Infrastructure Advisory

CRISIL
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Talking about trash

It's time for a better business case in waste management

Indus Exposium

Contents

Foreword

Building and sharing knowledge on both, waste management and conversion of waste to energy, are among the critical issues being discussed across nations. This is not just from an environment point of view, but also to reduce energy-import burden of economies.

Clean environment, clean energy and lower energy imports are all big challenges facing India. Last year, we were the largest importer of coal and second-largest of crude oil. We also import liquefied natural gas (LNG) and uranium to meet our burgeoning energy needs. Overall, we spend 6-7% of GDP for this.

Rising quantities of waste and their management have led to programs such as Swachh Bharat, Namami Gange and others to improve air and water quality.

However, efforts in waste conversion are yet to gather momentum on the ground because they are a concurrent subject falling in the ambit of both the Centre and the states.

The potential in converting waste to energy is huge in India, including from biomass (crop and plant waste), municipal solid and liquid waste, plastic waste and, increasingly, electronic waste. Converting it all would mean 40-60 MMTOE, or roughly a ~$30 billion business. Huge opportunities, including for job creation, indeed.

I believe waste management and waste-to-energy conversion programs should be taken up all the way to the district and tehsil levels if India is to enjoy their full benefits.

Governments could create dedicated funds by levying cess and creating a mechanism of different energy-rich waste as feedstock for low temperature bio-methanisation process, and first and second generation bio-ethanol production, besides encouraging production of electricity from waste.

Implementing all that can potentially help replace about a fifth of India's LNG and crude oil imports.

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Message from CRISIL Infrastructure Advisory

Urban waste has become a major area of concern with unchecked population growth in cities, economic growth and rising consumption. Already, inefficiencies were ubiquitous at civic levels when it comes to managing waste. Half of the garbage generated still gets dumped unprocessed.

Clearly, there is an urgent need for directional change, both in terms of investment support for infrastructure creation and enhancing capacity at the local level to improve their performance in the entire value chain of solid waste management and, more specifically, processing and disposal of urban waste scientifically, thereby reducing environment and public health impact.

To be sure, the Swachh Bharat Mission has lent much-needed focus on cleanliness in cities. In the past, there have been many attempts to implement technological solutions for scientifically processing urban waste by constructing composting, bio-methanation and more complex waste to energy plants. The first waste-to-energy plant was constructed more than a decade ago, yet consensus eludes on the apposite technology ecosystem for urban waste.

Environment-friendly waste to energy technologies with controlled emission mechanisms are the way forward to minimise the land being used for dumping waste. Cities will have to ramp up efforts towards source segregation of waste because that is quintessential to any technology's success.

The urban waste challenge is fiendishly complex, and states will have to play a proactive role in handholding cities in implementing sustainable solutions to achieve the desired outcomes. A fundamental review of support mechanisms state needs to create for cities is imperative. But this in itself will not ensure efficient service delivery. Considerable emphasis must be laid on empowering urban local bodies along with resources – human, technological and financial – and increasing the accountability of service providers engaged by measuring performance at every step.

This report takes a closer look at the important aspects of urban waste management and identifies the institutional reasons impacting service performance.

For stakeholders, we believe this will be the fount of actionable ideas.

Sameer Bhatia
President
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Mountain of waste

The scale and speed of India's urbanisation is transforming the country, bringing challenges and opportunities. As more people migrate to towns and cities for a better life, not only is the population of developed urban centres growing but new urban clusters are also being created. The World Economic Forum (WEF) estimates in the coming decade, India will become the most populous country in the world, with close to 40% of its population residing in urban areas.

This burgeoning population and corresponding economic activity is putting more disposable income in the hands of people, driving consumption. According to the WEF, consumer spending will grow by more than 2.5 times from current levels by 2030. This demographic shift in geography and economic capability is resulting in an inevitable by-product – the challenge of urban solid waste. Overwhelmed cities are struggling to collect all the generated waste and dispose it scientifically.

