

Diagnostic study of

INFORMAL SUPPLY CHAIN

of **RECYCLABLES**

in **Guntur** and **Vijayawada**,

Andhra Pradesh



Research Team : **Dalit Bahujan Resource Centre**, (DBRC, Guntur)

Lead Researcher : **Kabir Arora**



Research team members :

Alladi Deva Kumar, Executive Secretary, DBRC

Chukka Samuel Anil Kumar, Project Coordinator, GWI

B. Rasagna, Documentation Coordinator

J. Manjula, City Coordinator; **P. Prakash**, City Coordinator; **T. Yaama**, City Coordinator

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1. Introduction

After bi-furcation of Andhra Pradesh, Guntur- Vijayawada have become the most important region in the state, as it is a part of Amravati capital region. As we head forward, in each of the two cities, infrastructure will take centre-stage. Waste management is vital infrastructure for the health city. The status of it is not very optimistic. Most of the waste generated is dumped, except the recyclables, which are channelized by informal actors for recycling. Waste-pickers to re-processors, there is a long chain of actors. This diagnostic report on informal waste (recyclables) supply chain profiles those actors, notes their vulnerabilities and make recommendations for the organization. The report begins with the profile of the two cities, profile includes number of residents and the waste generated by each of the two cities. It is followed by research methodology and objectives of the research. There is detailed description of actors of informal waste supply chain, their vulnerabilities and sore points and concludes with the recommendations. The contours of policy paradigms are mapped in the report with summaries of solid and plastic waste management rules 2016.

2. Profile of Guntur and Vijayawada

Guntur and Vijayawada are two major districts in Andhra Pradesh. Rich soil, with diverse number of crops made these two cities famous for their agriculture produce. After the bi-furcation of united Andhra Pradesh¹, in Telangana state and Andhra Pradesh, Guntur- Vijayawada region was chosen for the new capital and is called Amravati capital region.

Guntur

Guntur is known for its chillies and other spices, tobacco. It has large agriculture based industries, across the district. For our research, we have focused on Guntur Municipal Corporation area. The corporation is divided in 52 wards. According to the 2011 census, population of Guntur city is 744916, with 189559

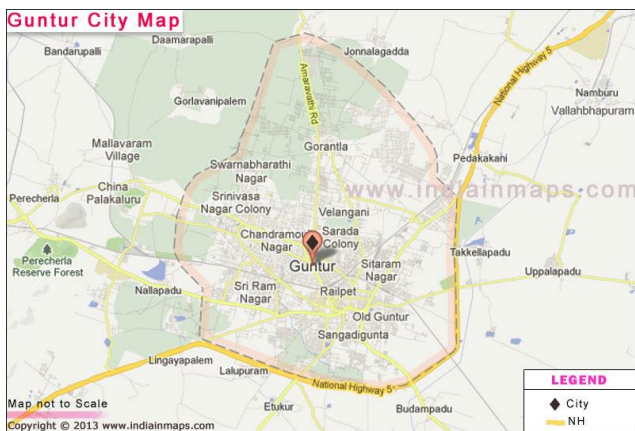


Figure 2 Map of Guntur Municipal Corporation Courtesy indianmaps.com



Figure 1 Map of Andhra Pradesh, Courtesy Deccan Chronicle (Published on 31st October 2014)

households. Guntur generates around 450 tons of waste every day. 40 percent of the city has source segregation and 82 percent of the city has the facility of door to door collection of waste. 428 tons of waste is disposed (read dumped), whereas 10 tons is composted, and 12 tons is sold for recycling(Holkar, Suresh and B.M. n.d.). These numbers are based on the submission made by urban local body to the Central Pollution Control Board. There is no accurate measurement of waste and most of these numbers are at best guestimates.

¹ The erstwhile capital of Andhra Pradesh Hyderabad is being shared by the two states for the period of ten years, after that Hyderabad will be the capital of Telangana alone

Vijayawada

Vijayawada is the second major city in Andhra Pradesh, located in Krishna district and on the banks of river Krishna. Like Guntur, it is a part of Amaravati capital region. According to 2011 census, the population of Vijayawada city is 1034350, with 2.5 lakh households. There is no source segregation and 100 percent door to door collection. City generates around 550 tons of waste, out of which 450 tons is disposed or dumped (Holkar, Suresh and B.M. n.d.). City boasts of bio-methanization, composting plants and had experimented with waste to energy which failed miserably.



