

# **Solid Waste Management in Chennai: Lessons from Exnora**

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### **ABSTRACT**

In India two channels of solid waste management run parallel to each other: the formal and informal sector. The formal sector includes local government, municipalities and private companies; whereas the informal sector consists of waste dealers and waste collectors (rag pickers) made up of a large number of urban poor who make their living out of waste. Non-government organizations such as Exnora not only provide important support in organizing these informal sector waste workers to increase their earnings and improve their living conditions, but also help in overall waste reduction by converting waste into valuable commodities. Founded in 1989, Exnora, whose name stands for EXcellent NOvel and RADical ideas, focuses on mobilizing and empowering communities to participate in preserving nature and preventing environmental degradation, thereby realizing the aim of organizing civic amenities on a self-help basis, managing waste collection and recycling and adding dignity to the role of waste pickers in India. Exnora partnered with the municipal corporation to form innovative groups called civic exnoras for better segregation and collection of waste and to bring overall improvements in solid waste management services in certain residential areas. There are only a few places in India where a non-government organization, community and municipality work together for a common cause, thus the concept of Civic Exnora is unique and innovative in itself. This case study presents a system of popular participation in organizing solid waste management through the awareness created by Exnora. Civic Exnora has promoted communities being directly involved in a voluntary effort in waste collection, removal, recycling and applied concepts such as the 3Rs (Reduce, Reuse and Recycle), Waste to Wealth and Zero Waste Management. The study highlights the strengths and challenges faced by Exnora. Exnora through its Civic Exnora innovation performs an important role in mass awareness, environmental protection and empowerment of the disadvantaged. Because community involvement, local government cooperation and technical improvements are critical to its success, its sustainability is questionable as a result of obstacles presented by political pressures and growing privatization.

**Key words:** innovation, solid waste management, municipal waste management, Chennai, non-government organization, Exnora, community-based organizations

### **Introduction**

In Indian megacities, municipal solid waste management has become a challenging problem, especially in cities like Chennai, which generates 0.71 kg of municipal solid waste per capita every day—the highest in the country (“Chennai’s per capita waste at 0.7 kg highest in the country,” 2014). Growing waste generation is mainly due to population growth, economic development and changing lifestyles. Primarily responsible for waste management,

municipalities and local agencies have been ineffective in tackling the waste problem. Some issues related to municipal solid waste management are low priority for safe disposal, lack of appropriate organization, insufficient financial and technical resources, a limited number of disposal sites and inadequate knowledge of disposal methodology (Pandian, Ramanathan and Rawat, 2010: 199).

Municipal solid waste is simply collected, transported and dumped without treatment or processing. A substantial amount of waste remains unattended at collection centers, roadsides and riverbanks. Most often cows and other stray animals feed on waste dumped in these places. Open dumping of garbage facilitates the breeding of disease vectors and unsanitary dumpsites increase the risk of groundwater contamination (Kumar, Venkata and Rao, 2013: 48). A substantial amount of the municipal waste budget (around 75 per cent) is spent on street sweeping, with only 20 per cent on transportation and 5 per cent or less on disposal (Hanrahan, Srivastava and Ramakrishna, 2006: 30). However, in spite of street sweeping, roads remain dirty, spoiling the aesthetic beauty of cities and towns. It is common to see people throw their rubbish onto the street. The prevailing thought is “cleaning up is always somebody else’s responsibility.” The Government of India issued Municipal Solid Waste (Management and Handling) Rules, 2000 to improve waste management. The rules promised environmental sustainability in solid waste management by promoting waste separation, recycling, and use of disposal techniques such as composting and incineration. Government agencies believed privatization to be the panacea for solid waste problems. Under the impetus of Municipal Solid Waste Rules and the privatization drive, Chennai became first city to contract out municipal solid waste management services to a foreign agency, the French company Onyx (Ahluwalia, Kanbur and Mohanty, 2014: 225); however, in spite of the Municipal Solid Waste Rules, the Greater Chennai Corporation<sup>1</sup> and the private operators continued to dispose of the collected mixed waste at open dumpsites, posing ongoing risks to the environment and public health (CMDA, 2008).

Besides Greater Chennai Corporation and private operators, non-government organizations such as Exnora are also working as conservancy agencies<sup>2</sup> in the field of solid waste management. Exnora introduced the concept of people participation in solid waste management by forming community-based organizations such as Civic Exnora to independently manage waste in their locality, with the parent body playing an advisory role (Dhamija, 2006: 84). The Civic Exnora innovation has shown that the active participation of people can bring a spark of change. Exnora is active in Chennai, Panipat, Lucknow and Hyderabad, but this paper mainly focuses on Exnora in Chennai. A non-government organization, Civic Exnora provides sustainable waste management systems that are successful in reducing waste and generating employment and income. The community intervention Exnora, however, has a marginal presence and is vulnerable to indiscriminate privatization drives. With this background, this article seeks to understand how Exnora functions and to explore whether Civic Exnora has and to what extent could in the future keep

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<sup>1</sup> The Corporation of Chennai was renamed Greater Chennai Corporation January 2016. The new nomenclature for the civic body reflects its expansion. Earlier Chennai was divided into 10 zones and 155 wards, but in 2011, 42 small local bodies were merged with Chennai Corporation, the number of zones increased from 10 to 15 and the number of wards increased from 155 to 200.

<sup>2</sup> Under the twelfth schedule of the 74th Amendment of the Indian Constitution, 1992 (Article 243 W), municipalities are responsible for public health, sanitation conservancy and solid waste management—the municipality is the main conservancy agency performing functions of waste collection and maintenance of sewage and drainage.

the streets free from garbage and assist rag pickers in spite of the challenges from political pressures and growing privatization.

A review of existing literature reveals that several studies on Exnora have been undertaken. The problem of waste management has been explored, revealing the inability of the municipal bodies to provide necessary waste management services and the response of civil society organizations in taking control of this problem (Hosetti, 2006; Dhamija, 2006; Dahiya, 2003; McDougall et al., 2001; Medina, 1997; Ramkumar, 1996). Studies of the municipal body, Onyx and Exnora, highlight issues of effectiveness, equity and the role of urban poor in waste management in Chennai city (Esakku et al., 2007; Srinivasan, 2006). Few studies consider the relationship between civic exnoras and local government with a view to designing a sustainable municipal solid waste stream in the region (Galab, Reddy and Baud, 2004; Dahiya, 2005). Examination of future trends and challenges for Civic Exnora has raised the issue of why these institutions are thriving in one part of Chennai city and missing in others (Anand 2003; 1999).

This case study focuses on providing insight on and information about the emerging role of Exnora as well as the obstacles to achieving its objectives. It suggests that the policy framework needs to recognize and support community projects such as Exnora and find ways to provide incentives to them. This approach could add value by going beyond the often sterile “privatization” debate, and help to create space for other initiatives to prosper in a coordinated manner.