Data available from the national government portal (Swachh Bharat Mission Urban) suggests cities are able to collect 85% of the waste. However, on average, only 46% of this is treated and the rest is dumped haphazardly. The Task Force on Waste to energy as set up by the Government of India estimated urban India generates close to 1.7 lakh metric tonne (MT) of waste daily. The mountain of waste will surge to 4.5 lakh MT by 2030 and 11.95 lakh MT by 2050. These numbers are a matter of grave concern for urban policy makers at the local, state and central levels if they are to better prepare urban India to manage waste effectively and scientifically.

So much done, yet so much gets dumped

Prior to 2000, the general practice was to dump solid waste in demarcated open grounds somewhere on the outskirts of cities and towns. However, this gave rise to leachate, or ooze from decomposing waste, percolating and contaminating the soil and ground water.

In 2000, in response to a public interest litigation against municipal bodies, the Supreme Court directed the Ministry of Environment and Forests (MoEF) to ready a framework to manage municipal solid waste. The Municipal Solid Waste (Management and Handling) Rules, 2000, were formulated as a result, with clearly stipulated timelines of compliance. This was followed by the first urban renewal mission, i.e., the Jawaharlal Nehru National Urban Renewal Mission (JNNURM), which provided much-needed focus to waste management. The mission sanctioned Rs 1,925 crore in financial assistance to 46 projects across various cities for improving solid waste management. However, as reported by the task force on waste to energy, only 19 projects were operational till 2013.

Despite incentives, private sector footprint in waste management is small

Prior to 2000, the private sector had a very limited role in the waste management process, which was confined to collecting and transporting waste. Since then, however, the engagement has expanded end-to-end from collection to processing and disposal. Service contracts for the collection and transportation of waste have mutated to public-private partnership (PPP) projects with integrated service provision contracts involving models such as build-operate-and-transfer and build-own-operate-and-transfer.

Several initiatives have created a level-playing field for the private sector to help support cities in managing their waste better. These included an increased focus under JNNURM, incentives such as a tax holiday for solid waste management projects for the first 10 years (of the 20-year project period), the MoEF supporting 50% of the capital cost of plants demonstrating composting, relief on customs duty on imported machinery for waste to energy projects, and lower tax slabs for waste-to-energy plants / devices.

With the launch of the Swachh Bharat Mission in 2014, improvements in sanitation and solid waste management took centre-stage in India's urban affairs. However, four years since the launch of the world's biggest sanitation mission, cities are unable to process even half the waste being collected. The untreated waste is polluting the country's most critical natural resources.

Converting waste to energy is an effective solution

Cities have taken initiatives to scientifically processing waste. In earlier days, when waste to energy was not so popular, composting was seen as option along with biomethanation. However, composting could take care of only the organic component in the waste that cities could segregate at the processing facility. Close to 50% of the waste was still going to landfills. For biomethanation plants to succeed, pure organic waste was required. In the absence of systems to collect only organic waste from waste producers, cities faced difficulties in providing pure organic waste. While there are successful example of biomethanation plants at the community level, there are no good examples of city-scale plants having succeeded. Then came the integrated waste processing plants, which would separate a fraction of the waste having high calorific value (such as plastic, tyre, rubber material, etc.) to be used as a fuel (refuse derived fuel or RDF) in industries. The organic component is converted to compost. The substantial moisture content in the mixed waste makes segregation of waste at the processing plant ineffective and reduces the calorific value of the inorganic waste. Waste to energy was seen as a savior for cities addressing two issues, i.e., waste processing and generation of electricity, at one go. The technology of incineration (or mass burning in a controlled environment) was introduced in the first plants which were installed in India around 2007. Composting was generating close to 50% of inert material, requiring substantial pieces of land for developing landfills. Biomethanation had its own challenges when implemented on a large scale. Early waste-to-energy plants committed to reduce the inert waste going to landfills to less than 10%, effectively reducing the need for land. Revenue from the sale of electricity was proposed as a good source of income, making it economically feasible and environmentally friendly.

