FORESIGHT IN INTERNATIONAL DEVELOPMENT

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Managing Waste in India with Foresight[*]

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Abstract With rising prosperity and urbanisation in emerging and developing economies there has been a rapid expansion of waste generation. India, with an urban population of 377 million that is expected to reach 590 million by 2030, is also facing an unprecedented challenge of waste management. Significant uncertainties about the future trajectories of waste management exist, including the concept of waste as a resource and the role of the informal sector. This article describes an analytical framework that combines foresight and political economy methods used in a multi-stakeholder workshop setting to develop future scenarios for the sector. The process provides insights to increase participation in waste management policymaking in India by opening up the process beyond expert committees. The use of foresight tools with political economy analysis has the potential to democratise the policymaking process of waste management in India for the inclusion of all stakeholders and particularly the informal sector.

Keywords: Foresight, political economy, waste management, urbanisation, informal sector, stakeholder engagement, policymaking.

1 Introduction

The rising prosperity of emerging and developing economies is accompanied by rapid, and in most cases unplanned, urbanisation. Urban centres are concentrated areas of population, economic growth and material prosperity. However, such concentration of material prosperity and population has an undesirable consequence – it leads to the rapid expansion of waste generation. In many cases the challenge of managing the rising quantity of waste is further exacerbated by the limited capacities of the local authorities.

We focus on the challenge of waste management in urban India. With the possible exception of China, India is urbanising at an unprecedented pace and scale. The current urban population of 377 million (Ministry of Home Affairs 2011) is projected to reach more than 590 million by 2030 (McKinsey Global Institute 2010). However, the rate of growth of waste generation is more than twice the rate of growth of urban

population.[1] The health and environmental impacts of rapidly rising waste are largely due to the lack of infrastructure to collect and treat it. Only 65 per cent of the waste generated gets collected from households while the remainder gets dumped in solid waste disposal sites (CPCB 2014). The collection rate of 65 per cent in India is lower than the average of 68 per cent for other lower middle-income countries and waste generation per capita is likely to increase by more than 50 per cent in the next ten years (Hoornweg and Bhada-Tata 2012: 86).[2]

In India, the responsibility of municipal solid waste management (MSWM) lies with the local government, referred to as 'urban local bodies' (ULBs). While various policies for MSWM exist, none of them have been able to significantly improve waste treatment thus far. The very detailed MSW Rules (2000) have been effectively implemented only in a few municipalities. Although the MSW Rules require ULBs to report on the status of MSWM, in 2013–14, out of a total 3,839 ULBs, only one third provided such a report to the Central Pollution Control Board (CPCB 2014). This suggests widespread non-compliance even after 15 years of the notification of the MSW Rules. Such non-compliance could be ascribed to limited access to funding, and technical and management capacities at the municipal level (MoUD and CPHEEO 2014).

The widespread failure to effectively manage waste by the ULBs has created the space for the private sector as a solution provider. Traditionally, private sector actors in the waste sector consisted of the large numbers of informal micro, small and medium enterprises (collectively known as the informal sector) engaged in collecting, segregating and recycling municipal solid waste. Medina (2007) estimates that around 2 per cent of the population in developing countries depend on waste picking or the informal waste management sector for their livelihood. Although the exact numbers are not available for India, there is a widespread informal sector in large Indian cities that significantly reduces the burden of the municipalities by managing certain fractions of waste. Such private sector participation is not mediated by the ULBs and largely operates without any state support.

However, over the last decade, there has been a concerted effort to privatise waste management and transfer the responsibilities of waste management to companies contracted by the ULBs. The decision to privatise waste management is driven by the belief that due to better access to funding, technology and more cost-effective solutions, the participation of the private sector can reduce the burden on ULBs and modernise waste management (Dukhan, Bourbon-Seclet and Yannic 2012: 9). Such privatisation has relied on the participation of large, and formal, waste management companies. The entry of these large companies was facilitated significantly by the launch of a large urban reform project initiated by the Government of India, the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) in 2006. Under the JNNURM, 46 cities with a million-plus population embarked on modernising their solid waste management sector in partnership with the

private sector. Most of the additional central assistance (ACA) from the Government of India, amounting to nearly INR 11.2 billion, was given to the large waste management companies (Government of India 2014).