Figure 4 Map of Vijayawada Municipal Corporation, Courtesy Google Maps

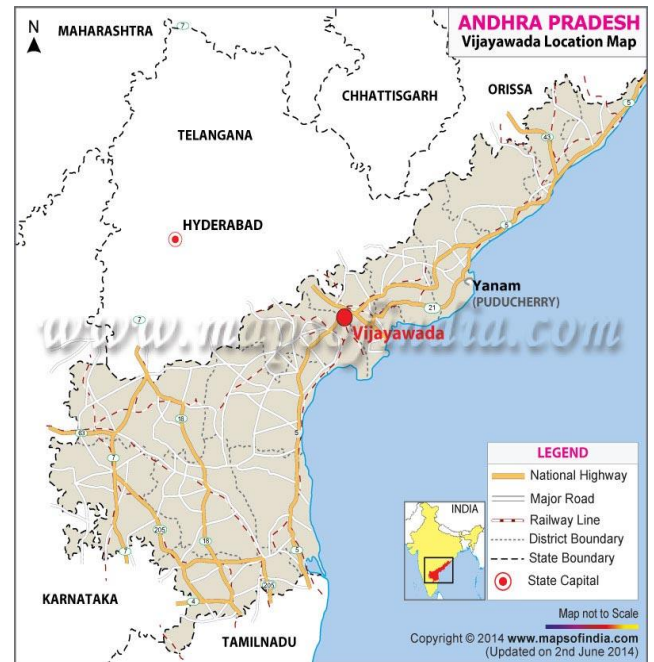


Figure 3 Location of Vijayawada on the map of Andhra Pradesh and India, Courtesy Map of India Website

The data in terms of proportion of organic, recyclables, sanitary and hazardous waste for these two cities is not available. For the report, the author is relying on the national level ratio concluded in the Municipal Solid Waste Management Manual published as a part of Swachh Bharat Abhiyaan (Clean India Mission). The manual quotes NEERI study of 2004-2005 and states that municipal solid waste includes 40-60 percent compostable material, 10-25 percent recyclable material (2016). It presents detailed numbers, provided below:

- A. **Bio-degradable material- 47.43 percent**
- B. **Paper- 8.13 percent**
- C. **Plastic/Rubber- 9.22**
- D. **Metal -0.50**
- E. **Glass- 1.01**
- F. **Rags- 4.49**
- G. **Inert- 25.16**
- H. **Others. 4.06**

With little to no evidence available of processing of solid waste (except few small organic waste management facilities) in both the cities, we can comfortably say that most of the waste is dumped and a fragment of the waste is ch annelized for recycling by the informal actors such as sanitary workers, waste-pickers, scrap dealers and aggregators and re-processors.

3. Objective and methodology

The research project has a very humble objective i.e. to identify actors in informal recycling chain, the role each of these actors play and trace the trail of recyclable material. In addition to that, during the study, vulnerabilities of informal recycling supply chain were identified.

Primary data was collected from the different actors. Focus group discussions were organized with the forty waste-pickers (five participants in each group) and nineteen sanitary workers, individual interviews (with the help of survey forms) were carried out involving ten scrap dealers and three large aggregators. The research team visited the settlements of waste-pickers and sanitary workers, scrap shops, aggregation centres and one re-processing unit in Auto Nagar, Vijayawada.

4. Urban waste economy and recycling pyramid

To our initial understanding, it seems that Vijayawada and Guntur have a linear waste chain. This is very unlike other major cities in India. Waste-pickers and sanitary workers are at the bottom of this chain, followed by neighbourhood small scrap shop owners. Above small scrap owners, there are aggregators (or wholesale scrap dealers) and after that re-processors. Post re-processing the material is sent for manufacturing of finished goods. Due to logistical issues, the researchers were not able to include the peak of the pyramid-manufacturers, who use the re-processed material for manufacturing goods.