The paper is divided into four sections. Section I gives the overall background of solid waste management in Chennai. Section II analyses the significance of conservancy parties in waste management. They include a public agency such as Greater Chennai Corporation, private sector firms such as Onyx, and voluntary organizations such as Exnora. Section III analyses the history and organization of Exnora. It specifically examines the conceptual framework, operations and role of civic exnoras. Section IV explores challenges of sustainability for civic exnoras. A mixed methodology is adopted containing both primary and secondary sources. The primary sources include in-depth interviews with Chennai citizens and members of Exnora. A field survey conducted in the Pammal area, Chennai, in which 122 residents were approached. A total of 100 people responded to the survey questions via a door-to-door collection method in April, 2014. Secondary data have been obtained from various books, journals, newspaper articles and websites identified in the references below.

## **Solid Waste Management in Chennai**

Chennai rose from small and scattered fishing villages to the fourth largest metropolitan city in India with an area about 1170 sq. km and a population of 4.6 million in 2011. It is divided into 15 zones and 200 wards. The city is the capital of Tamil Nadu state and has been growing in importance in all areas including public administration, medicine, trade and commerce, industry, and higher education. Over 20 years, waste generation increased from 600 to 3500 tonnes per day (Esakku et al., 2007). Every day 4500 metric tonnes of garbage is collected and removed from the city. According to Greater Chennai Corporation (2016), out of the total waste generated in Chennai, 68 per cent is of residential origin, 16 per cent is produced by commercial establishments, 14 per cent by schools and institutions, while industry accounts for just two per cent; the remainder comes from hospitals and clinics and is disposed of

separately. The solid waste collection efficiency in the city is 97 per cent, which is slightly less than the Ministry of Urban Development's benchmark of 100 per cent efficiency (Sridhar and Kashyap, 2012: 102).<sup>3</sup> The waste generated by households and commercial establishments is collected from community waste storage areas by the staff of the Greater Chennai Corporation and deposited in two open dumps located at Kodungaiyur and Perungudi at the south and north ends of the city. According to the Chennai Metropolitan Development Authority, various types of waste, which require different types of handling and treatment, are disposed of together (CMDA, 2008). Both sites are overloaded with garbage and cause serious health problems for nearby residents. One study has concluded that, within a three-year span (1999-2002), there was a two-fold to three-fold increase in contamination of soil and groundwater due to leachate from the waste at the Perungudi dumpsite (Padmavathi, 2008: 2254). Greater Chennai Corporation is planning remediation of portions of the current dump sites in order to stop and reverse the environmental damage caused by unscientific dumping of waste (Tipping point for Trash in Chennai, 2013).

Dumping at the landfills does not end the life cycle of waste. A major part of it gets recycled through the informal sector. The marginalized urban poor compete with dogs and other animals scavenging through the piles of vegetable peels, broken glass and scraps of metal. Many rag pickers, wearing discarded old gray canvas shoes and shabby clothes, make a daily trek to collect salable materials from the tonnes of city refuse that get unloaded at Kodungaiyur dumping yard day after day. They make their living by digging deep through piles of refuse and scooping out recyclables with their bare hands without using masks, gloves or other protection. Sometimes they use magnets attached to sticks to find the metal scraps. Thick black smoke from spontaneous fires may cloak them, but they keep working in these conditions.

The impoverished rag pickers comprise a social group that resorts to waste picking for meagre incomes and some merely for every day survival. Without them, rubbish would not be collected, sorted or recycled. The rag pickers spend their days sorting the endless trash in search of non-biodegradable items they can sell. The landfills are the last point for trash collection, as most recyclables have already been removed by other waste collectors who pick up bags of garbage directly from homes. The activities of the rag pickers are not systematic and they scavenge from one locality to another. They can earn US \$2.5 to US \$3.5 daily by selling metal, paper, plastic and bricks (Nandi, 2014).<sup>4</sup> Approximately 1.5 million people in India subsist by sorting through trash from roadsides, municipal bins and landfills and sell the reusable material (Joey, 2011). They divert a considerable quantity of resources from the waste stream. In Delhi, where total waste generation is 6000 tonnes, the rag pickers remove between 720 to 900 tonnes, which amounts to a daily saving of US \$9,776 to US \$12,221 per day for the Municipal Corporation of Delhi (Singh, 2010: 131).

In spite of their contributions, the rag pickers survive in a hostile physical and social environment (Medina, 1997: 2). They are accused of stealing recyclables from the dump yards, which belong to municipalities or private operators. The authorities have adopted several means to keep rag pickers out of the dumpsites. Greater Chennai Corporation put CCTV

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<sup>3</sup> The Indian Ministry of Urban Development has developed standardized service level benchmarks with respect to basic municipal services in the year 2006. Collection efficiency is one of the performance indicators related to solid waste management service. It is defined as the total waste collected by the Municipal Corporation and authorized service providers compared to the total waste generated within the city, excluding recycling or processing at the generation point.

<sup>4</sup> All values are expressed in US \$ for the sake of simplicity (US \$1= Rs. 62, Exchange Rate 4 February 2015).

cameras around the Kodungaiyur dump yard to monitor and prevent rag pickers from entering the yard and setting fire to garbage in order to collect metal scraps (Garbage fire chokes residents of Kodungaiyur, 2012). Municipalities shed all kinds of responsibilities toward rag pickers, even if they meet with an accident while scavenging in the dumpsites. In 2011, approximately seven rag pickers were buried alive in the Hyderabad dumpsite and perished. The dangers of the humiliating but tempting vocation of rag picking have been brought to the forefront of public attention (Dump yards turn death traps for rag pickers in Hyderabad, 2011) without result. The entire waste situation clearly needs a new framework. For the urban poor who neither have skills nor the capital for investment, waste recycling remains the most economically and socially viable option.

There is a need to integrate economic necessities and waste management issues in an environmentally sustainable and a socially just manner. All communities, and especially those that are most affected, have a critical role to play in waste management services. Organized waste collection systems need to include these rag pickers in the waste management chain, so that they can do cleaner recovery of recyclables and to increase the income of the rag pickers themselves. Decentralized initiatives carried out by numerous groups like Exnora in small local communities as well as at some larger municipal and regional levels have shown a substantial shift in this direction; however, the recycling waste systems in which the rag pickers play a crucial role are being torn apart and displaced by the corporatization of waste management.

### **Conservancy Parties to Municipal Solid Waste in Chennai**

Chennai has a mixed regime of waste management involving public authorities such as Greater Chennai Corporation, private parties such as Onyx and Neel Matal Fanalca, and civil society groups such as Exnora. The solid waste management department of the Greater Chennai Corporation is responsible for conservancy operations in Chennai city. Established on 29 September, 1688, the Greater Chennai Corporation is the oldest corporation in India (Greater Chennai Corporation, 2016). It is headed by a mayor who presides over councilors elected from each ward in the city. The actual work of providing civic services is done by field staff. Since the 1980s, Exnora has been working as a conservancy party in small local pockets. In the latter part of 2000, Onyx started handling waste and in 2007 another private company—Neel Matal Fanalca—began operations in some zones of the city.