Despite the presence of a large informal sector, private sector participation in the municipal solid waste context has predominantly focused on formal waste management companies that have been able to access government support and expand their operations. The role of the informal sector as private actors has not been acknowledged by the government to the same degree, leading to an underestimation of their contribution, and has also caused conflicts at different levels that undermine the potential of both (Chaturvedi, Arora and Saluja 2015: 8).

The discussion above suggests two defining characteristics of waste management in India. First, there are significant uncertainties about its future trajectories. We focus on the critical uncertainty related to the very conception of waste. Given the current scenario in India, it is not certain whether in the near future waste will continue to be dumped in landfills or whether it will be considered as a resource. Additional uncertainty is regarding the role of the informal sector. It is not clear whether the focus on privatisation of waste management will yield the desired results and lead to the further marginalisation of the informal sector, resulting in widespread loss of economic opportunities for the urban poor. The second defining characteristic of waste management in India is the presence of multiple actors who have several, and often conflicting, objectives. Understanding the complex interplay between the actors and their objectives and how they play out under different approaches (and technologies) is critical for designing and implementing effective interventions. The implication of such a diversity of actors and objectives is that the solid waste management sector is embedded in, and mediated by, a political framework with uneven power geometries, local political contexts and relations between stakeholders (Yates and Gutberlet 2011: 639). Consequently, these actors with their own conceptions of the future would like to influence developments in the sector such that they help meet their objectives.

In this article, we describe the experience of using foresight methods to deal with the complex and uncertain challenge of waste management in large cities of India. An analytical framework is developed to address the critical issues of whether waste is conceived of as a burden or as a resource and what the role of the informal sector in future waste management will be. We also describe how combining foresight methods with political economy analysis allows us to identify the alliances that can drive progress within scenarios and also identify pathways between scenarios.

In what follows, Section 2 describes the analytical framework that combines foresight and political economy methods. In Section 3, we describe the results from applying the analytical framework to the context of waste management in India. Section 4 describes the lessons from the process of using foresight methods, while Section 5 concludes.

2 Analytical framework

In order to put some order into the uncertain and complex world of waste management in urban India, we use two different methods. To deal with uncertainty about the future we structure the research along four steps of foresight (horizon scanning) methods (Foresight HSC 2009) as follows.

Scoping: As a first step, we developed a scoping note that specified the key research question and identified the target group. The overall research question was: *Who will drive the transformation from a waste management perspective to an inclusive resource management perspective in urban areas of developing economies?* The key target group for the research was city-level policymakers. The other key target group was the stakeholders who work with the policymakers and advise or influence their thinking on waste management. This group included those working with and for the informal sector, including non-governmental organisations (NGOs) and other civil society groups, waste management consultants and the media.

Ordering: As a next step, based on secondary research, we identified the drivers for waste management in developing countries. This allowed us to identify the two critical dimensions in relation to the research question. The first is the continuum between waste and resource management. The two ends of the waste–resource management continuum can be described thus: when all waste is dumped into a landfill and nothing is recovered, the value of waste is close to zero. On the other hand, if all the embedded resources (materials and energy) are recovered from the waste, the value of waste is enhanced and it is described as a resource in the proposed framework. The second dimension is the continuum between working with the informal sector and working against the informal sector. These combinations of the two dimensions were used to create the four scenarios.

Implications: During a workshop in Delhi, participants characterised the actors, infrastructure and governance elements of the four scenarios. The participants developed the four scenarios in a pre-specified structure.

Integrating futures: The insights from the steps outlined were used to develop recommendations that would provide strategic direction to decision-makers currently working on waste/resource management.

