economy by studying how waste is retrieved at source and chart its journey to the recovery and recycling markets (2011). The study looked at journey to recovery and recycling, in terms of quantification of waste retrieved to extrapolate it to the city scale, it did not do justice. There has been little or no documentation on the city's informal recycling clusters, on how the area developed to be a hub for recycling, the status of employment, and the quantity of the city's dry waste that reaches these hubs for recycling.

For the purpose of the study, based on the two focus group discussions held at Waste-picker Colonies, Jolly Mohalla and Nayandahalli reveal the following statistics:

Note: Waste received also comes in from other towns in Karnataka Note: 1 tonne = 1000kgs

Location	Waste-picker Colonies	Nayandahalli	Jolly Mohalla
No. of Godowns	15	300	500
Waste Inflow per day (Tonnes)	6 to 10	10.32	2 to 6
% of Plastic Waste	60%	90%	80%
Average Waste Inflow per day per Godown (Tonnes)	8	10.32	4
Average Plastic Waste Inflow per day in the location (Tonnes)	72	2786.4	1600
Average no. of working days	20	26	26
Amount of Plastic Waste per month in the location (Tonnes)	1440.00	72446.40	41600.00

Total Plastic Waste Inflow per day in all 3 locations :

3749.47 Tonnes

Total Plastic Waste Inflow per month in all 3 locations :

114046.40 Tonnes

Total Plastic Waste Inflow per year in all 3 locations :

1368556.80 Tonnes

*Note: There is an overlap of the quantity as some portion of materials is transported from wastepicker colonies, Jolly Mohallah to Nanyadahalli. It should be read as inflow into the cluster at a point. This also includes post production waste from industries and other cities and towns of Karnataka.



Limitations in the Study

There is no accurate official data of the waste generated in Bengaluru and hence no true figures are available of the percentages of different streams of waste generated. Because of the inherent vulnerability, perpetuated by informality many informal waste entrepreneurs were not comfortable to share the data and the details of their business and operations. Less than half participated in the study. Most informal recyclers keep no formal records. The calculations are anecdotal.

Conclusion

A study of discards is the study of humanity. We live in a linear world, or we believe it to be linear. Once we have used something, it is ready to be placed in trash-bin. What we have tried to map through our work is the trail of 'discard' from your dustbin to the finished product in someone else's room. The map is still incomplete. There are many unknown areas to be explored. There are aspects which are discussed extensively. Waste doesn't stay 'waste' once it reaches the hands of waste pickers; it becomes 'material', 'waste ore' to be extracted. Those engaged in waste extraction are the pillars of infra-economy (a term used by Vinay Gidwani extensively), providers of basic environmental services. This report begins with the question of material flow, breaking the dichotomy of discards and resources, and concludes with the stories of people who work on the transformation of discards to resources. It takes a detour of legislation promoting recycling in other parts of the world and analysis of Indian experience is provided.

Dastan-e-Nayandahalli

A Photo Essay









The city's dirty secret Scattered on the streets, A faceless figure, in unkempt clothes Wanders around searching, rummaging, picking; Empty bottles, discarded tea cups, crumpled paper, Dirty plastics bags and empty shampoo bottles; from the rubbish pile of rotting food, egg shells and sanitary napkin A passer by frowns in disdain and covers his nose Unconcerned, she goes about picking With the growls of the dogs for company, amidst the blaring horns Unconcerned she meticulously goes about the business of picking

Oh you thief, says the lady of the house, I don't want you nearby Halt, who goes there, says the cop

I know not who I am, for the city does not identify me, she says Unconcerned, she continues picking, silently keeping the city clean

She is the waste-picker!



- Pinky Chandran











Scrap- a byproduct of something Rarely counted, usually unaccounted, in the official records... Once aggregated, Moves up the invisible trail of trash In tempos and trucks... To the enterprising place in the fringes of the city, To the godowns of Nayandahalli.







Far away in the city,
Past the Viswabawati river,
A tributary of the Arakavathy,
Now,
An open drain of green waters,
Emitting pungent aromas...
Way past the constructions of the metro and the tall buildings
Nestled inside, are a gaggle of tins/asbestos sheet sheds...



Is there anything more naked, Than the glinting tin shed... Hiding the city's rubbish, In a cloak of anonymity... Ever wondered, What transpires inside?







What is waste? Baby, don't you know? Our frantic obsession, of all things we desire and once used, Discarded without a second thought What is waste? Baby, don't you know? Unwanted leftovers of our consumeristic society One bottle, two bottles, heaps of assorted stuff -compact powder, toothbrush, milk packets, old CDs, melting crayons, disposable cutlery and boxes from takeaways wrapped up in plastic bags, dumped in drains and footpaths, tied to trees or gates... What is waste? Baby, don't you know? One man's waste is another's resource

- Pinky Chandran























We go about our lives, Understanding nothing about their world... Of, Working in and with waste... Of, working with wrecked, damaged, bent, beaten stuff... Of, Working with dirty, dried, smelly containers... Of, Working with tattered, shattered and crushed pieces of materials... From twisted metals, to crumpled papers and broken glasses...















What if your trash could talk? From the worn out sneakers that ran marathons, To the bottles that held lavender infused body wash, The neatly sorted, categorised, graded, bundled and stacked stock Tell stories... But does one pause to ponder, The journey of the meandering trail, It takes to reach the destination for aggregation...








The garbage city, Piled with stocks of old, discarded rubbish, Of plastic bottles, helmets, slippers and others,

People in trash filled sheds, Sorting, sorting and sorting... With music for company, made possible by connecting speakers, found in trash to their mobiles... They sort and categorise over 35 types of plastic! Reclaimers of the city's waste, the people working ask... "What's wrong with what we do? Why are we always nameless, faceless and addresses?"

-Pinky Chandran









































Waste,

synonymous with trash, Perceived to be dirty, useless, One that once discarded, Must disappear from our view... Waste, In common parlance, Always has a negative undertone... But, waste, To the recyclers of Nayandahalli Is not devoid of value...

Bengaluru's Sunday Reuse Markets: A Photo Essay

Itwar Bazaar or Sunday Bazaar (Markets) is a fascinating way to spend a Sunday. Salma and Siddique took to upon themselves to give us a tour of the place. The believed that our study would be incomplete if we failed to document Bengaluru's Reuse market.

We met at nine am at the by-lanes of Jolly Mohalla and wandered around the market, taking in the sights and sounds. Knick-knacks, scraps, watches, second hand electronic goods, computer spares, watches, mobiles, toys, utensils, home decors, shoes, handbags, clothes, gears, spanners, dumbbells, nuts and bolts, kitchen appliances, plastic containers, aluminum vessels, brass items, lamps, tube-lights, scissors, and many more.