A “revolution” almost happened in Chennai in 1989, when Exnora was established to encourage people to take up their civic responsibility in response to the Greater Chennai Corporation’s inability to manage waste in Chennai effectively (Asian Development Bank, 2009: 106). It was a middle-class awakening built around voluntarism, service and taking charge of one’s own neighbourhood. Some of the founding members had seen clean streets abroad and were determined to try to clean up the streets of Chennai as well. The concept of Exnora in Chennai was the result of one resident’s initiative, Dr. M.B. Nirmal, a bank employee-turned-activist and a “master motivator of the masses”. Exnora’s main agenda is “use citizens to sort out citizens' problems” (Gosling, 2001: 142). It is as if someone’s house is set on fire—he does not wait for the authorities, but quickly makes efforts to stop a disaster. Similarly, people assumed immediate responsibility for cleaning up their neighbourhoods as a way to deal with the ineffective waste management system. The Chennai Corporation, in spite of having high waste collection rates, does not have a proper workable plan for solid waste management (Sivaraman, 2013). It also lacks technical expertise and sufficient manpower. The daily waste generated in the city is disposed of in dumpsites without following

internationally-accepted scientific procedures. The Municipal Solid Waste Rules mandate the Greater Corporation of Chennai to have a mechanism that ensures segregation of waste at source into wet and dry. The rules also disallow indiscriminate dumping of garbage; however, they are hardly followed, making the waste management system of Chennai efficient in terms of waste collection yet ineffective in terms of waste management at the same time.

In the late 1980s and 1990s, the rapid acceptance of the grass root Civic Exnora movement illustrated how active community participation can lead to cleaner and more engaged neighbourhoods. Exnora introduced the concept of people participation in solid waste management by forming community-based organizations such as Civic Exnora to independently manage waste in their locality, with the parent body Exnora playing an advisory role (Dhamija, 2006: 84). A typical civic exnora is affiliated with Exnora and hires rag pickers (re-named “street beautifiers,” not only to give a positive image to the position of waste collector, but because his activity include both cleaning and beautifying the area) for door-to-door waste collection in exchange for a monthly “user fee” from the households (Anand, 1999: 162). They contribute both to the environment and society by adopting sustainable waste management practices and by employing rag pickers as waste collectors. The community-based organizations would not be able to operate completely independently. A strong relationship between the community-based organization and the municipalities is indispensable if they are to function effectively. In such decentralized solid waste management systems, non-government organizations or community-based organizations may require much support from municipalities or government agencies in the form of collection of leftover waste, allocation of space for composting, separation of waste by type, the issuance of identity kits to waste collectors, etc.

The Greater Chennai Corporation was well aware of the fact that municipal support is critical for the sustainability of Exnora. To facilitate private operators, it passed a resolution in 1999 to privatize municipal solid waste in the three zones in which the Civic Exnora movement was believed to be strong (Dahiya, 2005: 123). Exnora grew rapidly until the government contracted waste services with Onyx under a privatization drive. Post privatization, Civic Exnora’s street beautifiers lost their jobs and were pushed once again into the unorganized sector as rag pickers.

The Greater Chennai Corporation contracted with Onyx to provide conservancy services in three wards—6, 8, and 10—for a period of seven years (2000-07) (Kulshrestha, 2012: 105). The Greater Chennai Corporation argued that the cost of waste disposal would fall from US \$20 per tonne to US \$17.5 per tonne, saving US \$750,000 per year (Dahiya, 2005: 123). Onyx was entrusted with collection, transportation and disposal of municipal solid waste. Some of the characteristic features of Onyx services include: use of imported technologies for solid waste management; mechanization of handling tasks through lifting, compacting and tipping devices; day and night services of collection; training programs for workers; improved maintenance; and a relatively young labour force (Reddy, 2011: 279). In the year 2000, while Greater Chennai Corporation was busy moving toward the privatization of waste transportation services, the Government of India issued new rules that regulated the municipal solid waste management at the local level in response to a Public Interest Litigation filed by Ms. Almitra Patel (Chaturvedi and Gidwani, 2011). The rules had further encouraged participation of private agencies.<sup>5</sup>

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<sup>5</sup> Municipal Solid Waste (Management and Handling) Rules, 2000, Rule 7 (2) specifies that the waste processing and disposal facilities must be set up by a municipal authority on their own or through an operator (MoEF, 2000).

As per the rules, government bodies at all levels (central, state and municipal) are required to take steps to improve the municipal solid waste services in India. The mandatory requirements are source segregation and storage at the source, door-to-door collection, abolition of open storage, daily street sweeping, transportation of waste in covered vehicles, waste processing by composting or energy recovery, and disposal of inert waste in sanitary landfills; however, many of the rules are regularly not followed. For example, although Onyx had the capacity and expertise to implement environmentally safe waste management, it refused to follow the Municipal Solid Waste rules saying that the contract did not cover the management of segregated waste (Srinivasan, 2006: 2263). Thus, waste reduction was far from optimal.

The transfer of solid waste management to Onyx nevertheless yielded some positive results. Residents across the 3 zones noticed improvement of cleanliness in their areas (Subramanian, 2007). Onyx's services were not contingent on the residents' ability to pay which might account for its good performance in higher and middle as well as low income areas (Srinivasan, 2006: 2261). Onyx's average daily waste collection rate was higher than that of the Greater Chennai Corporation. The Greater Chennai Corporation managed 2000 tonnes of waste per day with manpower of 10,000 workers in 7 zones, while Onyx collected and disposed of 1100 tonnes of garbage every day using 2000 workers in 3 zones (Esakku et al., 2007). Greater effectiveness in waste collection meant an increased expenditure by the Greater Chennai Corporation, since Onyx's payment was based on tonnage collected.

Though residents also confirmed that Onyx collection rates were higher than those of the Greater Chennai Corporation's in the initial period (2000-04), Onyx's performance slipped over the years. There were various reasons for the deterioration of service: The Greater Chennai Corporation had 'a relaxed attitude' with Onyx and became less vigilant. After the formation of trade unions, quality control within the company was even more difficult and led to a direct fall in the services provided by Onyx (Srinivasan, 2006: 2261). Some environmental issues developed as the company simply collected and dumped the waste at the Pallikarni dumpsite without separation. The dumpsite area was affected in two ways. First, the Perungudi, a low-lying swamp area adjacent to the Pallikaranai—a wayside stop for migratory birds and an important nesting area for more than 26 species—was affected. Second, the integrity of the Pallikaranai wetlands, which is crucial for the water security of south Chennai was spoiled (Jayaraman, 2002). The Tamilnadu Pollution Control Board therefore served notice to Onyx for "dumping indiscriminately on wetlands" (Sawhney and Chanda, 2004: 20). There was, however, no motivation to maintain or improve the performance standards, as it was certain that under the existing political framework, Onyx would not be able to renew its contract.<sup>6</sup>

Following completion of the contract with Onyx in 2007, the Greater Chennai Corporation awarded a seven-year concession to Neel Metal Falalca Environment Pvt. Ltd. for the collection, separation, transportation and disposal of municipal solid waste in 4 zones of Chennai (Saravanan, 2008). This attempt by Greater Chennai Corporation to contract waste services with Neel Metal Falalca also failed to yield the desired results and a penalty of US \$4061 was imposed on the company for failing to perform its duty well (Sangameswaran, 2008). Though the contract was to last until 2014, in 2010 the Chennai corporation council passed a resolution expressing their dissatisfaction with the agency and suspended the contract

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<sup>6</sup> There have been attempts by the All India Dravida Munnetra Kazhagam to oust the private company, citing malpractice like inflation of tonnage (Government Considering cancellation of Onyx Contract: Sampath, 2003). Batley has recorded similar breaches of contract in the city of Penang (1996: 744).