Our focus on the two critical uncertainties allows us to identify a range of future scenarios and reflects the current focus of waste management policy in India as well as globally. The first uncertainty relates to whether waste would continue to be treated as a problem to be managed or would be considered as a resource that can be utilised. There is a growing realisation that the linear economic model of 'take, make and dispose' is reaching its final limits. Therefore, concepts like that of a circular economy that is restorative and regenerative by design, and aims to keep products, components, and materials at their highest

utility and value at all times are gaining traction (Ellen MacArthur Foundation 2016). The '3R' principle – reduction, reuse, and recycling – is considered a measure for developing the circular economy (Zengwei, Jun and Yuichi 2006: 5). The 3R principle has direct relevance for the waste management sector in developing countries as they have to spend around US$46 billion annually on MSW management with an unmet need of another US$40 billion to cover the service delivery gap. There is increasing focus on using waste as a valuable resource to help ease the financial and resource constraints arising due to the increasing quantity of waste originating in developing countries (Le Courtois 2012: 3–4). However, moving from waste management to resource management requires significant investment and even the private sector is unable to access adequate finance for such projects (Aulakh and Thorpe 2011: 60). Furthermore, it has been argued that if a local government is not able to manage waste using its own resources, it will be challenging to engage a private enterprise to successfully provide the services (Coad 2005: 3). Therefore, the challenge of moving from waste management to resource management is much more pronounced in developing countries.

The second critical uncertainty in our framework is about the extent of involvement of the informal sector in managing urban waste. It is widely known that the informal sector plays a crucial role in management of MSW presently but government policies, particularly in India, favour formal 'end of pipe' solutions like waste to energy plants that are likely to limit access to waste for the informal sector (Schindler, Demaria and Pandit 2012: 18–19). Existing literature also suggests that informal sector operations have a net benefit in terms of economic, social and environmental impacts while formal waste management operations have a net cost (Ezeah, Fazakerley and Roberts 2013: 2514). The criticism of informal sector operations includes the health risks arising due to limited awareness or consideration for occupational health and safety by the informal sector (Ezeah *et al.* 2009). Informal sector workers and their families living near open dumps and landfills are highly susceptible to diseases and occupational health risks (Gutberlet and Baeder 2008: 1–5).

It has been highlighted by several studies that the informal sector operates in a very hostile social, physical environment and suffers discrimination, prejudice, repression, neglect and exploitation (Wilson, Velis and Cheeseman 2006; Sembiring and Nitivattananon 2010). Therefore, it has been suggested to legalise safe informal waste management activities by preparing educational toolkits, creating social support programmes, as well as providing strategic planning and technical and managerial guidance to the informal sector (Gunsilius 2012: 2–4). In addition, to provide new service roles and niches to the informal sector, Wilson *et al.* (2009: 63) recommended that cooperatives should be formed and informal actors should be part of waste management planning processes. There is a need for change in attitude and perception of the public towards the informal sector enabling the integration of the informal sector with the formal sector (Masood and Barlow 2013: 96).

Figure 1 The four potential scenarios

Working with the informal sector

'Revolutionary Margin'   'Green Transformations'

Waste ——————————————————————— Resource

'State of Nature'   'Techno-Nirvana'

Working against the informal sector
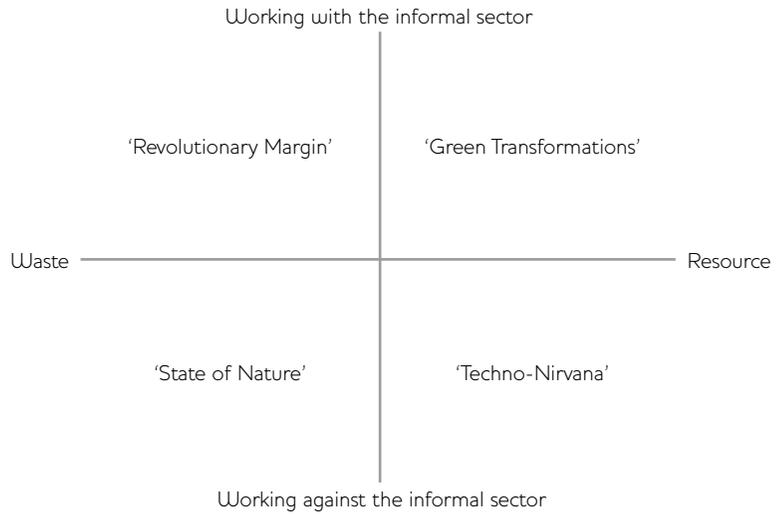
Source Authors' own.