Figure 5 Recycling pyramid



Figure 6 Consultation with waste-pickers in Vijayawada about their work

Definition and profile of each of the actors

Waste-pickers-Waste-pickers (earlier known as rag-pickers) form the bottom of recycling pyramid. They pick waste from the streets, dumping spots, sort and weigh it and after that sell it to neighbourhood scrap dealers and at times to aggregators. Thus, transforming the discards in ore/raw materials for the industry by their labour. Solid waste management(SWM) rules notified in 2016 by Union Ministry

of Environment, forest and Climate Change (MoEFCC) recognized the role-played waste-pickers. SWM rules say that ‘waste picker 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’ (MoEFCC 2016).

Mission for Elimination of Poverty in Municipal Areas (MEPMA) estimates that there are around 1000 waste-pickers in each of the two cities- Guntur and Vijayawada. The waste-pickers incur transportation costs to travel to the destination/lanes to pick up waste and to sell the sorted material. Every day they pick, sort and sell around 10-20 kilograms of waste and earn between INR 100- 200.

Sanitary workers (SafaiKarmacharis)- Sanitary workers are employed by municipal authorities directly or through a contractor to do door to door collection of waste, sweeping the streets and for cleaning the drains. They are salaried employees. There are around 5000 sanitary workers in Guntur and Vijayawada. Sanitary workers from Guntur were participants in the research programme. DBRC has a strong base within the community of sanitation workers in Guntur.

Sanitary workers have been given brooms, gloves and shoes plus a cart to undertake door collection of waste. Each cart is allied with two-three sanitary workers, who collect waste from more than 350 households. After collection, they take out the recyclables of value and give rest of the organic and other waste to the auto-tippers. These auto-tippers either dump the waste directly or pass it on to the tractors or trucks, who take it to the dump yard.

The sanitary workers are paid monthly salary. Each cart collects around 5-6 kilograms of dry waste (recyclables), they sell it to neighbourhood scrap dealers or the one prescribed by municipal authorities. Each cart earns around INR 30 a day from the sale of dry waste. Municipal authorities have framed a rule stating that each of the cart must pay fifty percent of its earning from dry waste sale to the municipal authorities.



Figure 7 Interaction with Safai Karmacharis

Neighbourhood Scrap dealers- Neighbourhood scrap dealers are based near the settlements of waste-pickers and sanitary workers. They receive the waste from waste-pickers and sanitary workers. After sorting the material, they sell it to respective aggregators or large scrap shops in Auto Nagar of either Guntur or Vijayawada. There are no estimates of the number of scrap dealers operating in the two cities. For research, we interviewed 9 scrap dealers in Guntur and 1 in Vijayawada. Three scrap dealers identified themselves as Schedule Caste, five of them from Other Backward Classes and One of them identified himself as Schedule Tribe. One scrap dealer (the only one interviewed in Vijayawada) shared that he is from Tamil Nadu, and used to do the job of Coolie (labourer in agriculture) in the village. With



Figure 8 Neighbourhood Scrap Shop

meagre earnings, he decided to move to Andhra Pradesh. Barring one scrap dealer in Guntur (he is from Prakasam district of Andhra Pradesh), most of them are from Guntur itself. Three of the ten interviewed scrap dealers worked as coolies, four were engaged in petty businesses and one worked as Kabadiwallah (itinerant buyer), before opening a scrap shop. Two scrap dealers acknowledged that scrap business was a family vocation for them. To set up a small scrap shop one needs an investment of INR 8000-10000, one needs to make the sales sustainable to ensure viability of the shop and have capacity to absorb shocks like fluctuations of prices.

Neighbourhood scrap shops have storage capacity of 3-4 quintals of scrap material, and receive upto 1-2 tons of waste. Most of their shops are on rent, except one which is set up in open space. They hire workers to do sorting, except one place where husband and wife jointly source the material and sort it and in other place, where waste-pickers do the sorting before selling it to scrap dealer.

Two of the ten shops surveyed have had themselves registered under shops and establishment law.