However, most waste-to-energy plants in the country are either not operational or are not running at full capacity. This is mostly owing to the quality and quantity of the waste, and pollution due to emissions from these plants. Despite having 279 composting, 172 biomethanation, and eight waste-to-energy plants in the country (operational status of which is mostly non-operational or underperformance), close to 2.12 lakh cubic metre of space is required daily to dispose 1.2 lakh MT of unprocessed solid waste. And this requirement is increasing day by day. Cities are staring at potential health hazards if no sustainable solutions are found soon.

A saga of wasted efforts

Before any waste-to-energy project was implemented in Indian cities, technology providers promoted the idea there was good potential in municipal waste, enabling electricity generation and resolving the issue of waste disposal.

Some providers also promoted the thinking that the capital cost of the waste-to-energy plant could be recovered through the sale of electricity alone. According to this, municipal authorities need not pay any additional revenue to the operator, except providing land to set up the plant.

Across India, cities went ahead and entered into various contracts without in-depth technology, know-how, and policy or technical guidance. They had no concept of the sustainability of the terms and conditions of the contracts they were entering into.

In most cases, cities agreed to provide completely segregated waste to the processing facility operator when they did not have such provisions in the contract they had inked with waste collection and transportation agencies. As a result, the entire raw-material risk fell to the respective city entering into the contract.

Additionally, when entering into waste-to-energy contracts, the cities committed they would deliver a specific quality and quantity of waste to the facility operator. This was based on the waste characterisation studies undertaken by the respective cities. However, such studies are carried out prior to designing the appropriate processing technology. They often miss out on seasonal variations in the waste quality reaching the processing facility, where it becomes next to impossible to segregate the aggregated waste. This resulted in the failure of multiple waste-to-energy processing plants in the country.

In most cities, waste collection and transportation was contracted out to private sector entities to improve the efficiency of the system. Most feasible modes of payment for such collection and transportation contracts were against the weight of the waste collected and transported by operators. While there were provisions in the contract that payment against only municipal waste be made to the operator, often, in the absence of strong monitoring mechanisms, these contractors mixed construction and demolition waste to achieve their daily waste collection targets. Waste-to-energy plants could not accept waste with such additives.

While conceptualising the implementation of waste-to-energy projects, cities often miss out on the essential backward linkage in terms of established power purchase agreement (PPA) with the local electricity distribution companies (discom). More often, the responsibility of establishing such a PPA lands on the shoulders of the private entity. The latter anticipates such a PPA while the plant is being constructed, which in most cases is delayed. When the plant is fully operational, whatever energy the plant generates in addition to what is required to run the plant, will have to be supplied to the local electricity grid which forms a major source of revenue for the plant operator. Additionally, since the electricity tariff in India is governed by the respective state electricity regulatory commissions (SERCs), it is often seen that approval of electricity tariff and associate PPAs with the DISCOM do not see the light of the day or are substantially delayed. In the absence of the PPA and approval regarding tariffs from the SERCs, plant operators are forced into accepting only the waste required to generate electricity for captive consumption. The additional waste gets accumulated, and is difficult for the operator to manage.

Indian cities have adopted various waste-to-energy technology options; but there are no clear successful technologies can be recommended. In the earlier phase of waste-to-energy in India (around 2007), incineration was proposed. However, the emissions from incineration plants were creating issues for local inhabitants, leading to strong opposition. This was followed by the introduction of large-scale biomethanation plants. However, cities entered into contracts for the construction of bio-methanation plants in the absence of separate collection systems for organic waste, which is essential for the efficient functioning of the plant. Most city-scale bio-methanation plants are today either closed or not functioning at full capacity. As against this, plants installed at a small community scale are showing signs of success when the quality of the organic waste reaching the plant is controlled.