Using the 'two axes method' (Foresight HSC 2009), two critical uncertainties define the boundaries of four scenarios. Figure 1 presents the two axes and the four resulting scenarios described in detail in the subsequent sections.

Based on the scenario descriptions developed by the workshop participants, the objectives of the key actors were distilled. Identification of actors whose objectives align allows us to detect relationships that are critical to make the scenario stable. If these relationships unravel, then it is likely that the scenario might transform into one of the other scenarios or might lead to a completely new scenario. To organise the actors and objectives and the identification of alliances, we use the methodology developed under the Political Economy Analysis of Climate Change Policies (PEACH) project for rapid political economy diagnosis (Schmitz 2012). In the scenario descriptions, Table 1 was used to summarise the actors and their objectives.

It is clear from Table 1 that the actors involved in waste management could have several, and different, objectives. Even if some actors have the same objectives, their priorities (rankings of the objectives) might differ. However, the critical task is to identify where and when actors whose priorities might be markedly different would come together and form alliances. For instance, the local government's highest priority is often a clean city. It could, however, ally with actors whose priorities might be different from its own as long as there is alignment over other objectives. The informal sector's highest priority may be protection of their jobs and livelihoods. The local government would form an alliance with the informal sector if, in addition to a clean city, it is also concerned about jobs in the local economy. However, if it is not concerned about jobs,

Table 1 Actor objective matrix

| | Actor | | | | |
Objective	Local government	Waste management company	Informal sector	Product manufacturers	Environmental NGOs
Clean city					
Health					
Resource value of waste					
Jobs					
Competitiveness					

Source Authors' own based on method used in PEACH project (Schmitz 2012).

but only about the resource value of waste, it might ally with the private formal sector whose top priority is likely to value recovery from waste.

The illustration above suggests that in political economy analysis it is essential to pin down the core objectives because they help identify and group together actors whose objectives align, although the reasons for the alignment of objectives might vary. In what follows, we use this notion of alignment of objectives to understand the stability properties of the scenarios as well as characterise the intra- and inter-scenario dynamics.

3 Scenarios
Based on the analytical framework developed in Section 2, as a first step in developing the scenarios, we organised a workshop in Delhi in October 2014 in partnership with a local NGO and a bilateral technical cooperation agency. All the relevant stakeholder groups – city-level policymakers, informal sector, NGOs, civil society groups, waste management consultants, formal sector, donors and media representatives – were invited. Before the workshop, a scoping note was shared with all participants, along with the research question and some background information describing the foresight methods.

The workshop began with a brief introduction to the waste management challenge and the overall research question. A foresight expert then provided an overview of the methodology. As a next step, the 'two axes method' used to generate the four scenarios was explained. After a brief discussion on the key drivers for waste management in the Indian context, a brief rationale was provided for the choice of the two critical uncertainties that were the basis for generating the four scenarios. To facilitate comparison across the different scenarios, the participants were provided a common structure along which the four scenarios had to be developed. Each scenario was given a distinct memorable name capturing its key characteristics. The participants

were requested to respect the boundaries of each scenario to ensure their distinctiveness. The participants were then randomly assigned to the four scenarios to ensure that different stakeholder groups were represented in each group.

The main characteristics of the four scenarios as discussed during the workshop are summarised next.

3.1 Scenario 1: State of Nature

Business-as-usual in many urban agglomerations around the developing world.

Attitudes to waste: Typical linear models of make-use-throw; waste is a problem that needs to be 'managed'; informal sector is 'part of the problem' (despite reducing burden on local government); limited engagement by manufacturers whose products (or packaging) generates waste.