Aggregators-

Aggregators or large scrap shops are large waste collection, storage and processing units located in respective Auto Nagars of Guntur and Vijayawada. Each of these units have bailing and crushing facility and can employ as many as ten workers. The aggregators or larger scrap shops in Guntur transport their material to Vijayawada. Auto-Nagars are industrial areas, and



Figure 9 Crushing facility in aggregation centre



Figure 10 Glance of sorted material in aggregators

have regular transportation facility. The frequent truck movement ensures regular supply of the material. During the research, we interviewed owners/managers/family members of owners of three aggregation units. All of them have registered themselves under shops and establishment law. One of them was using the license of the old shop and while the shop has moved to new location. They avail 1-2 tons of recyclables, i.e. plastic, paper, cardboards

and metal on daily basis and have capacity to store 1-2 tons a day. The initial investment to set-up an aggregation centre one needs capital of INR 200,000 -500,000. Two to three trips a month are organised to supply the sorted material to processing units, with a ton or two transported. Two of three aggregators have their own vehicles for transportation and one of them rents it.

Re-processing units- Re-processing units are in industrial area (Auto-Nagar) of Vijayawada city. They have bailing, crushing, melting facility. The research team visited one such unit and interacted with the workers in the unit. They were melting the crushed material through an old-machine. After melting, the stripes or large balls of melted plastic are passed through the water to solidify them and make them firm. These balls or strips are later sent to manufacturing units, who use the moulded for manufacturing finished products.

Settlements of Waste-pickers- The settlement of waste-pickers is not an actor per se. It is a geographical unit, which takes a form of an institution. Settlement provides place of residence to waste-pickers and it also function as a working space, where waste is stored and sorted before being sold to the scrap dealer. The research team visited two such settlements of waste-pickers, one set up near the re-processing units in Auto Nagar, Vijayawada and the other in the outskirts of Guntur. Most of the waste-pickers in Vijayawada (staying in the given settlement) are migrants from Tamil Nadu, whereas in Guntur, they are from Andhra Pradesh and are Yannadis (identified as schedule tribe). Before they worked as coolies and have no source of livelihood left in village, therefore moved to Vijayawada, whereas most of the Yannadis in the settlement in Guntur are from Guntur itself. They stay in huts with thatched roof and use the scrap material like flex banners, broken tables and chairs as construction material. The space outside the hut is used for sorting of material and material is stored within the hut. Each of these settlements form space for transforming discards into raw material for industry as well as some useful material for residential construction.

5. Insights from the research project- vulnerabilities and sore points

Informal waste economy is recognized with high degree of vulnerabilities. Shock event like demonetization or haphazard introduction of Goods and Service Tax destabilize the price equilibrium. The supply chain of waste economy is informal, there are no social and economic protection mechanisms in place. Social protection measures include support system for workers and employers like health/medical facilities or insurance, safety gear like shoes, gum boots, masks and uniform to ensure reduced occupational hazards, occupational identity cards to avail programmes instituted by state and union government. Economic protection measures include insurance for the material stored in scrap shops, cheap credit facility. The informal waste economy is prone to shocks and stays vulnerable.

In past, the reduced oil prices brought down the prices of virgin plastic. This affected the recycling material market. The buyers (manufacturers) preferred buying virgin plastic over recyclables as it was cheaper. This increased the stock of recyclable material and brought down its prices significantly. The illustration highlights the importance of oil prices to recycling market. In past one year, two major events shook the informal supply chains of waste: demonetization and haphazard introduction of Goods and Service Taxes.

Demonetization- On November 8, 2016 the nation shook with the announcement that the currency notes of INR 500 and 1000 were to be withdrawn and demonetized. These notes constitute 83 percent of cash supply in India. This disrupted the informal supply chains including that of recyclables and reduced the earning of waste-pickers. Those up on the pyramid have had no cash to pay for the sourced material(Shreenath 2016). For waste-pickers this resulted in no-work for days. Many small units shut down for days.