According to one of the traders, who has been selling his wares spread out on a tarpaulin sheet every Sunday for over 30 years, the market has grown from a small lane at Sultanpet, to encompass the entire area of Chickpet, Cottonpet, Avenue Road, parts of BVK Iyengar Road, Akkipet, Old Taragupet, AS and Achar Street. It opens from 8am and goes on till about 6 pm. The seconds markets, also has the dubious name of being called Chor Bazaar (Thieves Bazaar). He laments, "Why label the entire market as Chor Bazzar, when only a handful of traders sell stolen goods? It is hard enough that people bargain, but when some people look at each item suspiciously and try to lower the price, saying anyway it is stolen, it hurts".

We spend about four hours, exploring and soaking in the experience – the display, the colours, the commotions; the cows, the bikes and cycles making way past the shoppers, stationed wheel barrows, and the smell of biryani and samosas, and chai (tea). Exhausting, but worthwhile, to see the journey of the very things we term waste, breathe a second life.






































Vulnerabilities of informal waste supply chain and recycling industry



"There is no such thing as 'away'. When we throw anything away it must go somewhere." – Annie Leonard, Proponent of Sustainability

- Annie Leonard, Proponent of Sustainability

The informal waste supply chain of the recycling industry as evidenced from the two case study of Dharavi and Tikri Kalan and the case of Nayandahalli demonstrates that the network is complex, intricately linked and highly gendered at the lower rung of the pyramid.

Given the rapid rate of urbanization, consumerist lifestyle, there is persistent growth and constant increase of waste as cities continue to expand. Yet, informal recycling has its fair share of highs and lows, some cyclical, some seasonal, some by way of policies and some by way of global oil price fluctuations.

Informal recycling comprises a wide range of vulnerabilities overall – from the lack of income security, regular access to clean waste, access to health care, protection against accidents and illness, access to finance and technology, access to skill enhancement, infrastructure, the need for visual cleanliness imposed by the citizens, perceptions of the informal recycling and the absence of collectivisation for representation.

Reflections on vulnerability and sore points have discussed in detail below:

Weather induced vulnerability

Increase in moisture content in the material due to rains/floods, lack of proper infrastructure to store material, lack of spaces for drying, contribute to the decrease in prices of materials, during monsoon (about four months) and post monsoon (three months) and summer showers.

Market induced vulnerability

Dynamic and unstable global markets, rising energy prices, fluctuating oil prices all have a bearing on the prices of the materials, particularly plastics. Plastics, also called polymers are derived from petrochemicals. Therefore, when oil prices fall, the price of virgin plastic also falls. This makes it cheaper for manufacturers to source virgin plastic, rather than buy recycled plastic feedstock. The graph above shows the fluctuation in prices of plastic and other materials in the market.



TREND OF SALES PRICES AUG 2014- AUG 2017

Policy induced vulnerability

In the year 2016 and 2017, two major policy decisions hit the informal economy very hard- Demonitisation and the introduction of GST. Withdrawal of currency denominations of INR 1000 and 500, announced in 2016 with an aim to target undeclared cash stocks rendered 86% of India's money supply invalid overnight. This left many businesses in the informal recycling stranded for lack of small change, sending ripples down the supply chain. Many of them have no bank accounts and majority of their transactions occur frequently, in cash, and with other parties who form the most financially excluded segments of urban India.

Source : Hasiru Dala DWCC Selling Waste Data.

"In their daily operations, recyclers are not only faced with changing prices, types, and qualities of plastic, paper, cloth, and metal, but also changing circumstances. To illustrate the kind of contingencies that scrap dealers are confronted with daily, let us take the example of how a scrap dealer would approach a sack of HDPE (high-density polyethylene) plastic. Not only can the asking price for the sack suddenly fluctuate; it may also contain mixed waste and impurities; be seized by officials asking for a bribe during transport, or stored in a location that becomes a target of arson or eviction. On the other hand, perhaps the waste picker who sorted through it may suddenly fall ill and require emergency funds. When managing all of these matters, cash remains both the most concrete and the liquid mode of payment in a recycler's arsenalconcrete because it is easily retrievable and seldom fails as a store of value, liquid because of its near universal application". (Sreenath, Shreyas 2016)

The waste-pickers at the bottom of supply chain pyramid were hit the hardest. The godown owners have had no money to buy the material or pay their workers. There was no sale happening, as even those up in the ladder had no cash to pay. Many had to stand in line outside the banks to get currency converted and there was reduced liquidity in the market, one cannot withdraw the money beyond a threshold, which in turn took away time from sourcing waste.

The second policy intervention was introduction of Goods and Service Tax (GST). The recyclable plastic and other waste material was charged a Value Added Tax (VAT) of 5.1 percent. This was increased to 18 percent for recyclable plastic, metal and glass. The tax was charged at higher levels (where certain degree of formality exists) levels of informal waste supply chain, i.e. plastic, glass re-processing and manufacturing units. To ensure that prices do not increase for end consumer, the tax costs were passed on to the informal waste supply chain. For illustration purpose, for waste-picker who was selling the PET bottle was receiving INR 16 per kilogram, the price went down to INR 10 per kilogram. One had to more work and receive lesser amount. Many waste-pickers and recycling business units' association representatives met the government officials and sooner the tax on recycling material including paper, glass and plastic was brought down to 5 percent. The excessive tax is gone. There are provisions like every seller is to be registered and have a GST number. Those at the godown level can do so. But such provisions leave no space for waste-pickers and other informal waste collectors to work. They live hand to mouth existence and not financially literate to log-in in a system to file their taxes.

Time and again there have been talks of setting up waste to energy plants. These plants are being dumped in developing countries by the global north. Europe is moving towards the path of circular economy. The companies must do something about the incineration technologies. They are being dumped in countries like India. There have been no successful experiments in the domain of incineration in India. Still one does not understand why there is so much obsession with incineration. Incineration does not solve the problem of waste. It just burns the waste. Emitting toxins, carbon monoxide and other gases. It does not provide for major energy needs. In the times of climate emergency, incineration plants are not at all a good idea. Incineration plants in India cannot run without burning recyclable material like plastic, paper which have higher calorific value. Burning valuable recyclable material is a folly. The collection and processing of recyclable material provides livelihood to many. Recyclable materials have the potential to reduce mining and deforestation for virgin material. Installation of waste-to-energy policy plants will disrupt the informal waste supply chains in a way, it has never happened before.



Social unacceptance of waste aggregation units

Not in my backyard attitude of city dwellers has pushed the waste aggregation units in the fringes. Nayandahalli was in the periphery of the city. Waste godowns were set up there as it was far away from the city. Waste-workers, with all its geographically inherent vulnerabilities like being in the forested area with snakes and deadly insects, worked in peace. Slowly, the city expanded and reached Nayandahalli. Now there is a major metro train station connecting Nayandahalli to the city. Metro brought wealthy dwellers who don't want to have these godowns visible from their apartments' balcony. The godowns which were in the periphery, are now in someone's backyard. To survive they must move again to the newly defined periphery. Gentrification of the neighborhood has increased the land-prices. Most godowns are on rented land. The rents have gone higher and have become unpayable. The increased prices and not in my backyard attitude are forcing the waste aggregation godowns and reprocessing units to move further out, increasing the cost of transportation and setting up of new structures. There has been another development in the area. As godowns are being pushed off the city limits, to reduce costs, the homes of waste-workers/sorters are being used to sort the brought material. The mixed material is brought from the waste-markets, sorted and hammered for dismantling at home. The waste sorters stay in very small dwelling, there is little space to do anything other than sleeping and cooking. Now the same space has a new use-sorting and dismantling. It may create health issues for residents and little to no place for children for healthy up-bringing.