Various plants have come up recently with sophisticated technology such as pyrolysis, gasification, bio-fuel from plastic, etc. However, before commenting on their success or scouting for reasons for their failure, these technologies need to be tested over time.

Increasing awareness of the negative impact such processing plants on the local population has led to strong opposition against the setting up of these plants. Projects have been stalled in the absence of any suitable alternative location.

Cities have been adopting a fragmented approach while attempting to resolve the waste management issue. Institutional capacities in our cities are limited when it comes to assessing the most-suited processing technology for what fraction of the waste. All such issues in developing a waste-processing plant can be addressed while preparing solid waste management plants with due process and attention to the sustainability of the interventions proposed. A major misconception prevalent in cities is that waste is a resource and they can generate revenue from it by either converting the waste to compost or generating energy from it. Cities need to understand that waste is a responsibility of the local government which needs to be handled sustainability with minimum adverse impact on public health and the environment. Additionally, cities need to understand that to resolve their waste problem, they need to adopt more of a management solution rather than the technological solution which is being taken up at present.

Long term, and outcome-based short-term plans

Typically, cities that divide their large-scale solid waste management problem into small manageable dedicated actions have seen more success as opposed to cities which take on the issue with all guns blazing. For example, Panaji in Goa started two-way waste segregation in 2003. Dedicated officers of the city corporation monitored the same strictly, yielding sustainable success. Even today, waste is segregated in more than five fractions (compost, plastic, glass, metal, and card board).

Most cities draw up projects from detailed project reports (DPR) which have been prepared with the help of technical consultants. These are generally focused towards seeking financial assistance from the state or the national government. Though DPRs generally cover all aspects for system improvement and the required financial outlay for the project, they miss out on the focus in terms of a long-term sustainability strategy, institutional means for the implementation of the proposals, and mobilisation of associated financial resources. Additionally, these DPRs outline the manpower required to achieve the desired service levels in terms of street sweeping and collection of waste, etc. The inefficiencies in the current institutional mechanism in the department managing the solid waste often remain neglected.

The focus of our cities today is generating a comprehensive DPR for improving the solid waste management situation. This is against preparing a long-term strategy and carving out step-wise short-terms goals which fit their fiscal situation and to achieve the long-term objectives. Additionally, in most Tier II and III cities, the responsibility of managing municipal solid waste often rests with the health officer responsible for managing primary health in the city. Though there is a direct connection between unmanaged waste and the primary health of citizens, having individuals with appropriate training and qualifications is critical for the success of the long-term goal of improving the waste situation. Cities often lack an environment department headed by an environment engineer having clearly divided support functions within his team.

While preparing their long-term waste management strategy, cities should focus on one problem at a time. They need to also align the institutional structures to ensure the requisite short-terms actions are taken in a time-bound manner to ensure that long-term goals are achieved.

Enhance municipal revenue to support action plans

Traditionally, Indians believe general services are the responsibility of the government and they are to be provided free of cost. Recovery of the cost of services in Indian cities has remained a challenge. JNNURM made it mandatory for cities seeking financial assistance to recover the operation and maintenance costs of key services such as water supply and sewerage and solid waste management. Conservancy tax is the most common tax being charged as part of property tax in most cities, which lacks buoyancy. With increased private sector engagement in supporting cities in managing (collection, collection and transportation, collection and transportation and processing and disposal of waste) municipal solid waste, the own revenue sources (conservancy tax) of cities barely cover the cost of operations and maintenance, let alone the capital costs. Apart from the available internal resources, cities largely depend on the financial resources available under centrally sponsored schemes or direct transfers available under the recommendations of the respective finance commissions. The low effective life of the vehicles used to manage waste in the city puts an additional burden of high maintenance costs and replacement costs every 5-7 years. It is often observed cities lack the capacity to build an effective business model backed by the remunerative structure of user charges to be levied on the users of the services provided by the local government. Additionally, in most cases, there is lack of political will in, first, implementing new user charges and, second, revising to the rate at which the user charges are applied to meet the financial obligations towards providing waste management services.