Haphazard introduction of Goods and Service Tax (GST)- On 1st July 2017, Goods and Service Tax was introduced. The scrap plastic, metal was charged a tax of 18 percent and scrap paper 12 percent. Earlier Value Added Tax on the given material was 5 percent. The significant increase in taxes increased the cost of taxation bringing down the prices. Taxes are paid by those who are up in the chain like re-

processors or manufacturers. They pass on the taxation cost lower down the supply chain by reducing the price of sourced material. This ensures that prices of scrap material are not high for the customers and can stay below the virgin material, making recyclables preferable over virgin material. The increased taxation cost brought down the prices significantly, for illustration purposes, in many cities, price of PET bottles came down from INR 20-25 to 12-15, reducing the already meagre earning of waste-pickers. The introduction of GST and demonetization forced many units to shut down. According to one scrap dealer, he lost around a hundred thousand rupees during the week of introduction of GST, as he sourced the material at higher price (pre-GST introduction) and sold it at lower price (post GST introduction). Many waste-pickers' groups advocated reduction of taxes and on their demand the GST council reduced the tax on scrap material from 12-18 percent to 5 percent. This gave some respite to the informal waste supply chains.

Relationship of scrap dealers and waste-pickers- Waste-pickers earnings are meagre. They need additional micro-credit support system to feed themselves and manage their households. The scrap dealers provide for the credit and this forces the waste-pickers to engage with just one scrap dealer. They must abide by the whims and fancies of scrap dealers to earn as well as have the credit facility. Not all scrap dealers are exploitative, yet the exploitation is ingrained in the system because of the informality and absence of perfect competition, where there is information asymmetry about the prices of waste.

Contractual nature of sanitation work- This issue is very particular to sanitary workers (SafaiKarmacharis). Sanitary workers are hired by municipal authorities through a contractor. Technically self-help groups of interested individuals (preferably women) to undertake sanitation work were to be formed. These self-help groups were to be contracted to do sanitation work, including de-weeding, cleaning of drains, sweeping and door to door collection of waste. The self-help groups have become the fiefdoms of contractors who manipulate the self-help groups laws and take contracts. The contracted sanitation workers are not provided with occupational safety gadgets. Most of the time, they must buy brooms and other things on their own. In past, salaries used to come on time, with the change in Commissioner, they have started having delays. The money for Provident Fund (PF) and Employee State Insurance (ESI) is deducted, no one knows how to access the money and other facilities from PF and ESI. The irony in Guntur is that waste-pickers have occupational identity cards and contracted sanitary workers don't have it. In a formal system of sanitation work, we have increased degree of informality.

The municipal authorities have come up with an unprecedented norm stating that the fifty percent of the earnings from recyclables collected by sanitary workers is to be paid to the municipal authorities. The sanitation inspectors are assigned to suggest scrap dealers, to whom the sanitation workers will sell the material. This will help in raising revenue for municipal authorities. The absurdity of the norm can be realized that a substantial amount of time of officers is to be spent on tracking recyclables from each of the cart, which do not weigh more than 5-6 kilograms and tracking the money which will be in tens of rupees. Letting sanitation workers earn from it would have been a better strategy than asking for a 50 percent cut. Instead of moving away from contractual nature of work and ensuring the safety of workers, administration is going to invest time in tracking tens of rupees and few kilograms of recyclables every day. One doesn't know how much of the revenue will be generated from such a meagre amount.

General issues around health of the workers- Waste-pickers, sanitary workers and sorters in the shops of aggregation centres and scrap dealers work manually. Through out the day they bend number of times. They have no occupational safety gear. Making them vulnerable to occupational hazards. In case of waste-pickers, those staying in informal settlements with thatched roof, their housing condition is deplorable. Most sanitation workers have a house of their own, yet the sanitary conditions- sewage and water supply is in deplorable situation.

Bribe- Informal supply chains stay under the radar of taxation. Their role in keeping the city clean and supporting indigenous manufacturing sector is never recognized. Due to informality, (and increased taxes, which have reduced now) they are to pay bribes sanitary inspectors or tax authorities.

6. Policy paradigms

In India, waste management is a domain of municipal authorities. Environment Protection Act 1986 is a source legislation under which waste management rules are notified. These rules govern the sphere of waste management ranging from construction, e-waste, hazardous, plastic and solid waste. For the current report, we have relied on Solid and Plastic Waste Management Rules 2016 (SWM and PWM respectively) notified by Union Ministry of Environment, Forest and Climate Change (MoEFCC).