Waste management process: Where there is a market, some household waste is collected, segregated and recycled by informal sector; outside legal framework; unsorted waste collected by private companies contracted by city governments (financed by taxes on property and subsidised by central government); waste is then either deposited at secondary collection points or sent directly to transfer stations; eventually transported to landfills – essentially open dumping grounds with limited energy recovery; informal sector further segregates waste at secondary waste dumps or landfills, 'cherry-picking' the valuable material.

Consequences: Lack of scientific disposal mechanisms and capacity constraints leads to widespread open dumping of waste, resulting in 'mini' landfills around the city. Waste is openly burnt due to the odour from dumps; policy instruments such as extended producer responsibility (EPR)[3] neither understood nor applied.

Key issues: Limited incentives for private sector to develop innovative technologies; grass-roots innovation driven by informal sector; however, little attention to environment health and safety norms; conflict between formal and informal sector – resulting in lobby groups and alliances.

3.2 Scenario 2: The Revolutionary Margin

Attitudes to waste: Waste management is a service provided by informal sector, focus is on collective rights and safety; informal sector seen as a local government 'ally' (works within legal ambit); limited focus on resource recovery.

Waste management process: Local government works in partnership with informal sector, predicated on its ability to get organised as a collective body; informal sector provides door-to-door collection, segregation of household waste (likely to be based on occupational health and safety considerations, e.g. 'hazardous' and 'non-hazardous' with limited focus on resource recovery); formal waste management companies manage non-recyclable waste as well as recovering energy at the landfill.

Consequences: Organised informal sector accesses majority of recyclable waste so can bargain for better prices with recyclers in the formal sector; economies of scale and better linkages mean the collective can invest in material sorting and recovery facilities.

Key issues: Initially low levels of material resources and energy embedded in waste because of improved ability of informal sector to remove recyclable material; incinerators (for remaining waste) may need further subsidies; however, fraction of waste *not being recycled* could increase where informal sector does not have market or technology to process new materials (from new, complex products); potential for conflict reappears as formal technology-driven companies exploit gap in the market.

3.3 Scenario 3: Techno-Nirvana
Attitudes to waste: Focus is on recovering the maximum value from the waste through innovative and capital-intensive technology.

Waste management process: Local government collaborates with formal private sector to recover value out of waste and introduces technology-based interventions for resource management; contractual agreements (through public–private partnerships) are for whole waste value chain; households segregate waste at source into multiple categories; door-to-door collection organised by formal private sector through motorised pick-up vehicles; large centralised material recovery facilities segregate recyclables and compost organic fractions of waste; non-recyclable and inorganic fractions sent for energy recovery in large capital-intensive incinerators.

Consequences: Informal sector provides services to households trading recyclables but is restricted and actively discouraged by local government. This waste goes either to material recovery or to recycling facilities where it is crushed for recovery of material or burnt in incinerators; waste management companies lobby against informal sector role since monopolistic access to all waste contractually agreed; manufacturers whose products can be turned to useful waste engage with local government and waste management companies to develop innovative solutions; regulations governing partnership between local government and private sector create entry barrier for small informal sector companies – leading it to become disenfranchised.

Key issues: Informal reuse and repair industry suffers because EPR is interpreted to extend producer property rights to entire product life cycle; waste management infrastructure highly capital intensive, large-scale, mechanised, as well as carbon and energy intensive; cost passed on by local government to waste generators – households, commercial establishments, and non-commercial organisations; additional increased costs for pollution control and monitoring the infrastructure; financial intermediaries support innovative entrepreneurs or large waste management companies to set up waste management infrastructure; potential conflict between environmental groups and local government, inexperienced in the consequences of large infrastructure.

3.4 Scenario 4: Green Transformations

Attitudes to waste: Focus on inclusive resource management; local government values resource-saving potential of skills, networks and decentralised infrastructure as well as potential for job creation which results from this partnership with informal sector collective.