Chapter 6: Report of the Workshop on the Need for State Level Policy on Recycling

November 15th and 16th, 2016 Parisara Bhavana, KSPCB

Organized by Hasirudala and Radio Active CR 90. MHz



Background

India is stepping to become the manufacturing hub in South Asia. To manufacture one needs raw materials and most of them are availed by exploiting the natural world either through lumbering and mining. The raw materials need to be processed before being sent to the manufacturing units. The processing of raw materials requires additional carbon intensive inputs. All these processes have very high ecological footprint. In the times of climate emergency such growth and ambitions are not sustainable unless we look at better alternatives. Recycling and reprocessing of material for usage in manufacturing is one such alternative. Reprocessing and recycling of waste generated in the cities is the way forward. The classical idea of looking at cities as mines of future proposed by urbanite Jane Jacobs is a step in that direction. This reduces the load on natural world and also ensures that our garbage concerns are sorted. In other words, linking our solid waste management policy with the manufacturing policy i.e. Swachh Bharat with Make in India vision.

For this to happen we need to have certain things in place:

- Awareness regarding the quantum of waste generated every-day, how much of the given material is worth recycling,
- What are the recycling processes and how are they undertaken, who all are the actors involved? What are the institutions which are involved in the process?
- What are the obstacles which hinder the process of recycling? How can they be addressed to aid better recycling processes?
- Legal, technological and financial implications.

National Action Plan on Climate Change (NAPCC), Karnataka State Action Plan on Climate Change, recently released solid and plastic waste management, petrochemical policy rules that recognize some of these elements and recommends creation of robust mechanisms for encouraging recycling and provide incentives to the recyclers.

It is worth mentioning here that most of the recycling undertaken in India is by informal actors (not recognized by law – different from being illegal), given that the informal recycling industry is shaped in the form of a pyramid the waste pickers occupy the bottom layer followed by the scrap dealers, aggregators or godown owners in the layer above. Further up are the reprocessors and the bigger/ smaller manufacturing units' source reprocessed material from the above two layers for manufacturing of the finished products. To bring the representation of all actors Hasiru Dala organized a roundtable workshop, with the aim of answering the above questions.

Workshop Report : Day 1

Session 1

Ms. Nalini Shekar, formally welcomed the gathering. Next was the introduction round, following which Ms. Pinky Chandran, set the context to the two day workshop.

She explained, following the Lok Adalat's directions in 2011, the Bruhat Bengaluru Mahanagara Palike (BBMP) became the first municipality in the country to register waste-pickers and enumerate scrap dealers. So, by 2012, given that the BBMP had registered 4175 waste-pickers, Jain University, Hasiru Dala and Solid Waste Management Roundtable, decided to look at the economic aspect of informal recycling and their net contribution to the city, while extrapolating data for the estimated 15,000 waste-pickers in the city. The study revealed that the estimated 15000 waste pickers were retrieving about 1050 tonnes of waste per day and saving the city about Rs. 84 crores annually.

On the similar lines given that Dry Waste Collection Centre (DWCCs), at ward level were set-up in Bengaluru following Lok Adalat's intervention and further validated by the Karnataka High Court's direction by instructing the municipality to set up necessary infrastructures to facilitate ward level decentralized management of waste for all categories, it became important to study the operations of 32 Dry Waste Collection Centre operated by the informal sector. And hence, the Solid Waste Management Roundtable spent one year in assessing the same. She also explained the concept of DWCCs for the out of town participants. DWCCs are based on a zero-subsidy model for operations; the DWCCs are envisioned to meet the environmental objective of managing the Municipal Solid Waste (MSW) recyclable waste stream through responsible recycling.

They are also expected to be a hub for social inclusion of the informal sector in the process, and ensure economic viability through market driven delivery mechanisms. The research revealed that from January to July 2015, the DWCCs retrieved over 23, 73,908.8 kgs of dry waste, with an annual saving of about Rs. 48.79 lakhs, on the investment made to construct these centre.

Following these studies, the next logical sequence in the study would be the study of informal waste markets and hubs and hence Nayandahalli was chosen. It was important to trace Material Flow Value Chain or simply put Bengaluru's Dry Waste Chain and identify the actors involved. In the one year study period, formal survey by way of questionnaires were administered to 100 godown owners, 18 factory owners and 10 home based workers. Informal semi structured focus group discussions were conducted in batches with godown owners, waste sorters, truck/ tempo drivers and home based workers. Separate radio interviews with godown owners, sorters and factory owners were also conducted, in addition to the use of photo documentation. She shared the details of the findings and explained that they also travelled to Jolly Mohalla, Dharavi, Mumbai and Tumkur, for wider appreciation of informal recycling spaces. She also shared stories of people from Navandahalli, and concluded with a presentation of the recently released Plastic Waste Management Rules 2016 and the need for a **Recycling Policy.**

Inaugural Session

The first session transitioned into the inaugural session. Mr. Shantappa and Dr. Jai Prakash Alva, Board Members, Karnataka State Pollution Control Board formally inaugurated the workshop and stated their commitment for the Recycling Policy.

Mr. Shantappa, spoke about the Government's plan to set up a three R park 'Reduce, Reuse, Recycle', and requested participants to submit any suggestions regarding waste management and recycling.

Dr. Alva stressed the importance of defining terminologies for the informal waste economy. He questioned the definition of waste and resource and urged for a new thinking. Waste, he said would raise concerns of interstate (cross border) movements and can be done so only after required permissions from the respective state's Pollution Control Boards.

Resource, or material on the other hand, which acts as a feeder /raw material to industries, should be treated differently and on that grounds felt the need for National level policy on Recycling.

The third session was devoted to Defining the Informal Waste Economy (Definitions, Mapping Actors, Mapping the Chain and Terminologies). This was anchored by Kabir Arora

Kabir explained that the term recycler has been used loosely and has many connotations according to the different rules. The process of recycling also means different things in different situations and the definition of the words - waste and material.

The participants articulated that the moment the waste-picker, lowest in the material flow chain, picks up the item discarded, it can no longer be termed waste and must be classified as "material or resource". They explained that colloquially they termed it as "maal".





This led to the next level of discussion where the participants defined the actors within the chain

- Scrap dealer:
 - Buys only newspapers
 - Buys mixed material
- Itinerant Buyers (Cycle)
 - Buys only newspapers
 - Buys only copper
- Itinerant Buyers (Cart)
 Buys mixed materials
- Waste-picker Colony based aggregation
- Home based workers
- Wholesalers
 - Collects from all over the state
 - Collects different materials
 - Specialize in one material
 - Vary based on scale
- Recyclable Market Ex.: Jolly Mohalla
 - Collect and trade waste
- Recycling Hub Ex.: Nayandahalli (Consists of people across the chain)
 - Sorter
 - Home based worker
 - Godown owner
 - Reprocessors-Grinding, washing, blowing, moulding, segregation
 - For cotton: threading, filler, bedding, lumps
 - Delhi godowns
 - Manufacturers/Moulders.