Solid waste management rules: SWM rules 2016 prescribe that informal recycling industry should be incentivized. The way forward to do that is not provided. SWM rules 2016 compared to its preceding norms are more progressive, it pursues inclusion of waste-pickers, ask for their training and involvement in solid waste management of the city. They go in detail mentioning that waste-pickers should be given occupational identity cards. The rules omit that similar cards should be given to sanitary workers, the reasoning maybe that once they are hired they will receive them. Still they have not received.

Plastic waste management rules: PWM rules 2016 move towards a different imagination where they have registered waste-pickers and registered recyclers and prescribe a way to govern them. There are some standards put in place for recycling industry. None can be followed as the makers of the rules weren't considerate of the fact that most recycling industry in India is informal. Unless they get any incentive to register themselves they will stay informal.

Swachh Bharat manual and survey: In addition to rules, Swachh Bharat (solid waste management manual) has been prepared Ministry of Housing and Urban Development in consultation with German development support agency GIZ. The manual goes in detail about inclusion of waste-pickers, prescribes standards for door to door collection of waste, setting up of facilities. It is a long document with case studies from cities like Bangalore, Pune where decentralized centres for recyclable, no/low value waste collection and aggregation have been set up and waste-pickers have been integrated. There is prescription for sending no-value inert waste like multi-layered packaging material, waste cloth etc. to cement kilns for co-processing. This is being actively done in Karnataka and Goa. Succeeding the manuals, there is Swachh Bharat Surveykshan (Clean India Survey), which is being conducted from past two years and will be conducted again starting in January-February 2018. Majority of the marks in context of solid waste management are for visual cleanliness and citizens perception.

Mandate of National SafaiKarmacharis Finance and Development Corporation (NSKFDC): NSKFDC is a corporation set up by Union Ministry of Social Justice and Empowerment with an objective to support sanitation workers and manual scavengers with their credit needs. Waste-pickers and informal waste collectors have been recently added. The credit is provided by the corporation for up-gradation of businesses (which in case of waste-pickers can be setting up of scrap shop for aggregation of recyclable material or maybe setting up small re-processing plants). The credit is provided at 4-6 percent rate of interest. This is one avenue where there is clear space for ensuring many small recycling enterprises exist and flourish.

Manufacturing and related policies: Technically manufacturing and small and medium sizes enterprises' policies should have a special focus on recycling as (informal) recycling industry provides ore or raw material to the industry, particularly, small and medium size enterprises. Make in India initiative of government prescribes that industrial units should have zero defect policy, i.e. no defect is equal to no waste, all industries are asked to manage their waste within their premises. Thus, recycling is reduced to the premises of the industry. There is a huge potential of linking Swachh Bharat with Make in India. National policy for petrochemicals 2007 is the only document where there is explicit reference to recycling and suggestion has been made to institute recycling parks in the city.

Concluding remarks on policy paradigms: In India's climate action plan we find reference to solid waste management. Nationally Appropriate Mitigation Actions (NAMAs) document submitted by Government of India to United Nations Framework Convention on Climate Change (UNFCCC) includes solid waste management as an area to work on. India's another submission for 'Intended Nationally Determined Contributions' (INDCs) to UNFCCC makes a reference to solid waste management. There is no connection with manufacturing. Recycling and connections with manufacturing helps in reduction of carbon footprint of individual products, thereby, contribute in mitigation efforts. A detailed study is required to understand the nitty-gritty of reduction.

Smart cities guidelines only talk about recycling of construction waste and for the rest of solid waste incineration and composting is recommended. The later is not a smart solution, if it is anything, it is a carbon intensive solution. The verdict on incineration is divided, the report will not be delving in it.

In conclusion, it can be said that there is a huge potential to link solid waste management (processing of recyclables, low/no value waste) to manufacturing. Informally, it is already being done by the actors already mentioned above. What we need to do is to create a holistic vision in our policy documents. The expression of intent in SWM rules stating incentivization of informal recycling industry is a nascent step in that direction.

7. Recommendations and way forward

The recommendations made here are for Dalit Bahujan Resource Centre and other relevant actors working with waste-pickers and informal waste collectors in Guntur and Vijayawada. These recommendations will help in devising the way forward for the organization.