(Mayor to Bring Neel Metal Fanalca Under Scanner Again, 2013).

The failure of private agencies to provide essential services raised questions about the accountability and transparency of decisions taken by elected government bodies. The objectives of privatization were to achieve low costs and to improve quality of service. The profit motive, however, led contractors to work against the government's desire to safeguard public health. This failure indicates that the officials either were not sufficiently empowered or lacked the will to compel contractors to follow the rules and abide by their contracts. The municipal corporation already suffers from a shortage of qualified staff, yet privatization imposes several new responsibilities upon them to monitor and evaluate the functioning of the service provider. According to Brook, the government needs to increase its accountability and transparency by creating and maintaining a publicly accessible database which contains the contracts, budgets and performance records of all privatized solid waste management projects in the nation. Further, there should also be annual public reporting of the performance of each locality's waste management services (2011: 34).

Nevertheless, the competition offered by Onyx and the introduction of Solid Waste Management Rules, 2000 led to an important change in the solid waste management operations in the zones managed by the Greater Chennai Corporation (Srinivasan, 2006: 2261). The Greater Chennai Corporation offered door-to-door collection in order to close the gaps in its services. The improved service provided by local agencies— door-to-door collection of waste from each household and its transfer to municipal bin and landfill sites— prevented accumulation of waste on the streets. In some localities, where conservation services were led by the Greater Chennai Corporation, Exnora leaders resisted the Greater Chennai Corporation's attempts to introduce door-to-door collection of waste because they felt that the formal setup of conservancy services defeats the purpose of cooperation or partnership in civil society (Srinivasan, 2006: 2262). As a participant in civil society, Exnora proved to be a great success and bridged this gap.

### **Civil Society Participation in Solid Waste Management: Exnora**

Civil society participation is a form of informal privatization, in which the failure of public services leads private bodies or communities to step in (Batley, 1996: 731). In Chennai, since the Greater Chennai Corporation was unable to cope with the growing volume of waste generated from rapid urbanization, a municipal solid waste management performance gap was created. As a result, problems of public defecation, waterlogged roads, garbage-filled gutters and polluted bodies of water needed urgent attention. Where municipalities have failed to provide adequate services, civil society plays an important role in ameliorating the condition. There has been greater involvement of individuals, communities and non-government organizations which have taken social initiatives not only to manage the waste, but to turn it into a resource (Table 1).<sup>7</sup> Exnora is the product of one such community intervention.

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<sup>7</sup> Urban governance has been decentralized through the *74th Constitutional Amendment Act* of 1992. This *Act* allows for local communities to participate in local development processes, and also to legitimize the transfer of responsibility for development to lower levels of government.

**Table 1: Community Based Organizations Active in Solid Waste Management in Chennai City**

Organization	Approach
<i>Civic Exnora</i>	<ul style="list-style-type: none"> <li>•18 % of the municipal solid waste generated in Chennai is managed by Civic Exnora</li> <li>•Created about 1,500 jobs and offered rag pickers rehabilitation</li> </ul>
<i>Mahalakshmi Road Welfare Association</i>	<ul style="list-style-type: none"> <li>•Each householder paid US \$5 (Rs. 350 ) to the association</li> <li>•It has a separate composting plan.</li> </ul>
<i>Purna Nagar community based organization</i>	<ul style="list-style-type: none"> <li>•Established in 1992 with 150 middle class households</li> </ul>
<i>Shanthi Nagar community based organization</i>	<ul style="list-style-type: none"> <li>Established in 1994 with 150 upper grade income households.</li> <li>•It aims to fill the gaps in conservancy services.</li> <li>•Income boost by selling of recyclables by rag pickers.</li> </ul>
<i>Kumari Nagar community based organization</i>	<ul style="list-style-type: none"> <li>•Five-year-old community based organization run by housewives of the area.</li> <li>•Collects US \$3 ( Rs. 200 ) as annual fee from its members (approximately 160) and uses it to clean of 7 streets in the area.</li> </ul>

Table 1 is derived from S. Esakku et al., 2007. Used with permission.

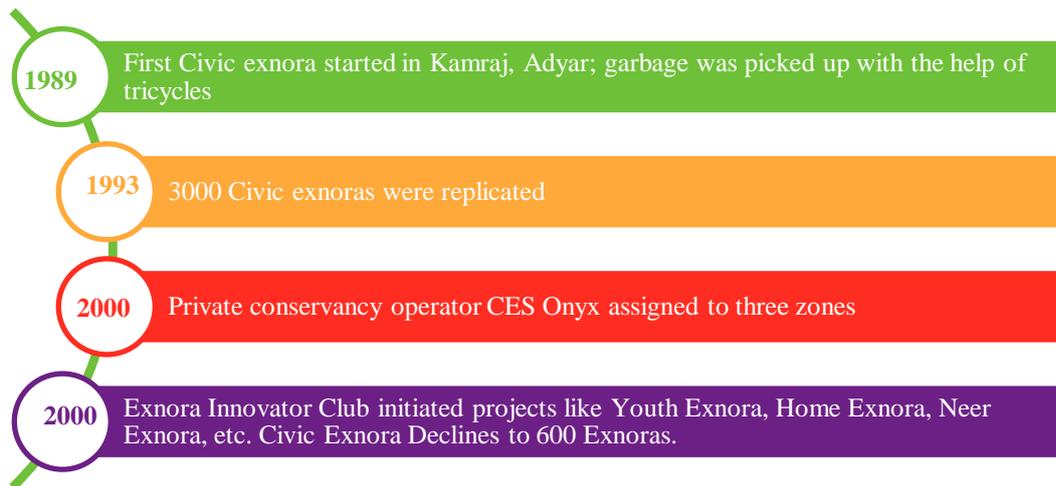
Exnora, an acronym for Excellent Novel Radical, was recognized among 100 best practices at the 1996 Habitat II conference in Istanbul due to its Civic Exnora initiatives in Chennai (UNESCO, 2016). Estimates suggest that over the 14 years 1989 to 2003, Exnora organizations contributed \$3493 US million to urban sanitation and cleanliness and that almost 4.5 million people benefitted from its 17,000 street chapters (Vittal, 2004: 107).

The Exnora’s journey began in 1989 with the efforts of its founder, M.B. Nirmal (Figure 1). When the Greater Chennai Corporation chose to experiment with hydro containers (A large containers used for waste collection) with a capacity of eight tonnes at Kamaraj Avenue, Adyar, Chennai, Exnora got involved (Hosetti, 2006: 74).

For the Greater Chennai Corporation's experiment to be successful, garbage would have to be placed directly into the hydro containers located at the end of every street. The residents found it inconvenient to carry waste from their respective houses to the end of street for disposal. It was here that Exnora stepped in to provide a practical alternative for the primary collection by taking the garbage directly from households and disposing of it in hydro containers. The municipality had responsibility for emptying the hydro containers on a regular basis, the secondary stage of garbage collection.

As a result of community efforts, in 1993 more than 3000 civic exnoras had been created in just five years, serving nearly one million people and making it an excellent example of what community-based organizations could accomplish (McDougall et al., 2001: 82). This civic movement was so successful that it rapidly spread across South India. It covered 40 per cent of Chennai city, 75 per cent of its suburbs and had clubs across Tamil Nadu and the three southern states (Das, 2002).