Waste management process: Waste segregated at source by generators (households, commerce, etc.) with door-to-door collection managed by an informal sector collective; collections monitored and material is transferred to decentralised material sorting facilities, also managed by the collective in partnership with NGOs and technology start-ups; local government pays waste pickers, operates state-of-the-art landfills, and actively encourages repair and refurbishment markets through incentives such as providing space for weekly markets selling second-hand and repaired goods; financial and regulatory instruments make landfilling of recyclables and energy-rich materials prohibitively expensive for the waste disposer; repair and reuse industry actively promoted and works in close partnership with product manufacturers.

Consequences: Manufacturers work with informal collectives setting up take-back programmes for end-of-life products, making them a crucial link in their value chains; local government can enforce environmentally sound and occupational health and safety compliant processes. Process is facilitated by simplified regimes of taxation to informal sector enterprises who are members of the collective.

Key issues: Incinerators not considered viable for developing country context (due to absence of adequate monitoring capacities and infrastructure for pollution control); minimal conflict between formal and informal sectors since the former benefits from the latter's participation in the value chain; however, such participation needs active intervention from local government and other policy enablers to ensure materials do not leak back into unregulated markets.

4 Combining foresight with political economy analysis

While foresight methods enable the characterisation of future scenarios, they do not allow for the evaluation of these different scenarios from the perspective of the different actors involved. By combining actor objective analysis with the foresight method, we were able to identify the actors and the objectives that are influential in driving each scenario. The identification of the actors and their objectives in the four scenarios indicated the alliances that would drive the particular scenario. The objectives of the actors distilled from the discussions during the workshop and the scenario description by the working groups are summarised in Table 2.

The political economy analysis using the actor objective matrix also allows us to analyse the intra- and inter-scenario dynamics. It is well known that the informal sector has the knowledge and networks that will enable proper collection and segregation of the waste (Cointreau, Gopalan and Coad 2012). However, the informal sector can play this

Table 2 **Objectives of the actors in each scenario**

Scenario	Actor				
	Local government	Waste management company	Informal sector	Product manufacturers	Environmental NGOs
State of Nature	Clean city	Resource value of waste Competitiveness	Jobs Resource value of waste Competitiveness	Competitiveness	Jobs
Revolutionary Margin	Clean city Jobs	Resource value of waste Competitiveness	Health Jobs Resource value of waste Competitiveness	Competitiveness	Jobs
Techno-Nirvana	Clean city Resource value of waste Health	Resource value of waste Competitiveness	Jobs Resource value of waste Competitiveness	Resource value of waste Competitiveness	Clean city Health Jobs
Green Transformations	Clean city Jobs Resource value of waste Health	Resource value of waste Competitiveness	Health Jobs Resource value of waste Competitiveness	Resource value of waste Jobs Competitiveness	Clean city Health Jobs

Source Authors' own.

role at scale and with maximum efficiency only if it has the mandate from the local government as in the Green Transformations and Revolutionary Margin scenarios. A comparison of the objective of the different actors under the Green Transformations and Revolutionary Margin scenarios also suggests that the inclusion of the informal sector will not automatically enable the transition from waste management to resource management. The alignment of interests of the different stakeholders in a particular direction is critical to enable this transition. The Green Transformations scenario achieves this objective through the alignment of objectives between local government and the informal sector collective, as well as the product manufacturers.

The informal sector has limitations in recycling certain parts of the waste, especially because of the changing composition of the waste stream and a rising proportion of complicated materials in the waste chain. In these cases, the informal sector can be a partner of formal

waste management companies that have the finance and expertise to develop technologies. The informal sector can source the material to the formal waste management companies for some of these waste parts (Chaturvedi, Arora and Kilguss 2011).

The role of the local government is extremely critical in fostering and shaping these partnerships as seen in the Green Transformations scenario. In other cases, the local government's inaction or the support of the formal sector creates conflict between the informal and formal private sector much like the Techno-Nirvana and State of Nature scenarios. Our analysis of the scenarios also suggests that the inclusion of the informal sector is important because the results are not only inclusive in process but also because they are inclusive in outcomes. For instance, this is brought out through a comparison of the Green Transformations and Techno-Nirvana scenarios where the latter achieves the transition from waste management to resource management at a lower cost because of the participation of the informal sector. Also, the employment generated because of the decentralised infrastructure in the Green Transformations scenario would be much larger compared to the Techno-Nirvana case. The observations made indicate that the inclusion of the informal sector would facilitate, and in certain cases, accelerate the transition from a waste management to a resource management perspective.