The discussions also progressed to the Informal Jobs and workers conditions and the participants felt certain non-negotiables by the State would be mandatory :

- Compulsory health checkup for all workers
- Identification cards for the people in entire material flow chain
- Maintain stable price value
- Safety gear should be provided in subsidy by the Government
- Training in modern technology

The session concluded with the playing of the Radio Series Daastan-e-Nayandahalli and dinner.

Day 2

The first session was devoted to Rethinking formalization. This session was anchored by Ms. Sandhya Narayanan. She explained that while formalization within the informal economy requires many different approaches, depending on the categories of the workforce and the enterprises, the session will discuss challenges to formalization from the Informal Enterprises (Scrap shops, Dry Waste Collection Centres (DWCCs), godowns, informal recycling clusters, recycling units and factories) perspective. The session saw deliberations on the issues representing and organizing, registration and taxation, legal and regulatory frameworks, occupational id cards, use of public space, infrastructure and shared services, access to government subsidies and formal business associations/ membership.

Participants were of the opinion that even though Scrap Shops came under the Shops and Establishments Act, they must be treated as a legitimized entity and must be enumerated within the Municipality limits, with the appropriate identity cards. This they felt would also ease the market for new entrants.

The question on defining Re-processors and Wholesalers led to a debate on formal and informal sector, as most informal enterprises reach the formal enterprises through series of channels which are again informal or subcontracted relationships down the value chain.

The definitions for the unorganised sector in the National Commission for Enterprises were :

Informal Sector: "In 2004, the Government of India set up the National Commission for Enterprises in the Unorganised Sector (NCEUS) to examine the issues of the informal economy. The NCEUS adopted the following definition of the "unorganized sector." "The unorganized sector consists of all unincorporated private enterprises owned by individuals or households engaged in the sale and production of goods and services operated on a proprietary or partnership basis and with less than 10 total workers."

Informal worker/employment: "Unorganized workers consist of those working in the unorganized sector or households, excluding regular workers with social security benefits provided by the employers and the workers in the formal sector without any employment and social security benefits provided by the employers".

Informal economy: The informal sector and its workers plus the informal workers in the formal sector constitute the informal economy

Given this discussion and definition, the participants considered using the term authorized and unauthorized, would be more appropriate.

Given this agreement, formalization of the informal enterprises must be gradual and ongoing, and must not be a blanket one size fit all approach. Each layer within the value chain must be looked at differently. The participants felt the following should be put in place :

	Formal Instrument	Place of operation	Taxation and Access to finan	aces Comments
Waste pickers	- Registration by the Municipality - Issue of occupational ID cards	- Local neighbourhoods - Place of sorting to be provided by municipality - Regularize waste- picker colonies		
IB				
Scrap Shop	- Enumeration - Registration of Shops and Establishments not compulsory	- Local neighborhoods - Selection of space on market principles		 Scrap dealers to be considered as micro-enterprises and hence, it was expected that should find their own space to set up shop, within a residential area. Further municipality to decriminalize the profession
Wholesaler	- Enumeration - Registrations of Shops and Establishment	Designated or Natural Waste Markets around the city and within the city must be earmarked	Tax break for five years (Limited liability)	 Existing waste trading markets to be protected, with up -gradation in infrastructure by the municipality Decriminalizing the profession and allotting the industry as a green industry would make it easier to avail bank loans and other financial aids

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The participants from Karnataka stated that while according to Karnataka State Pollution Control Board plastic processed goods are in the "green industry" category; this is a narrow scope as the focus is on the end product. So again the definitions of recycling/ green industry are open to interpretation. Different products that are sent for recycling are categorized different according to the Central Pollution control Board.

The second session was on Smart Cities and Informal Recycling, anchored by Kabir Arora. He explained that objective of Smart Cities Mission "is to promote cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of 'Smart' Solutions." "The core infrastructure elements in a smart city would include: sanitation, including solid waste management.' The illustrative list of smart solutions in the Smart City Mission guidelines is also very suggestive of 'Waste to Energy & Fuel'. Waste to compost, Recycling and Reduction of C&D waste are other two areas mentioned in it. He also mentioned that the mention of informal sector inclusion is made in the annexure referring to 'scope the of work for Smart City Consulting Firm' which will make submission on behalf of selected city by state government).

The participant from Tumkur, expressed his concern at the lack of recognition of recycling as smart solution, which led to a discussion on the need for a facelift for the entire recycling industry.

Recommendations to Government:

It was proposed that, Recycling to be considered as a smart solution, in addition extended producers responsibility to facilitate recycling must be mandated, along with earmarking spaces for construction of Dry Waste Collection Centre at the ward level and protection to waste markets and creating recycling Hubs in Clusters. Given that Smart City framework was technology focused, the Recycling Industry needs to have access to upgraded technology



Post Lunch session, the discussion focused on **Skill Development and the Informal Waste Economy**. Ms. Pinky Chandran anchored this session and explained that Skill development of the informal waste workers, assume utmost priority, given that training can improve productivity and provide for decent work, reduce occupational hazards, and access to better working conditions.

She then went to highlight key elements of the National Policy on Skill Development and Entrepreneurship 2015. She mentioned the policy with a focus on entrepreneurship has a component on Ease of doing business under which the following has been envisioned:

- Introduce Unique Enterprise Number (UEN) that a new enterprise could use for various registrations including taxes, labour laws and social security. Once UEN is available, all regulatory and support agencies shall use it to fasten the process of setting up an enterprise.
- Introduce an online Composite Application Form (CAF) that will help entrepreneurs file a single application for obtaining all approvals and clearances from various government authorities. Encourage States to strengthen existing ****
- Single Window System' with a High Power Committee empowered to give all necessary clearances for setting up a business.
- Convert the present District Industries Centres (DICs) into Business Development Centres (BDCs) with an objective to provide technical and procedural hand-holding support and counselling to pre-start-up, nascent, early start up and growth ventures.
- Permit flexibility to start-ups in 'hiring and retaining' workforce for operational adjustments and rationalisation during the first three years of operation of an enterprise, assuming that by the end of three years it will either stabilise and grow or become sick and close down.
- Allow easy exit to enterprises if they have been in operation for less than three years. Such enterprises will be facilitated to close their operations, if not found viable, within a period of three months. Special fast track court would be set-up to expedite the process of closure of such firms.
- Consider tax incentives to new and existing entrepreneurs

She also spoke of the Training Programs developed in Bengaluru :

- Scrap Dealer Certification Program provided by Radio Active- Jain University in collaboration with Hasirudala for Waste-pickers and Scrap Dealers in and around Bengaluru. The curriculum covers legal and financial aspects of running a scrap business, basic maintenance of accounts, HR and customer service, soft skills and behavioural training, standardization of existing scrap business, standards to be followed, occupational hazards and safety, communication and role as future service provider/ microentrepreneur.
- Waste picker Training Manual, designed by Jain University which covered New waste management policies, Business Management, Personal Safety and Personal development
- Training on Organic Waste Management, developed by HasiruDala at two levels basic orientation for organic waste management and advanced learning for composting that includes bio dynamic method of composting and anaerobic composting.
- Terrace Gardening Training and the Mushroom Cultivation Training developed by Hasiru Dala
- Event Waste Management Training, developed by Hasiru Dala for eco-friendly events

She then led the discussions on two fronts: Training Requirement of the Recycling Value Chain and the Skill India- Make in India perspective

Discussion Points :

What kind of skills are needed?