**Figure 1: Exnora’s Journey**



Source: Author

By 2000, however, a turning point came for Exnora after introduction of Onyx as a service provider in three of a total of ten Chennai zones. On one hand, the number of civic exnoras declined from 3000 to 600. On the other hand, many new projects had begun with the help of Exnora Innovators Club such as Youth Exnora, Home Exnora, Temple Exnora, Neer Exnora and Toilet Exnora.

**Figure 2: Institutional Set up of Exnora**

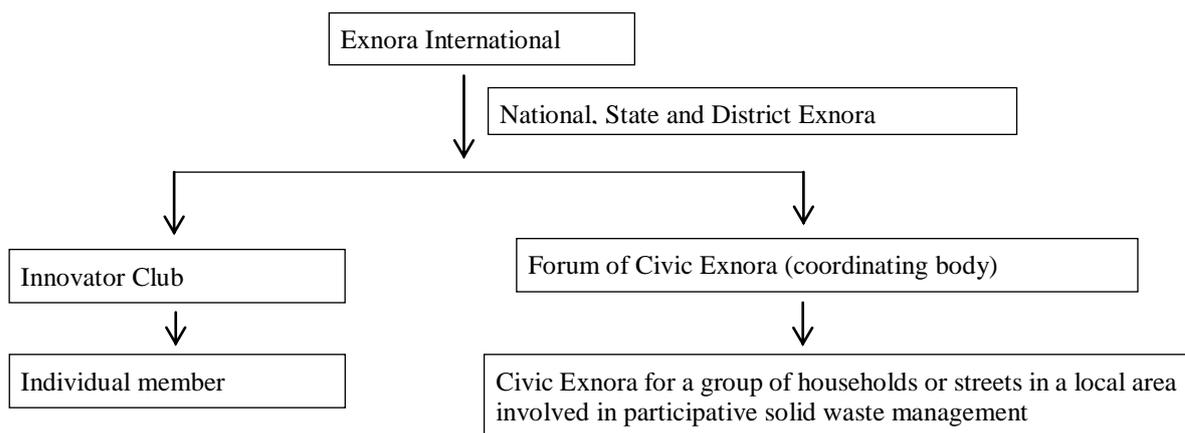


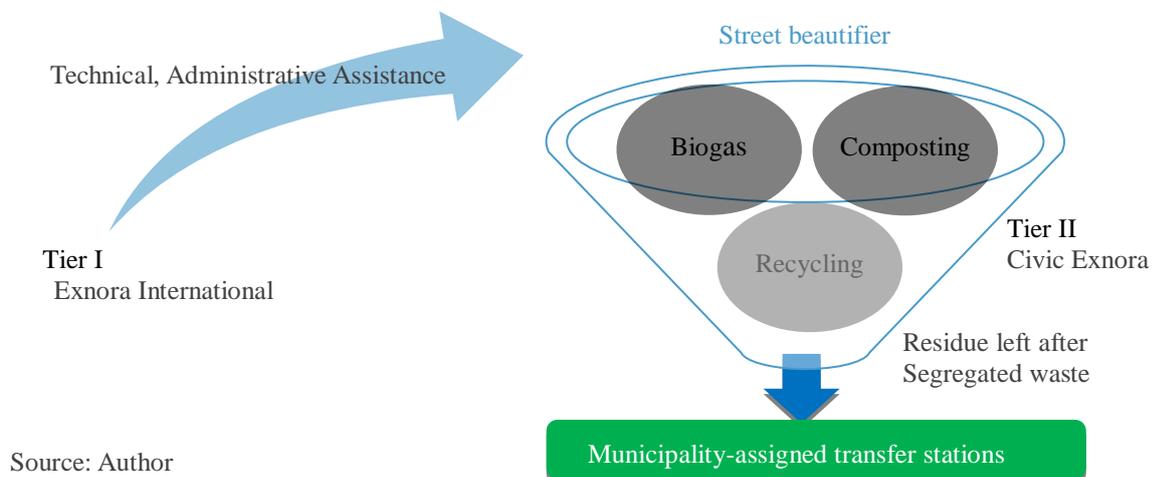
Figure 2 is derived from a figure included in T. K. Ramkumar, “Exnora case study on community initiative in municipal solid waste management,” a workshop paper presented at UMP/SDC Collaborative Programme on MSWM in Low-income Countries, Cairo, Egypt, October 14-18, 1996. Accessed April 1, 2016 at: <http://www.ircwash.org/sites/default/files/343-96MI-14448.pdf>. Used with permission.

Exnora functions in two ways, by forming civic exnoras and by forming exnora innovators clubs (Figure 2). In the organizational structure of Exnora, overall planning is done by the apex body, Exnora International, and its various branches at the state and district levels, whereas local planning is the responsibility of various Exnora Innovator Clubs whose activities are coordinated by district bodies. Implementation, operation and maintenance are done by community-based organization civic exnoras.

Civic exnoras are self-sufficient in their operation and maintenance and are funded by user fees ranging from US \$0.3 to US \$1 per month (the fee may vary depending on the region) paid for the door-to-door waste collection service by participating households. Revenue is also generated from the sale of the recyclable items and compost. In the case of the Exnora innovator club, funds are raised from the members, fund raising campaigns and a spectrum of funding agencies including both government and private organizations. People mostly work as volunteers for Exnora but are paid in some cases. For example, the guest faculty of the Teach Reach Program of Exnora's Innovator Club is paid a small honorarium of US \$23 per month for teaching underprivileged children. The expenses are met by the club directly or through outside sponsorships.

Many Exnora innovator clubs have involved their subsidiaries or extensions in environmental activities such as monitoring waterways, harvesting rainwater, planting trees, converting degradable waste into compost and creating street light fuel or cooking gas from waste-driven energy. The projects are thus multi-sectoral and address a wide range of issues. For example, Neer Exnora attempted to revive three water bodies, namely Sathangadu Lake near Manali, the tank of Kothandaramar temple in West Mambalam, and the General Kumaramangalam Colony tank in Kolathur, that had been neglected for several years (Lakshmi, 2011).

**Figure 3: Conceptual framework of Civic Exnora**



Source: Author

### Conceptual Framework and Workings of Civic Exnora

Exnora is unique in its two-tier structure (Anand, 2003: 235). In the first tier, Exnora International does the overall planning from the top level and, in the second tier civic exnoras execute the operations at the local level (Figure 3). The Exnora International, non-government organization has three main functions: to define organizational purposes and rules, to give technical and administrative assistance, and to motivate people and guide local and state institutions. At the local level the neighbourhood civic exnora organizations provide services to its members and are funded by subscriptions. In this system, Exnora adopts a particular street or block consisting of about 75 to 100 households, to which a street beautifier is assigned. The residents of a particular civic exnora take responsibility for their streets, pay a monthly fee to

get their garbage cleared, organize meetings with officials to air grievances, and have eminent persons in the neighbourhood as presidents. The street beautifier is responsible for collection of waste from each household, the transfer of its useful components into separate containers for recycling and putting the residue into the municipal bin.