JNNURM focused on recovering operations and maintenance costs incurred by urban local bodies when providing services through user charges. However, it was not directly linked to the sanction of financial assistance to cities for waste management projects. The financial assistance under the Government of India's Swachh Baharat Mission is mostly expected to be financed through either the state or city government, amplified by the introduction of user charges and other financial mechanisms such as land value capture and through PPPs. However, such tools of raising additional finance through new financial tools are seldom used by cities in India due to lack of capacity at the local level. Under the co-operative federalism theme of the Government of India, under the Swachh Bharat Mission, it has been mentioned cities are required to raise finances through other means to support project implementation. However, no mechanisms are specified in the mission which suggests how these financial resources will be available. This shifts the onus of arranging the financing on local and state governments.

The MoEF's Solid Waste Management Rules warrant cities to frame bylaws to levy user charges and impose fines for littering and non-compliance. This would be a useful source of financial empowerment for the cities, subject to approval from the respective state governments approving the user charge levy and local authorities putting in place a strong user charge collection mechanism. Needless to say, it is extremely important to place emphasis on cost reduction in waste collection and transportation. However, the infrastructure for transportation, processing, and safe disposal of solid waste would call for levels of investments which municipalities are in no position to make. Given their financial constraints, city governments will have to develop financially sustainable models of service delivery and expect to be supported by capital subsidy where necessary. As discussed above, while preparing the long-term strategy for improving the solid waste management and the short-term action plans, cities will have to strongly consider financial sustainability to achieve the desired output.

Enhance local capacity to make the right choices

Composting was the predominant technology adopted by cities in processing their waste post segregation. However, a large area was required for setting up plants and the effective waste reaching landfills was close to 60%. This is evident as it became a daunting task to separate only organic waste from the bulk mixed waste reaching the processing site. Installation of mechanical separators too were been largely unsuccessful. Additionally, the compost being produced had consistency and quality issues which led to difficulties for plant operators in entering into long-term purchase agreements with end users such as fertiliser companies. The second issue is about sustainable revenues and a market for byproducts. Compost is difficult to sell throughout the year, and fertiliser companies do not enter into long-term purchase agreements. Also, compost is no match for chemical fertilisers in terms of effectiveness. Around 2012, integrated waste processing plants were introduced by some cities to generate additional revenue through the sale of waste having high calorific value. Some cities introduced waste-to-energy plants with incineration as a technology.

Waste to energy in India has largely been introduced by the private sector where the specific technology is been provided by their foreign technology partner. At present, various waste-to-energy technologies exist in India, namely, incineration, pyrolysis / gasification, plasma arc, etc. Each of them has their own pros and cons. However it is difficult to say which technology is the most suitable for processing typical Indian waste while meeting the environment norms.

For technical support on the selection of the right processing technology, cities largely depend on external technical consultants when they are setting up waste processing plants on their own with financial assistance from either the state or the central government. In case of projects which are being implemented on a PPP basis, the choice of the waste-processing technology is generally kept to the private entity interested in participating in the project.

Cities learn through successful examples among their peers. In the absence of any time-tested successful examples in waste to energy in India, cities are looking for alternative technologies to process their waste before it is landfilled. However, technical handholding at the national, state and city level is essential for cities to appreciate waste to energy and make it successful.

For example, decentralised bio-methanation seems to be a promising solution through which almost half of a city's solid waste could be processed which is purely organic in nature. Financial sustainability requires biogas is used mainly for cooking or bottled into compressed biogas to be used as fuel, and the slurry is collected, dewatered and marketed as organic manure (upon enhancement). Private participation in the development and operation of bio-methanation and/or bio-compressed natural gas plants can also be encouraged through viability gap funding, especially since these plants offer tremendous saving on transportation and pre-empt greenhouse gas emission complications down the chain of solid waste management.