- Training delivery(Lab based skilling, apprenticeship training)

- Explaining the training component she said that training could take multiple formats like Acquisition of new skills in the specific job domain (Scrap business), new opportunities(organic gardening, micro entrepreneurship) and other life skills such as communication and negotiation skills, personal development and finances, problem solving and decision making, anger management and customer service, current waste laws etc and can go a long way in confidence building and better inter-personal skills. She added that Awareness of the laws and directives, will also contribute to better organization of the workforce and collective bargaining towards policy measures, and business development.

	Training Requirements / Delivery	Other Comments	
Waste pickers	The trainings programs developed by Bengaluru should be expanded to other cities.	Opportunities to be created by friendly waste management polices eg. Eco Friendly weddings	
IB	Similar to the trainings mentioned above		
Scrap Shop	Scrap Dealer certification program	Mentorship and Entrepreneurship Hub, for ease of operating	
Wholesalers/ Reprocessors/ Manufactureres	Similar program like the Scrap Dealer Certification, with special focus on registration and taxation, policies related to labour	Mentorship and Entrepreneurship Hub, for ease of operating Here the need for available information on government subsidies, incentives, procurement bids, export packages and import procedures for machinery etc, need to be available	



Other training requirement across the value chain was

- Identifying materials
- Training in identifying marking of plastic grades.

With the delivery mechanism, participants were open to different to classroom, simulation, apprentice based delivery. Participants also felt the need for Training Institute within the designated Recycling Hubs of the City.

The last session was on Fair Trade with the recycling industry. Ms. Nalini Shekar explained the concept of Fair Trade. She mentioned that the concept evolved over five decades with the goal of creating just and fair practices, and fair access to marginalized producers in terms of monetary benefits being passed down. She said the main principles include Transparency, Accountability, fair practices, payment of fair prices, ensuring no Child labour/Bonded Labour, ensuring good working conditions for the workers etc.

She then added that given that the waste-pickers who are placed way below in the value chain often are at the receiving end, when prices fall and hence when approached by Plastics for Change, a social enterprise dedicated to reducing plastic pollution, increasing recycling rates and creating dignified livelihoods for the urban poor in developing countries, Hasiru Dala came on board to partner in Bangalore.

Andrew Almack, from Plastics for Change stated that they have developed a deal process and mobile platform to create new markets for recycled plastics.

The platform builds transparency and accountability through the supply chain to provide fair market access to wastepickers and strengthen all members of the informal recycling supply chain and accelerate the development of recycling infrastructure.

Andrew spoke about the experiment. He said that in 24 hours around 80 lakh barrels of oil is used globally to make plastic. This experiments aims to solve pollution caused by plastics. In general, big brands only use virgin plastic which is non-recyclable. Hence Andrew along with other NGO's tried to convince the brand to use mixed plastic so that it can be recycled. This will eventually stabilize the plastic price. In reply to a participant's question he said that the mixed plastic would not affect the product quality. He further suggested that if the total capital is paid in advance by the brands the suppliers can easily access the raw materials. This would also stabilize the plastic price.

The recyclers from other states expressed their readiness to partner in this initiative, as they believed it was important to have minimum security and insulation against price fall.

Conclusion

Ms. Sandya Narayana, welcomed the participation of members from DMA, and provided an overview of the two day workshop. The participants restated the requirements for Formalization of Informal Enterprises.



Annexure 1 - Agenda

Agenda for Recycling workshop Day 1 : 15th November 2016

3.30 PM to 4.30 PM	Registrations
4.30 PM	Welcome and Introductions Nalini Shekar and Marwan Abubaker, HasiruDalay
5.00 PM	. Context setting; Sharing research progress Pinky Chandran, Jain University
5.30 PM	Inaugural Address Mr. Lakshman, Chairman, Karnataka State Pollution Control Board
6.00 PM	Tea Break
6.30 PM	Defining the Informal Waste Economy (Definitions, Mapping Actors, Mapping the Chain and Terminologies) <i>Kabir Arora, Alliance of Indian Waste-pickers</i>
7.30 PM	Dinner Audio Listening of Daastan-e-Nayandahalli by Radio Active CR 90.4 Mhz



Agenda for Recycling workshop Day 2 :16th November 2016

9.00 AM	Registration
9.30 AM	Rethinking formalization While formalization within the informal economy requires many different approaches, depending on the categories of the workforce and the enterprises, the session will discuss challenges to formalization from two- fold approach: i) Informal Enterprises (Scrap shop, DWCC, godowns, informal recycling clusters), recycling units and factories) The discussions will deliberate on the following issues representation and organizing, registration and taxation, legal and regulatory frameworks, occupational id cards, use of public space, infrastructure and shared services, access to government subsidies and formal business associations/ membership <i>Moderated by Sandya Narayanan</i> ii) Informal Jobs Organising workers, membership to waste-picker run organisations, minimum wages, occupational health and safety measures, pensions etc <i>Moderated by Maitriyi Shankar, KKPKP</i>
10 .30 AM to 11. 45 AM	Fair Trade #Plastics for Change is a social enterprise dedicated to reducing plastic pollution, increasing recycling rates and creating dignified livelihoods for the urban poor in developing countries. (Screening of a short video) In Bengaluru, Plastics for Change and Hasiru Dala have developed a deal process and mobile platform to create new markets for recy- cled plastics. The platform builds transparency and accountability through the supply chain to provide fair market access to wastepickers and strengthen all members of the informal recycling supply chain and accelerate the development of recycling infrastructure. (Moderated by Nalini Shekar, Hasiru Dala)
11.45 AM to 12.00 PM	Tea Break
12.00 PM to 1.30 PM	. Smart City and Informal Recycling The objective of Smart Cities Mission "is to promote cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of 'Smart' Solutions." 'The core infrastructure elements in a smart city would include: sanitation, including solid waste management.' The illustrative list of smart solutions in the Smart City Mission guidelines is also very suggestive of 'Waste to Energy & Fuel'.