Strengthening the organising effort- Most of the waste-pickers have occupational identity cards (those

who were participants in the research), where-as this is not the case with sanitation workers. There needs to be a push for similar cards or recognition be given to them. Both waste-pickers and sanitation workers lack occupational safety health gear. It is the responsibility of municipal authorities to provide for occupational safety gears like gloves, mask, cap, shoes and uniform and replacement whenever they break or shatter.

With emphasis on visual cleanliness, waste is reducing from the streets. Waste markets are volatile. It is suggested that alternative livelihood programmes for waste-pickers be formulated. They can be involved in setting up and operations of waste management facilities, door to door collection of waste, in the areas which do not have those services or setting up of small micro-enterprises for recycling.

It's suggested that the organization should meet municipal authorities and pursue them to remove the norm of fifty percent payment to municipal authorities from collected recyclables by sanitation workers. The sanitary workers earn very little, they are forced to even cut down their meagre additional earning.

Organising other informal actors like neighbourhood scrap dealers- Small scrap dealers are vital to waste management. They are the link between big-players like aggregators and waste-pickers. It is essential to organise them in a membership organization for two reasons, one they can mutually support each other by providing credit in the times of need like fluctuations in oil prices or an event like introduction of new taxes. It is easy for a membership based organization to avail loans and credits as there can be large scale collateral collectively provided by members. Second once organized it is easy to have uniform pricing in all scrap shops, increasing information symmetry, thus, creating space for perfect competition. For organized waste-pickers it is easy to negotiate with organized scrap dealers for fair prices for their material.

Setting up of fair-price scrap shop- The other way to ensure better prices of waste-pickers is setting up of low cost/low maintenance scrap shop. This scrap shop can have direct ties with re-processing units in Vijayawada and supply them material directly. Waste-pickers are trained to bring in sorted material, for which they will get better price and reducing the cost for sorting. For setting up of the scrap shop, one can avail the cheap credit facility provided by NSKFDC.

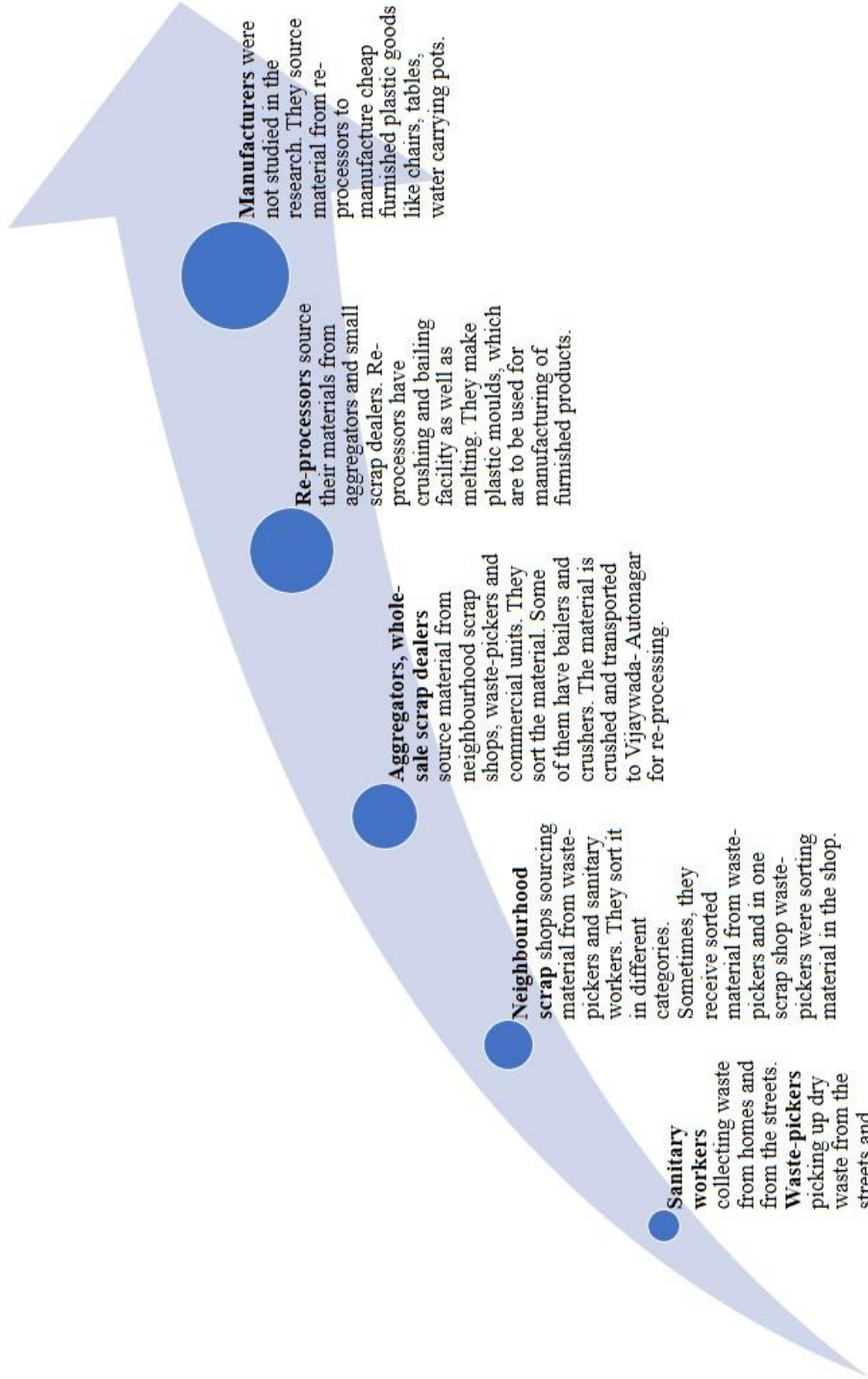
As it is sorted material, it can be stocked and later supplied or sold to the re-processing units. The fair price in one scrap shop will encourage and push other scrap dealers to raise their prices, as they will have competition from the given shop. One must be considerate that the shop must make profit and cover its operations cost from the day one to sustain itself. This means low investment on capital side, as machines for bailing and crushing will require time to time maintenance and electricity costs will be additional.