Civic exnoras provide employment opportunities to waste workers and local scrap dealers working in the field of informal waste management. Exnora has created about 1,500 jobs and offered rehabilitation to numerous rag pickers (Lighting a Spark of Change, 2005). Former rag pickers are officially designated *street beautifiers* and, instead of hunting through municipal bins and landfills, are hired for door-to-door collection of separated waste, thus improving their social status and ensuring a steady source of income. The local waste dealers also benefitted by purchasing recyclables from these waste workers. The street beautifiers are equipped with uniforms, shoes, gloves and tricycles and earn a fixed salary of US \$49 to US \$65 per month. The incorporation of rag pickers into a formal system has had a profound impact in improving self-esteem among this marginal class of urban poor. In a personal interview conducted on 8 April, 2014, Ms. Mangalam Balasubramaniam of Exnora Green Pammal stated: “Now our street beautifier goes, rings the bell and proudly says—*Hamari ghanti bajegi, hamein koodha chahiye* (Once our bell rings, we need garbage)”. There has been a complete transformation in the status and living conditions of rag pickers who are now integrated into better organized channels of solid waste management.

Civic exnoras have created widespread environmental and civic awareness by promoting the community being directly involved in a voluntary effort in waste collection, removal, recycling and keeping their environment clean and green. Campaigns, formal and informal training programs are some of the techniques through which awareness is created.<sup>8</sup> A resident of the Vadapalani Road in Chennai said (Ghosh, 2003: 53): “Our street used to be one big garbage dump; the bin outside our home was always overflowing, as the corporation van often did not show up. My neighbour would set the garbage on fire, but the smoke irritated my asthma. I would douse it with water. So we fought all the time. One morning the dustbin disappeared and a brightly painted cart stood at my door with a boy in uniform and gloves called the street beautifier. He taught us to separate our garbage at home. Each morning, he empties the organic waste into the green section of his cart and recyclable waste into the red. Later he takes the cart to our Zero Waste Centre, where he empties the organic waste into a storage tank for conversion into compost. He sells the recyclables and compost to augment his income. I pay US \$0.33 a month, and our street is now spotlessly clean. Where there used to be garbage outside each home, we have now planted trees.

As a result of Exnora’s efforts, communities have become more aware of the need to maintain a systematic method for garbage removal from households; thus, households in general take a more active role in keeping their surroundings clean. In a survey conducted by the author in the Pammal area, 75 per cent of residents found that there had been improvement in the area due to Exnora’s work (Appendix 1). However, only 50 per cent people felt that popular participation had increased over time. One resident commented that “there is a need for awareness in each and every house as people still throw waste on the streets.” Some people have suggested further actions that could be taken. One resident suggested: “In every street separate dust bins should be kept for separation of waste.” Another person insisted that “infrastructure needs to be improved and two separate bins could be provided”. The benefits of

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<sup>8</sup> In our interview, Ms. Balasubramaniam commented that thousands of children are registered in schools for various educational and awareness campaigns which are taking place for solid waste management by Exnora.

a clean street are public, whereas the costs are private. Interactive sessions, awareness campaigns and other educational programs could further increase people's participation for the common good.

Exnora has been innovative in its approach and proposed source separation and recycling organic waste as early as 1997. The concept of the 3Rs (Reduce, Reuse and Recycle), Waste to Wealth and Zero Waste Management have been applied by several civic exnoras to clean neighbourhoods and reduce the burden on dump sites by-recycling as much waste as possible locally.

Exnora Green Pammal, in the Pammal area (suburb of Chennai) is one of the civic exnoras that started as a self-help group in 1996 by Mrs. Mangalam Balasubramaniam: It grew impressively. The PepsiCo-Exnora Zero Waste Management project in Pammal has created an infrastructure and shown successful technical innovation in solid waste management through vermicomposting, biogas, charcoal briquettes and use of processed plastic in roads. The program also involves street beautification, awareness programs on sanitation and tree planting that includes the concept of "each child adopt a tree". The Zero Waste Project has been recognized as a model project by the UNICEF Centre for International Learning in the area of urban solid waste management because of its remarkable initiative in waste reduction and recycling (Unicef pat for PepsiCo waste mgmt project, 2007).<sup>9</sup> Exnora Green Pammal received the Exnora Environmental Standard Organization certification for reducing carbon emissions by over 5,062 tonnes in 2010 (Exnora Green Pammal, 2016). In 2014, 80 per cent of Pammal's waste was being composted and, with the sale of recyclables, the total waste which went to the landfill had declined to 10 per cent.<sup>10</sup> The compost *Exorco* (Excellent Organic Compost) made by Exnora Green Pammal has been tested by the Central Pollution Control Board of India and shown to contain lead levels far below the safety standard.<sup>11</sup> The success of Pammal's community-driven vermicomposting at Sri Shankra Nagar encouraged and inspired other people to learn and to start a similar process in their own neighbourhoods.<sup>12</sup> At present, Exnora Green Pammal is serving over 200,000 residents and employs more than 400 people (Brooks, 2010: 11).

Unlike Exnora Green Pammal, however, not all decentralized models involving non-government organizations or community-based organizations produce the desired results. In 1999, Sukuki Exnora, another civic exnora, started vermicomposting at Indra Park and Jubilee Hills, Hyderabad under the *Zero garbage or no garbage to landfill site* drive with an expenditure of US \$1142 (Galab, Reddy and Baud, 2004: 220). The system promised a better resource recovery rate as the collected waste is separated, composted and sold; but when, in 2000, Sukuki Exnora started selling animal manure with brand name *Suvarna* at US \$0.07 per kg, it failed to attract buyers. The contract terms stipulated that the Horticulture Department of

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<sup>9</sup> UNICEF (United Nations Children's Emergency Fund) initiated an international learning session in 2006 as part of its water and sanitation program. In 2007, UNICEF selected the Pammal Zero Waste Management Centre as the Learning Centre for international representatives. A team of 21 delegates from 9 countries (Denmark, Egypt, Zambia, Philippines, Indonesia, Nepal, East Jerusalem, Djibouti and Ethiopia) visited the Pammal project under the aegis of UNICEF to understand the planning, process, implementation and impact of the Zero Waste Program.

<sup>10</sup> In the interview conducted by the author, an Exnora representative stated: "There is more than 90 per cent resource recovery out of waste". Previous studies also substantiate this point (Dahiya, 2003: 98).

<sup>11</sup> Exnora samples contained 11 mg of lead content per kilogram, far below the safety standard of 100 mg per kilogram (Ahluwalia, 2012).

<sup>12</sup> It includes VOC Nagar, Kamarajapuram, Ponni Nagar, Iyappan Nagar, LIC Colony, Rettaipillaiyar Koil Street, Department of Atomic Energy Townships, Mangadu and Panipat.

the Municipal Corporation of Hyderabad would buy back the manure if it was not sold in the open market. It also encountered the NIMBY (not in my backyard) syndrome.

The residents living near the composting site became agitated due to environmental deterioration in the area, as mixed waste was brought to the composting plant. They complained about the pungent smell and the rodents attracted by garbage piled in the parks. As a result the project was suspended. Hence, the initial purpose of recycling the residential waste through composting has not been very successful.