Increase in the knowledge of the municipal officer in the decision-making position is the key in making waste to energy work. They need training in available waste-to-energy technologies and handholding for preparing small-scale pilot projects in their cities. The success of these pilots will generate internal learning of the implementation challenges needed to be overcome while scaling up the pilot project.

Engage with citizens on a daily basis

The objective of implementing any waste management initiative is to minimise the amount of waste going to the landfill and maximise resource recovery. Unsegregated urban waste in India makes this objective a challenge. This is because waste is either collected in a mixed form or, when collected after segregation, it gets mixed during transportation in the absence of separate transportation systems. Segregation of waste at each household and then ensuring segregated means of transportation is a logistical challenge for cities. It is evident from the successful waste-to-energy projects in India that bio-methanation can work only when pure organic waste is available. Similarly, incineration works efficiently only when only highly flammable waste with no moisture content is made available constantly.

Another critical issue is waste-processing technology selection based on the composition of waste. Today, there are various options to process unsegregated wet waste, including composting (vermin, aerobic, anaerobic), thermal conversion (incineration), thermo-chemical (pyrolysis, gasification and plasma arc), biochemical (biomethanation), and physiochemical (separation of refuse derived fuel).

However, surveys by the National Environment Engineering Research Institute suggest there is no significant variation in the composition of waste generated across cities, except an increase in the amount of plastic waste. So arriving at the optimal technology becomes a challenge for cities.

Citizens of any city are the key link in the solid waste management value chain. They can ensure the first level of waste segregation. The solid waste management rules introduced by the MoEF in 2016 had made it mandatory for all waste generators to ensure that segregation of waste at source is implemented within one year of prescription of these rules, i.e., by close of 2017. They mandated that cities need to segregate their waste in biodegradable, non-biodegradable, non-recyclable combustible waste, sanitary waste, and non-recyclable inert waste. However, despite clear stipulations, implementation is far from achieved. Through efforts made by local authorities under the Swachh Bharat Mission and good scoring available under the annual Swachh Survekshan exercise launched by Ministry of Housing and Urban Affairs, cities have some motivation in implementing some segregation at source. Segregation of waste by households in each of these fractions is a challenge owing to the availability of storage space for such waste. Local authorities will have to come up with innovative ways to encourage citizens to segregate.

Cities that have regular constructive dialogues with citizens to implement a segregation system have enjoyed long-term benefits. This involves providing the requisite infrastructure for waste segregation and then engaging with citizens on a daily basis over the long term to bring in the required behavioural change to segregate the waste. To start with, local authorities should first engage with citizens for two-way segregation, i.e., bio-degradable and non-biodegradable, and ensure two separate collection and transportation systems are made available. Municipal staff from the local government should engage with the residents at the ward or even a smaller level. Additionally, local authorities can provide waste collection bins at the community level to collect only recyclable waste which is voluminous compared with organic waste. The waste segregation efforts of residents need to be incentivised for citizens to continue with the practice. Organic or biodegradable waste can be processed with appropriate processing technology and non-biodegradable waste can be sorted further for some economic value by engaging the informal sector, i.e., rag pickers. Municipal officers will be required to establish a two-way communication system with the citizens and remove the bottlenecks they face in waste segregation. Also, the local government needs to ensure enough municipal officers are engaged in this activity who will own this initiative for a long period to ensure that waste segregation becomes a norm. These officers will require constant training and capacity-building as well as facilities

for peer learning to adopt good practices. Segregated waste will then resolve the issue of the bad quality of waste being supplied to waste-to-energy plants which leads to their failure and closure.