To characterise inter-scenario dynamics, it is critical to understand what makes a scenario stable. In our framework, the stability of a scenario depends on the alignment of objectives of the involved stakeholders. Table 2 clearly shows that the two scenarios on the waste management part of the x-axis – Revolutionary Margin and State of Nature – are relatively fragile because they are based on limited alignment of objectives across different actors. This limited alignment does not allow for the development of alliances that can stabilise the scenario. For instance, the actor objective matrix of the Revolutionary Margin scenario suggests that it is a relatively tenuous scenario because it is contingent on the alignment of a single objective – jobs in the informal sector – between the informal sector and local government. In the case of the State of Nature scenario, because there is hardly any alignment of interests, it is relatively straightforward to infer that external influences (a crisis, an international or national policy) that change the objectives of the actors could also transform the scenario. Table 2 clearly shows that the two scenarios on the resource management part of the x-axis – Techno-Nirvana and Green Transformations – however, are relatively stable because they are based on alignment of multiple objectives across different actors.

5 Learning from the process of using foresight

The four scenarios developed by the participants of the workshop, although highly stylised, are based on alternative (shared) visions of the future. They also represent the different political choices that could be made by the stakeholders involved in waste management. By clearly defining the possible futures of waste management through the horizon-scanning methods, a discussion on a comparative analysis of these

scenarios could be initiated. The first implication of such comparative analysis shows the value of mainstreaming the informal sector in waste management in Indian cities. By working together with the informal sector, the local government (and the waste management sector in a city) is likely to benefit from the existing capacities in the private sector, beyond formal waste management companies. Also, working closely with the informal sector will allow for broadening the discourse on waste management and initiate discussion on alternative pathways from waste to resource management that are not focused exclusively on formal private sector participation and large-scale technological solutions.

Our analysis also establishes that the transformation of the waste management sector in urban India cannot be achieved by initiatives of individual actors from the private or the public sector. The scenarios described make it explicit that local government-led initiatives that do not involve the informal sector would face stiff resistance from several actors. At the same time, the informal sector by itself would not be able to achieve the transformation of the waste management sector due to limitations or absence of certain capacities. The transformation from waste to resource management is likely to be achieved through alliances of several actors with divergent priorities. The forging of such alliances depends crucially on the capacities and intentions of the local government due to their centrality in waste management governance in the Indian context and their power to convene the different actors.

Forecasting could be expert-led or involve most stakeholders, including the general public. The type of stakeholder involvement influences the futures techniques used: more participative exercises are more likely to use qualitative and deliberative techniques while expert-led exercises are quantitative or modelling based. The effectiveness of the techniques depends on the issue and different stakeholders' influence on the agenda (EEA 2011: 16). It is also argued that participatory foresight is more suitable for complex issues as expert knowledge often fails to provide answers to many important questions and the perspective of all stakeholders is a necessary step towards rationalisation of the deep social and cultural consequences (Nikolova 2014: 2). For this reason, the workshop involved participation from different stakeholder groups using predominantly qualitative and deliberative techniques. During discussion of possible future scenarios, the groups were formed randomly so that no stakeholder group was able to dominate and influence the discussion. However, as 'participative' foresight initiatives often fail to distinguish between expert participation and stakeholder or citizen participation leading to the dominance of certain voices and opinion in particular policymaking processes (Bingley 2014: 9), the possibility of some stakeholder groups dominating the workshop cannot be ruled out completely.