The civic exnoras are successful in creating greater civic consciousness which is indicated by less littering, waste reduction and the initiative taken to enable the marginalized to be employed and gain some income. The factors that made it successful are participation and good relations among key stakeholders (the municipality, residents and street beautifiers), community participation (willingness to try new concepts like separation at source) and household willingness to contribute both financially as well as in time spent on other aspects of the process (UNCHS/UNEP, 1997: 94). It failed, however, in several social, economic and political aspects, which led to a threat to the initiative's sustainability, a matter to be discussed in the next section.

## **Challenges to Sustainability of Civic Exnora**

Exnora is able to spread the message of citizen cooperation by expanding through its various civic exnoras and Exnora's Innovator Clubs. By the end of year 2000, however, it started shrinking and the number of civic exnoras dropped from 3000 to 600 (Sridhar A., 2013). Civic exnoras were discontinued in many places due to the challenges described below. While such initiatives are certainly laudable, the extent to which they can be relied upon to undertake a complex public sector role is still questionable. There are some common difficulties that can be identified in the Civic Exnora innovations introduced by Exnora.

### ***Financial Aspect***

Creating methods for financial transparency among stakeholders to make them accountable to the system is still a challenge for civic exnoras. Most of the Civic Exnora innovations are able to sustain themselves on the basis of the user fees collected from the participating households; however, non-participating households could upset the balance. The system can work efficiently if most households keep up their payments, but where too many have defaulted, the street unit has collapsed. This might be one of the reasons that most civic exnoras have shown their successful outcomes in middle or upper-income areas as compared to low-income ones. The survey results from Pammal further substantiated that many households did not pay Exnora. The survey found that some residents of Pammal area paid no fees, others contributed between US \$0.16 to US \$0.81, while a few offered tea or snacks to the street beautifiers in return for their services (Appendix 1). Civic exnoras struggle not only because of the non-payment of fees by individuals, but also because of unjust compensation from municipal bodies. In 2006, the waste management system of Pammal area changed under the privatization drive and the municipality contracted with Exnora Green Pammal to pay a daily service charge of US \$0.01 per household for waste collection. But, in our interview with Mrs. Mangalam Balasubramaniam of Exnora Green Pammal, she emphasized the problems faced due to the passive role played by municipalities in the system. She said "There are 25,000 households where waste is collected; however, there are only 12,500 households listed in the

official data. Therefore, we are not getting 50 per cent of the money for the service provided. Following talks with officials, they increased the numbers of households by an additional 4,000 households... Since 2006 a gap of 30 per cent exists.” Collection of fees thus remains a problem, although a reduced problem.

### ***Technical Aspect***

There is no shortage of innovative ideas for any system. New technologies, equipment and processes are constantly marketed and solid waste management is not an exception. Many private entrepreneurs equipped with high-end technologies, like Onyx, are coming forward to offer solid waste processing projects or collection and transportation networks in the cities. In comparison to these private players, one common deficiency of non-government organizations is lack of the scientific knowledge and technical know-how needed to understand complex industrial processes. In the case of Exnora Green Pammal, in the absence of new techniques such as vermicomposting, its success would have been difficult.

### ***Non-Participation by the Community***

There is a need to become sensitive to the problem of waste in society in order to avoid environmental degradation. A change in consciousness will not be brought about and this change is will not be possible without involving the people who are responsible for creating the waste. People can cooperate by separating waste, keeping streets clean and promptly paying monthly charges. Non-participating members can pose a special problem. They may de-motivate participating households which, in turn, can affect the sustainability of such Civic Exnora innovations. In spite of awareness campaigns, there are people who do not participate in waste separation, resulting in mixed waste. Further, there are cases of dumping waste in water channels or on the roadside. According to a survey conducted by Anand, “forty-seven per cent of civic exnoras felt that there was either ‘very little’ or ‘little’ cooperation from the households in their neighbourhood and only twenty per cent felt that people were very cooperative” (1999: 174).

Pammal, the area visited by the author, which is one of the successful civic exnoras shows similar results. In the door-to-door survey conducted with 100 residents, 60 per cent of people responded positively to the question whether waste segregation takes place at the source (Appendix 1). In Exnora Green Pammal, however, the lack of popular participation is indicated as survey result also shows that 40 per cent people do not follow any rules and no more than 20 per cent of the residents separate their waste at source. Moreover, about 40 per cent of residents were ignorant about the final disposal of the waste. A survey conducted by TERI showed that 23 per cent of the residents in Chennai do not understand how to separate the waste and many could or would not do it because they found it cumbersome (TERI, 2013: 35). In order to be sustainable, a community intervention has to be owned by the community itself. A non-government organization and community-based organization, can, at best, be a facilitating agency for the same.

### ***Leadership***

Exnora encourages individual leaders to create civic awareness and deal with their local problems. In some cases, civic exnoras tend to be identified with the people who took the initiative to mobilize the required political and technical support to sustain the process. For example, the success of Exnora Green Pammal is primarily based on the effort and innovation of Ms. Mangalam Balasubramaniam, who initiated the work of a Mahalir Mandram (women's association) to address the challenge of waste management in Pammal in 1994 (Dahiya, 2003:

349).

Constant leadership, however, cannot be assured due to a shortage of skilled people. Anand's study revealed that most civic exnora leaders recognize that it is time for leadership to be passed on to others, but many feel that there is no one forthcoming to take on the responsibility (1999: 176). Hence, when their interest wanes, the organization goes down with them. Some people look at community-based organization work as an extra voluntary task to which they are not prepared to commit fully (Muller et al., 2002: 248). When such an attitude prevails, systems usually collapse, without anyone to run and monitor them on a full-time basis. Civic exnoras exist for an average of 3.36 years due to improper functioning of the secondary collection system and lack of democratic leadership (Muller et al., 2002: 254). Hence, there is a need to change the leadership style from a personalized to a committee type arrangement. Civic exnoras should go beyond individual leaders and make space for more people to get directly involved in its working.

### ***Municipalities: Reluctant partners***

A strong relationship between Municipalities and civic exnoras is necessary for proper functioning. The Civic Exnora performs the primary function of collecting waste and dumping it in municipal bins, and the municipality takes it from the bins for final disposal. Unsatisfactory or below-par performance of municipal staff can create challenges for community interventions. For example, in a 1995 incident at Rasi, the municipal staff posed a new challenge for civic exnoras. The municipal staff did not clear the waste on a regular basis and waste remained piled up in the bins. The street beautifiers were left with little alternative but to dump the garbage near the overflowing bins, which were creating a nuisance for residents. This led to strong criticism of civic exnoras and the street beautifiers were driven away by "hired people" (Tropp, 2013: 132). The reluctance of municipalities is further reflected in popular opinion. 60 per cent of people surveyed in the author's survey in the Pammal area felt that the municipality was not supporting the work of Exnora (Appendix 1). In an interview, one resident of Pammal commented that "The municipality is mainly responsible for waste collection and separation, its true-hearted contribution is essential for keeping the waste segregated to avoid any serious consequences." It is very difficult to operate in an efficient manner without cooperation from municipalities as they are not only responsible for disposing of the left-over waste, but also for supporting waste collection in other ways such as allocating space for composting. It is at the sole discretion of the local authorities to determine to what extent they cooperate with Exnora units since there are no mandatory rules to compel municipalities to cooperate with them.