Need for stronger institutions

With ever-increasing urbanisation and urban waste, managing municipal solid waste has become a messy affair for municipal bodies. Municipal bodies on their own have neither the institutional capacities nor the financial means to tackle urban waste. Available financial assistance from the state and central governments is going to be limited and cities will be forced to seek support from the private sector. However, the larger question that prevails is whether cities have the capacity to engage with the private sector and create a win-win for both and forge an effective partnership. Though multiple attempts have been made, not much is seen on the ground. The challenge is how to address the lack of capacity at the local level to engage with the private sector in a professional manner and, at the same time, create a level-playing field for the private sector to support cities in managing their waste. Working on both fronts seems to be the way out for cities.

States need to be proactive

A comprehensive framework to implement municipal solid waste management projects that addresses all issues faced by civic authorities and private sector players is an imperative. State governments need to provide the enablers by involving all stakeholders such as municipal authorities, political representatives, private-sector players, financial institutions, electricity regulators, discoms, state pollution control boards, and agencies working for the welfare of socially weaker sections whose livelihood depends on municipal solid waste management. Cities on their own will never have the capacity to engage with so many institutions and obtain necessary approvals required for solid waste management projects. State governments have access to all the institutions and creation of a state-level solid waste management authority with the required mandate to support cities in improving solid waste management is critical.

Institutional changes required at local level

Primarily, the responsibility of managing urban waste is vested with the health officer of the local body responsible for providing primary health facilities in the city. It is unfortunate that while we have a dedicated ministry at the national government level associated with improving the environment which brings out national-level policies in solid waste management, the responsibility at the local level is with the health officer. Most cities have created a Swachh Bharat Cell in their respective cities which has a dedicated focus in implementing the Swachh Bharat Mission agenda. However, the life of this cell will be limited to the tenure of the mission. There is a dire need to set up an environment management department within the local body with adequate professional staff for managing day-to-day affairs as well as the work on the policy-level issues that are required for improving solid waste management. Creation of such departments would ensure the availability of professional staff and right assignment of the accountability on people having the right set of qualification and experience.

Create a level playing field for the private sector

Civic authorities have been finding it difficult to achieve complete synergy with the private sector in managing waste despite its growing necessity. The challenges range from environment compliance, attainment of desired service standards, limited institutional capacity, and political unwillingness. Also, local authorities do not have the competence to monitor performance. In most cities, municipal solid waste management comes under the purview of the health department, which, in turn, lacks the bandwidth to assess performance. Civic officials also find it difficult to understand and monitor complex contractual agreements entered into with private parties. An overenthusiastic private sector, on the other hand, enters into contractual obligations without factoring all the risk factors such as collection risk of user charges, availability of quality of waste during the life cycle of the project, availability of encumbrance-free land for setting up projects, fair assessment of project revenues to recover the project costs, etc. Such an imbalance in allocation of risks while entering into contracts becomes a recipe for future disputes. Cities with assistance from the state support unit can create fair contracts wherein they ensure they possess the institutional capacity to monitor the performance of the private sector.

Use ICT tools to measure and improve performance

Performance measurement of services has been introduced by the then ministry of urban development in 2009. However, the absence of reliable data recording systems has limited the relevance of the information generated on the performance of the services being delivered by urban local bodies. Though the 14th Finance Commission has made mandatory for all local bodies to report the service-level performance to become eligible to receive the untied grants, few cities have invested any funds in improving the data management systems. The Smart Cities Mission has given a real shift to use ICT technologies in monitoring the services being provided. Institutionalising ICT systems will help cities go a long way in first assessing their accurate performance. This assessment is the key for designing the performance improvements initiatives in a financially sustainable manner.

Conclusion

Managing municipal waste is not a technological challenge but a huge logistical task for a local government. Addressing only one component of the solid waste management value chain may not yield the required outcomes. A systematic solution for each component of the value chain is needed for the entire system to function. Stronger and enabled institutions coupled with use of ICT will go long way in delivering the required change in the sector.

Notes

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