Scrap dealers help waste-pickers time to time by lending them money in the hour of need. It will be very tough for scrap shop to provide for those loans. If it can't provide loans, it can't break the ties, which at times are exploitative. If it provides loans, its own financial viability gets in question. An alternative mechanism need to be put in place to ensure waste-pickers can get money when they need and not get in the trap of loans which forces them to sell their material to one scrap dealer.

8. Conclusion

The research on the informal waste supply chains in Guntur and Vijayawada began two months after the launch of GST. Under the new regime of GST, scrap plastic, metal was slapped with 18 percent tax and 12 percent on scrap paper. This was significant increase compared to the VAT regime, where the tax on scrap plastic was 5 percent. Scrap plastic is the most important recyclable material thrown away by homes and sourced by the industry. The increase in taxation devastated the informal supply chains, forced many units shut down. The report was written post reduction of taxes on scrap material. The active advocacy by waste-pickers and informal waste collectors' organizations ensured reduction in GST on all scrap material to five percent. This makes the report a little more relevant as it shows the vulnerabilities of informal waste supply chains. It captures the sore points like if a new tax is introduced and if its inconsiderate, it can destroy the livelihood of many. The informal waste supply chains have been disrupted thrice in past three years, first by reduced oil prices, after that demonetization and introduction of GST. This has shown that there is a need of creating a cushion cover for informal supply chains. Cushion cover requires certain degree of formalization. Formalization is nearly impossible if the workforce is not organised. The researchers make a recommendation of organising of work-force, this will ensure that they can access credit and come up with innovative ideas like Fair Price shops, which can work as shock absorbent.

The report begins with the profile of two cities with some statistics on their population and waste generations, moves to methodology, following up creation of urban waste economy pyramid and profiling of each of the actors in the pyramid. The illustration of informal waste supply chain is provided below for reference. In addition to that, the report details the vulnerabilities of the informal economy and recommends few measures to start with. It meanders through the policy paradigm and suggests that it is important to link the vision of Swachh Bharat Abhiyaan and Make in India.



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