### ***Political Influence***

Creating linkages with local political leaders and members of the community can be crucial to the success of a community initiative. According to Toxic Link, "At Chennai, it is alleged that the government has deliberately contracted out its municipal services to Onyx in areas where Exnora was working because Exnora was considered close to a particular political party" (2004: 16). In 1996, Greater Chennai Corporation hired a consulting firm to develop a solid waste management plan and to identify areas of private sector involvement (Mahadevia, Wolfe and Parashar, 2008: 28). In India, however, the labour laws protect the interests of workers and regulate the contracting of services. The *Contract Labour (Regulation and Abolition) Act 1970* provides that contracting out services can be prohibited if the services are already provided departmentally by any municipal authority (Zhu et al., 2008: 76); but, in order to integrate the services of the private sector and link them to services provided by the public sector, the government of Tamil Nadu passed an order 40 MS 99, dated July 8, 1999, to exempt

the municipal corporations from the provisions of *Contract Labour (Regulation and Abolition) Act*, thus allowing the municipal corporation to engage contract labour for sweeping and scavenging activities (Government of Tamil Nadu, 1999). The elected municipal council took the decision to privatize solid waste management in those blocks where civic exnoras had a strong foothold. According to Dahiya: “It is a case of elected representatives who collectively form the policy making of Chennai Municipal Corporation viewing civil society organizations and their working for urban environmental management as a potential political threat” (2005: 122). Many of the roads chosen as Onyx’s territory were those already serviced by Exnora, and hence made many of Exnora’s services redundant, even though the Onyx service did not involve transporting waste from households to the street collection points. A coordinator of Exnora commented “I would like to give the benefit of the doubt to them and I would really not want to say it was deliberate, I would rather like to say it was lack of foresight” (Forsyth, 2005: 18).

**Figure 4: SWOT Analysis of Exnora**



Source: Author

Community interventions in solid waste management involve many stakeholders. Any initiative to improve these interventions and make them sustainable would have to grapple with the numerous challenges, at different levels. A review of Exnora’s strengths and weaknesses (Figure 4) reveals why Exnora was not able to do more than waste collection or to introduce source separation and composting at few places. Consideration of risks and protective factors could help in revising the strategic plan of the community initiatives.

## Conclusion

The current solid waste management system in Chennai mixes various types of waste, both formal (municipalities) and informal sector workers are operating without any coordination; the quality and efficiency of waste management have a direct impact on the environment and the health of the citizens; and both organic and inorganic waste are valuable resources. Community innovations such as Civic Exnora might not be sufficiently equitable or practical to be regarded as an alternative to municipal corporation involvement in the provision of solid waste management services in the city, but their crucial role in addressing these issues cannot be denied. They incorporate broader goals that link resource conservation to social betterment, including the promotion of environmental awareness. This discussion of solid

waste management in Chennai and Exnora show has shown that community participation can work well in providing a sustainable solution to waste management.

Exnora's model of a decentralized system has many direct as well as indirect economic, social and environmental benefits. The community initiatives are labour intensive rather than capital intensive, so income opportunities are created. The rag pickers become waste collectors (street beautifiers) and their livelihoods are formalized, helping them to live with dignity and social recognition as an important contributor to the betterment of society. The overall burden on municipal staff is reduced as they do not need to collect primary waste door-to-door. Source separation keeps recyclable material cleaner, which, in turn, fetches higher prices. In addition it leads to a greater landfill diversion rate, which not only saves money in terms of excess land to be acquired for the landfill sites, but also conserves natural resources for other useful work. These interventions have a lot to contribute to strengthening civil society. Exnora innovations as implemented by Civic Exnora have resulted in the creation of much more aware and empowered citizens as local people manage and own the entire system.

Community involvement, cooperation of local government, technical improvements and political support can be critical in their success. It is necessary to ensure separation at source, in transit and during disposal of waste. Further, separation by residents will only work when municipal corporations have a timely and complete waste collection system and garbage pickup trucks have separate containers for dry and wet waste. A decentralized system has been shown to improve waste conditions if it can overcome some challenges. When community interventions are initiated by the everyday person who lacks expertise in the area, there is a need for civil society to build a capacity for implementing new ideas and processing new technologies. It is recommended that these decentralized solid waste management systems should increase their earnings by introducing proper management tools and develop a more organized system for their operation. In this way the benefits provided by community actions could be expanded. Instead of encouraging non-government organizations and community based organizations for adopting such measures, there is an increasing trend by elected municipal representatives to contract private parties for waste collection, transportation and disposal. This helps to transfer municipal responsibilities to the private parties; however, it has many pitfalls. The practice of making payments on the basis of the amount of waste collected creates a bias in favor of more waste creation. Further, this process works against the interests of the traditional waste collectors.

The policy focus must shift from waste disposal to management and towards the integration of the existing informal sector. Government and society need to be more attentive to the livelihood, occupational health and safety of rag pickers. They should be formalized and provided with personal protective equipment such as masks and gloves. This would help to avoid spreading disease and accidental burying of rag pickers at dumpsites. In July, 2014, the central government released a draft manual on municipal solid waste management that prescribes a decentralized system in which rag pickers are organized in a legally recognized membership based association (MoUD, 2014: 12). They are encouraged to form cooperatives, through the involvement of local non-government organizations and self-help groups to collect recyclables from households. However, whether it would be effective is questionable. More often than not, such policies remain only on paper and the government ends up contracting private operators for better service quality. In Chennai, in spite of the Exnora well-coordinated system, private agencies were encouraged to be contracted to provide waste services; however, there has been little overall improvement in the situation. There is a need to go beyond the often

sterile “privatization” debate, by creating space for multiple initiatives to prosper in a coordinated manner. The central issues are coordination, incorporation of good civic values and sustainable solid waste management. In this regard, it is worth recognizing that solid waste management provides the best opportunity for true public-civic-private partnerships. Communities need to organize the household collection, separation and even management of the degradable wastes in their own neighbourhoods, while private companies are best suited for transport and disposal of bulk, recyclable and non-recyclable waste.

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## Appendix 1: Author Survey Results

Method of data collection: Interview and door- to- door survey with relevant stakeholders in Pammal area, Chennai conducted during the month of April 2014.

Sample Size: 100

S. No.	Questions	Yes	No	
1	Does waste segregation at source take place?	60	40	
2	Who segregates the waste?	Residents	Beautifiers/Others	
		20	80	
3	Whether space is provided for waste segregation?	Yes	No	
		40	60	
4	Is there any improvement in the area concerned due to Civic Exnora's work?	Yes	No	
		75	25	
5	Whether municipal corporation supporting the work?	Yes	No	
		60	40	
6	Whether protective gears provided to street beautifier?	Yes	No	
		30	70	
7	Whether people participation increased over time?	Yes	No	
		50	50	
8	Are there any norms or rules that need to be followed?	Yes	No	
		60	40	
9	Are you aware of ultimate fate of the garbage?	Yes	No	
		60	40	
10	What is the monthly fee paid by each household?	Nil	US \$0.16- US \$0.81 (Rs.10- Rs.50)	More than US \$0.81 (Rs.50)
		20	70	10
11	What was the monthly fee paid to the private sector?	Nil		