	Waste to compost, Recycling and Reduction of C&D waste are other two areas mentioned in it. It seems recycling and enforce- ment of EPR are missing from smart solutions for the Ministry of Urban Development responsible for the mission. (The mention of informal sector inclusion is made in the annexure referring to 'scope the of work for Smart City Consulting Firm' which will make submission on behalf of selected city by state government) Recommendations to Government <i>Moderated by Dharmesh, IIT Madras</i>
1.30 PM to 2.30 PM	Lunch
2.30 PM to 3.30 PM	 Skill Development and the Informal Waste Economy Skill development of the informal waste workers, assume utmost priority, given that training can improve productivity and provide for decent work, reduce occupational hazards, and access to better working conditions. Acquisition of new skills in the specific job domain (Scrap business), new opportunities(organic gardening, micro entrepre neurship) and other life skills such as communication and negotiation skills, personal development and finances, problem solving and decision making, anger management and customer service, current waste laws etc can go a long way in confidence building and better inter-personal skills. Awareness of the laws and directives, will also contribute to better organization of the workforce and collective bargaining towards policy measures, and business development Discussion Points : - What kind of skills is needed? Training delivery(Lab based skilling, apprenticeship training) <i>Moderated by Pinky Chandran, Jain University</i>
3.30 PM to 3.45 PM	Tea Break
3.45 PM to 5.00 PM	Discussion with officials The National Environment Policy (NEP, 2006) mentions that there should be efforts to, "Give legal recognition to, and strength- en the informal sector systems of collection and recycling of vari- ous materials. In particular enhance their access to institutional finance and relevant technologies." Discussion points. - Mr. Lakshman, Chairmain, Karnataka State Pollution Control Board - Mr. Jai Prakash Alva, Board Member, (KSPCB) - BBMP - EMPRI - DMA Moderated by Sandya Narayan, SWMRT
5.00 PM to 6.00 PM	. Conclusion and Way Forward Pinky Chandran

Annexure 2 - Participants List

Akash Shetti, Plastics for Change. Akmal Baig, Bangalore Allah Bakash, Nayandahalli Atlaf, Nayandahalli Barkath Ulla Khan, Nayandahalli Beula, Radio Active, Bangalore Chand Pasha, Bangalore Harish, Bangalore Javeed Ulla Baig, Nayandahalli Kabir, Hasiru Dala, Bangalore Kizer Pasha, Bangalore Krupa Rani, Hasiru Dala Maheswari, Indore Maitreyi Shankar, KKPKP, Pune Mathin, Bangalore Mukesh Jhanjhanuala, Malegaan Naushad.S, Tumkur, Karnataka Pinky Chandran, Jain University Rahul Gupta, Indore, MP Ramakanth, SWMRT Salma Khanu, Bangalore Sandhya, SWMRT Bangalore Santosh Kumar Gupta, Nandnagri, Delhi Shreyas Sreenath, Bangalore Siddiq Pasha, Bangalore Sunil Ahamed, Venad Resource Management, Kerala Suresh Bhandari, Coimbatore Tanushita, Radio Active, Bangalore Tejas Choudhary, S3IDF Usha, Radio Active, Bangalore

Chapter 7: Conclusion and Executive Summary of Recommendations for a Recycling Policy in India

Valuing Waste : The necessity for a comprehensive recycling policy

India needs to make a paradigmatic shift from framing policies that treat 'waste' in a linear fashion, as something to be discarded, disposed or landfilled, to embracing the concept of circular economy that emphasizes material recovery and recycling. Perspectives that view waste as a problem to be solved or managed inevitably hinder visions that promote sustainable policies that emphasize waste as a source of value.

Key Concerns

- There is an urgent need to redefine the terminology of waste.
- The various policy and legal instruments drafted within the purview of the Ministry of Environment Forests and Climate Change, such as the Municipal Solid Waste Management and Handling Rules 2016, The Plastic Waste Management and Handling Rules 2016, The E-Waste Management and Handling Rules 2016, The Hazardous and other wastes (Management and Transboundary Movement Rules) 2016, need to be reexamined by taking into account the concrete flows of wastes, or waste streams, from points of production, consumption to waste generation; formal and informal linkages- such as state, intrastate, interstate, country, cross-border and import-export both actors and activities- that are involved in further retrieval, processing, or disposal of materials.
- There is also a dire need to consolidate the above mentioned policies, to clarify and standardize terms and definitions, systems and processes, as well as to recognize the key stakeholders that are addressed in the policies, especially the informal waste workers in particular and the informal sector in general.
 - Recycling is mandated as a method to handle different streams, the actors involved are often ignored, or made invisible in the process. The SWM and PWM Rules 2016 make an attempt to include waste pickers in the process, the focus is still on the technical aspects rather than the people that work across the informal recycling value chain. The social aspects or pathways do not find a mention in the larger schemes of the policy.

Poverty alleviation initiatives see no linkages with the environment, even though a large number of urban poor make their living from processing waste. Moreover, important research demonstrates that environmental degradation is also produced by social inequity and disproportionately affects marginalized communities. (Nixon 2011)

- When environmental concerns and policies are often framed, visual cleanliness and aesthetic sensibilities gain prime importance over key issues of environmental and social justice (Baviskar 2004) For example, issues of decent working conditions for informal waste workers are not raised and there is a blanket branding of informal waste work as illegal in current E-Waste Rules.
- Master Plans of Indian cities fail to allocate spaces for waste handling, thus rendering work by the informal waste sector as illegal or as mere nuisance to be abolished. In reality however, this lack of official sanction or recognition adds to the vulnerability of informal actors who are often at the mercy of civic authorities. The Dry Waste Collection Centre (DWCC) in Bengaluru (Chandran and Narayanan 2016) are a case in point as they enjoy legal sanctity within the municipality. Scrap shops in residential areas as well as recycling markets and hubs, which perform the same function as DWCC's but without legal recognition afforded to the latter, are often displaced. This phenomenon is evidenced from the incidents in other Indian cities. For example, Delhi's Karol Bagh at Tank Road, one of the earliest markets for plastic trading and recycling and which came into existence in 1970s, was removed in 1981 after complaints from residents.



Executive Summary of Recommendations for a Recycling Policy in India

The objective of a Resource Recovery and Recycling policy is to achieve a framework for sustainable and integrated waste management that can be implemented throughout the country.

Redefining the terminology for waste

The Environment Protection Authority of South Australia defines waste as any discarded, rejected, abandoned, unwanted or surplus matter, whether or not intended for sale or for recycling, reprocessing, recovery or purification by a separate operation from that which produced the matter. The Section 3(1) of the Act. Clause 4 of the Environment Protection (Waste to Resource) Policy 2010 specifies when 'waste' can cease to be waste. Its scope is such that beyond materials governed by existing specifications, it demonstrates that materials such as secondhand clothing ready for sale will not be waste (EPA South Australia 2012).