Our findings have several implications for waste management policymaking in India. Most waste management policies are drawn up by expert committees in India and then shared with local stakeholders

to obtain feedback. However, there is limited scope for making large-scale changes in the very conception of the policy. The initial framing of the issues by selected experts therefore dominates policy outcomes. In spite of the several failures of policies on waste management, such an expert-led policymaking process continues to be followed. Our analysis suggests that for uncertain and complex policymaking challenges, it is critical to open up the discussion on multiple conceptions of the challenges, incorporate the views of the different stakeholders and how these multiple conceptions could have a bearing on the initial framing of the issues to be tackled by policy. This opening up of the process of framing the challenge beyond expert committees would be critical for democratising the policymaking process. However, it is critical that such opening up of the policymaking process is safeguarded against capture by the elite and powerful. Waste management is particularly susceptible to such capture because the marginalised informal sector works in a regulatory vacuum with little support from the state. As a result, it is likely that the voice of the informal sector actors is either not heard or is captured by mediators and interlocutors.

The use of foresight methods, in combination with tools of political economy analysis, also show that policies for waste management in India should involve not only an environmental focus but should also include actors who are interested in the economic and social aspects of waste management. This would ensure that waste management is not closeted within the confines of the Environment Ministry but is incorporated into broader economic and social policy discussions. The experience of countries that have made significant inroads towards the transition from waste to resource management like Germany and Japan (and more recently, China), suggests that policymaking on waste management has to be much more joined up, involving actors from different ministries as well as local actors from several government departments beyond those concerned with the environment.

6 Conclusion

Managing rapidly rising quantities of waste is a global challenge. We have focused on the complex and uncertain waste management challenge in India. By using a combination of foresight methods and tools from political economy analysis, we develop an analytical framework that has the potential to put order into this complex and uncertain challenge. Using foresight methods, we characterise four alternative conceptions of the future of waste management. Our results, although drawn from a workshop in India, have relevance for most developing and emerging countries that have a significant informal sector presence in waste management. We also believe that our analytical framework has enough explanatory power to be used for other complex and uncertain challenges beyond waste management.

Our results indicate that the use of foresight methods to develop scenarios for the future through multi-stakeholder participation, could inform waste management policies in India and open up the process of

policymaking beyond expert committees. An understanding of potential futures developed in partnership with local stakeholders would also empower the officials of local government to make informed choices. At the same time, the opening up of the policymaking process is critical for the inclusion of a key actor in waste management in India, the informal sector, in policy processes.

Given the failure of waste management policies that have relied exclusively on expert committees for the initial framing, it is critical that the policy process is further democratised. This is especially topical in the present context when the Government of India is involved in redrafting all the waste management rules, and concerns have been raised about the process of stakeholder consultations on the rules (ESG 2015). The use of political economy methods shows that alliances of actors with different priorities are critical for the transformation of the waste management sector in India. However, the role of local government, with unmatched convening power, is crucial in developing these alliances. Local government is also critical in mainstreaming the informal sector.

Our analysis suggests that in the absence of such support the resourceful informal sector would have to confront the economically powerful and better organised formal waste management companies that are bidding for waste management contracts. However, such confrontation between the informal and the formal sector is neither economically, socially or environmentally desirable. On the contrary, it has the potential for undermining and delaying the transition from waste management to inclusive resource management. Such delays inevitably come at a cost to society. We show that developing alternative scenarios for the future together with political economy analysis allows us to identify actors and alliances that could delay the transition, but also identify those alliances that have the potential to accelerate the transition to inclusive resource management.

Notes
* This article draws on Chaturvedi, A.; Vijayalakshmi, K. and Nijhawan, S. (2015) *Scenarios of Waste and Resource Management: For Cities in India and Elsewhere*, IDS Evidence Report 114, Brighton: IDS.

1 According to the Ministry of Finance (2009), the rate of growth of waste generation is 5 per cent while the World Bank estimates that the rate of growth of urban population is 2.38 per cent.

2 The comparable number for collection rates in high-income countries is 98 per cent.

3 EPR is as 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. An EPR policy is characterised by: the shifting of responsibility (physically and/or economically; fully or partially) upstream towards the producer and away from municipalities; and the provision of incentives to producers to take into account environmental considerations when designing their products.

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