Coordination between Ministries and Departments

The lack of coordination and focus between different policy actors involved in the formulation and implementing policies and rules is clearly evident, through the various acts MSW 2016, Plastic Waste 2016 etc. There is a need for a formal interdepartmental coordination between the Ministry of Environment of Forest and Climate Change, Ministry of Urban Development, Ministry of Labour and Employment, Ministry of Skill Development and Entrepreneurship, Ministry of New and Renewable Energy, Ministry of Social Justice and Employment, Ministry of Small Micro and Medium Enterprises, Ministry of Finance, Ministry of Health and Family Welfare, Ministry of Housing and Urban Poverty Alleviation, Central and State Pollution Control Board, the municipal bodies, Directorate of Town and Country Planning, National Urban Livelihood Mission and other relevant stakeholders for a comprehensive and well-rounded policy, focusing on environment, health, social justice, urban planning viewed through gendered lens.

Moving away from policies for Waste Management to Policies for Material Recovery and Recycling

Progressive Countries across the world are moving away from waste management to material recovery policies to practically implement the concept of a circular economy, a system which is "restorative and regenerative by design, and aims to keep products, components, and materials at their highest utility and value at all times" (Ellen MacArthur Foundation 2015). The motivations for this shift stems from rising concerns over resource constraints and environmental impacts faced under linear economies that emphasize the extraction and utilization of raw materials and quick disposal technologies (Ellen MacArthur Foundation 2015). The shift heralds a new paradigm from previous attitudes where municipalities viewed waste as something of no value.

Adoption of Circular economy principles

Maximising resource value is best achieved by extending the useful life of products through resale, repair, and refurbishment: such high value activities underpin the transformational promise of a circular economy. These opportunities demand major shifts in business practice and governance. But the circular economy also encompasses more incremental, readily achievable gains, primarily through better collection systems and closed loop reprocessing (Benton and Hazell 2014)

Define and Acknowledge all actors in the Recycling Pyramid

There is an urgent need for policy makers to list, define and acknowledge all actors that make up the Recycling Pyramid: the waste-pickers, scrap dealers, itinerant buyers, home-based workers in waste, waste picker colony based aggregators, wholesalers, traders, processors etc.

Our experience in Bengaluru reveals a complex thread of inter-connections at all levels within the traditional linear recycling pyramid. Embedded in each category of actors are multiple sub actors performing similar jobs but varying in either quality or type of material, scale, method of collection or processing

It's important that the mapping of the actors is undertaken across the country to capture its Trans regional nature. It is also important to capture the colloquial names used for each actor.

Figure 4: Bangalore's Material Flow Value Chain. Source: Primary Author - Pinky Chandran





Legitimise the existence of other recyclers by way of enumeration

While the SWM Rules 2016 and the PWM Rules 2016 have prescribed the integration of waste pickers by way registering them and issuance of occupational ID cards, the other actors also need to be recognised and enumerated within the Municipality limits with appropriate identity cards. Moving away from centralised collection to supporting decentralisation of waste collection and processing

The traditional approach to management of waste has always emphasised on a centralised approach for collection and processing of waste. However cities like Pune early on in 2007 advocated for segregation at source and included waste-pickers in the collection of waste and more recently the Honourable High Court of Karnataka advocated for a two bin one bag (2Bin1Bag n.d.) system of segregation of waste and has also given access to the informal sector to operate Dry waste Collection centre in the city.

Invest in Resource Recovery Infrastructure

End subsidies and tax holidays for landfills and large scale waste to energy incinerators, as it creates a false acceptance of waste disposal in landfills, instead of resource extraction from waste streams. Such policies also deprive the necessary reuse markets of material and go against the waste hierarchy principles outlined in MSW policy and unwitting promote displacement of informal waste workers.

In addition, given that each actor requires space within the jurisdiction of the municipality, identification of spaces for recycling across the informal recycling industry – sorting spaces for waste pickers, space to set-up shop in neighbourhoods for scrap dealers, formal facilities like the Dry Waste Collection Centre within the wards, recognition of waste trading markets, colonies, and hubs are necessary. Space allocation within industrial estates as recommended by SWM Rules 2016, must be strictly enforced.

A snapshot of requirements

Actors	Responsibility	Formal Instrument	Place of operation
Waste pickers	By the State Government and the ULB	 Registration by the Municipality Issue of occupational ID cards 	 Local neighbourhoods Place of sorting to be provided by municipality Regularize waste-picker colonies
IB	By the State Government and the ULB	 Registration by the Municipality Issue of occupational ID cards 	- Local neighbourhoods
Scrap Shop	Central Government, State Government, ULB	 Enumeration of Scrap Dealers and issuance of occupational ID Cards Registration of Shops and Establishments not compulsory 	 Local neighborhoods Selection of space on market principles
Wholesaler	By the State Government and ULB	- Enumeration - Registrations of Shops and Establishment	 Designated or Natural Waste Markets around the city and within the city must be protected And spaces must be earmarked within the city must be earmarked.
Reprocessors/ Manufactures	By the State Government and ULB and Pollution Control Board	- Enumeration - Registrations of Shops and Establishment	 Designated or Natural Waste Areas around the city and within the city must be protected Recycling Hubs to be created /designated on the lines of a cluster approach.

Taxation and access to finances

Comments

- To be names as green workers or green collar workers - To be names as green workers or green collar workers - Special loan scheme by - Scrap dealers to be considered as micro-enterprises and the state hence, it was expected that should find their own space to set up shop, within a residential area. - GST Exemption - Further state to decriminalize the profession - To be names as green workers or green collar workers - Special loan scheme by - Existing waste trading markets to be protected, with the state upgradation in infrastructure by the municipality - Formal exemption on GST - Decriminalizing the profession and break for five years - Dedicated space in industrial townships - According informal recycling as a green industry status would make it easier to avail bank loans and other financial aids - Tax break for five years - Assign green industry status to make it easier to avail bank (Limited liability) loans and other financial aids - Opportunities for technology upgrade must be made available through government grants, along with required training

Setting Recycling Targets throughout the Country

The Report of The Task Force on Waste to Energy (Volume I), Planning Commission (2014), recommends for A National Policy on "Recycling, Resource Conservation and Preventive Environmental Management" , and further highlights the need for a Strategic approach through the National Recycling Programme (NRP). The NRP will be an overarching framework to create and mainstream the organized waste management and recycling industry. Under the NRP structured frameworks and guidelines for recycling industry should be developed to integrate it with the existing waste management rules & guidelines. Industry and sector specific recycling standards, including recycled product standards be developed under the NRP. It states 'As a strategy, it would be prudent to make efforts to motivate the waste generators to reduce generation in the first place and reuse the waste to the extent possible, guide and enable industry and commerce to enhance recovery of materials and intermediates during manufacturing, promote segregation of recyclables at source and re-use the material in remanufacturing of products and intermediates, transitioning towards achieving the goal of optimum utilization of recyclable material'.

Extended Producers Responsibility/ Product stewardship

According to the Organisation for Economic Co-operation and Development (OECD) definition, Extended Producer Responsibility (EPR) is "an environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle" 1 . In practice, EPR implies that producers take over the responsibility for collecting or taking back used goods and for sorting and treating for their eventual recycling. Such a responsibility may be merely financial or organisational as well. EPR should aim at internalising environmental externalities and should provide an incentive for producers to take into account environmental considerations along the products' life, from the design phase to their end-of-life. EPR is also identified as a key instrument in link with resource efficiency and raw materials strategies (Monier, et al. 2014)

The Plastic Waste management and Handling Rules 2016 defies extended producer's responsibility " as the responsibility of a producer for the environmentally sound management of the product until the end of its life. It states that the producers, within a period of six months from the date of publication of these rules, shall work out modalities for waste collection system based on Extended Producers Responsibility and involving State Urban Development Departments, either individually or collectively, through their own distribution channel or through the local body concerned. However, it is important for India that EPR must adopt a dual approach in the implementation of EPR - the product and the actors across the recycling value chain. The EPR strategy must account for incentives from the bottom of the recycling pyramid (Chintan Environmental Research and Action Group 2005). Within waste collection system, the producers must involve waste-pickers and itinerant buyers in the collection system, further up they must support the construction and o





perations of a Dry waste Collection Center, support waste recycling hubs, by pooling in for common infrastructure, training of informal sector workers, technology support for upgradation of machineries and buy back schemes, mentoring informal workers in business operations. Failing which the EPR process could spell a doom for the informal sector, as in the case of E-Waste Rules.

Skill Development and Entrepreneurship

Given the Central Government's focus on skill and entrepreneurship development, it is imperative to look at enhancing skills of the waste workers through multiple formats/ schemes etc which include acquisition of new skills in the specific job domain (Scrap business), new opportunities (micro entrepreneurship), life skills, current waste laws, identifying composite materials, identifying marking of plastic grades, technical training etc. Furthermore, the creation of mentorship and entrepreneurship hubs to access available information on government schemes, subsidies, incentives, procurement bids, export packages, import procedures for machinery is extremely important.

Informal waste workers starting from the bottom of the pyramid can enable corporates to fulfil their legal obligations of EPR. The informal sector can form the supply chain required in recovering resources in the discards. This will have multiple impacts- Social, environmental and economic:

Through the creation of predictable livelihoods, environmental protection by recycling and creating a circular economy by closing the loop.

Case in point: In Bengaluru, Twenty six DWCC supported by Hasiru Dala collected over 7414.44 tons of total dry waste (paper, plastic, metal, glass, cloth, others), out of which 614.95 is only of multi-layered plastics (Packaging discards). This shows the potential of engaging with the informal waste supply chain, for retrieval and further processing.







Hasiru Dala (meaning 'Green Force' in English) is a non-profit organisation based in Karnataka working with waste pickers and informal waste collectors. Founded in late 2011 and formally registered in 2013, headquartered in Bengaluru. Tumakuru, Mysuru, Nelamanagala, Chamarajnagara and Nanjangudu are other cities, where Hasiru Dala works. There are more than 10000 waste-pickers and other informal waste collectors associated with Hasiru Dala.

Websites: http://www.hasirudala.in. http://www.wastenarratives.com



The Researchers

Pinky Chandran, Lead Researcher and Author

Pinky has over 18 years of experience across international education, community media and environmental activism. Currently she heads Radio Active CR 90.4 MHz- a community radio station in Bengaluru and is the Board member of Hasiru Dala Trust. Pinky is also an active campaigner for decentralized community based waste management and is a member of the Solid Waste Management Roundtable, (SWMRT) Bengaluru. In past, she has worked on several policy related documents and reports and has co-authored several papers "A Working Observation on SWM Policy-Karnataka State and ULB Bengaluru", "informal Waste Workers Contribution- Bengaluru", A Working Observation on the Dry Waste Collection Centre in Bengaluru", and co-conducted a study for the Revenue Department, Government of India on "Temple Waste Management in Bengaluru Case Study of 10 temples in Bengaluru ". She also has been instrumental in co-promoting the concept of Dry Waste Collection Centres in Bengaluru, and has spent over two years with her colleagues documenting the operations of the pilot centre in HSR Layout. She also developed a waste picker Training Manual, as part of municipality's project on Better Livelihood for waste-pickers. As a keen believer in the power of community media, she also facilitates the production of the popular series Kasa Shramika Prasira Rakshka (waste-pickers are the saviours of the environment), a daily radio show conceptualized, produced and hosted by the waste-pickers and scrap dealers, by way of regular trainings and meetings.



Kabir Arora, Co- Researcher, Co-Author and Project Coordinator

Kabir is a passionate geographer. Having lived in eight different cities of India, he is trying to make sense of prevailing urbanity. To earn his livelihood, Kabir coordinates Alliance of Indian Wastepickers – an informal network of organizations, cooperatives, and companies working on waste management with the help of wastepickers and is currently based in Bengaluru. He firmly believes that informal economy work-force has entrepreneurial zeal and if supported a little, they can make significant contribution towards economic growth. In addition to his interest in informal economy, Kabir follows the discourse on sustainability thoroughly and is a Board Member of Indian Youth Climate Network. He participated in Conference of Parties (COP) – 11 (Hyderabad), 12 (Pyeong Chang) of 'Convention on Biological Diversity', and COP 20 (Lima), COP21 (Paris) of 'United Nations Framework Convention on Climate Change'. He writes regularly on the issues of waste management and climate change on www.wastenarratives.com. and www.whatswiththeclimate.wordpress.com.
Marwan Abubaker, Co-Researcher and Co-Author

Marwan is a farmer, foodie, animal lover and environmentalist with over 15 years of experience across agriculture, fish-farming and waste management. In 2009, he joined Radio Active CR 90.4 MHz and co-launched an initiative on addressing urban waste management. An active meactive member of the Solid Waste Management Roundtable (SWMRT) in Bengaluru, that works to promote decentralized waste management in the city, he took up the initiate to pilot the first Dry Waste Collection Center in HSR Layout in 2011. This pilot project, helped establish the case for the need for Neighbourhood Dry Waste Collection Centre.Following the pilot, in 2012 he assisted with waste-picker mobilization, by mentoring a team of four to register waste-pickers, networking with the officials and holding regular meetings with the waste-pickers. He also has conducted over 200 awareness programs on the importance of waste management in the city, and was an invited speaker at several important local and national events.. In December 2013, he was invited to Port Blair by the Andaman Nicobar Environmental Trust (ANET), to assist with implementation of municipal solid waste management in the city. In May 2014, he joined Hasiru Dala trust as Director-Operations, and is responsible for the overall management and business development, of the Total Waste Management Services and on 1st November 2015, he co- founded Hasiru Dalal Innovations Private Limited.



Nalini Shekar, Co-Researcher and Advisor

Nalini Shekar is a co - founder of Hasiru Dala, a non-profit that works with wastepickers organization in Bangalore that has reached to about 10,000 wastepickers in the city. She also co-founded Kagad, Kach Kashtakari Panchayat (KKPKP), union of wastepickers in Pune in 1997. Her passion is to work with the unorganized sector of labour who constitute 90% of Indian labour. Her main focus now is on inclusion of wastepickers in the Solid waste Management process of Urban Local Body. She has won many accolades for her work including the Kempegowda Award from the City of Bangalore. Recently, she was chosen as one of

100 women in India who make a difference in the society by BBC.com.



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