

GRASSROOTS INNOVATIONS IN SOLID WASTE MANAGEMENT

Introduction

In this special column I would like to underscore the innovative potential that resides in the collective of waste pickers around the world. We know that particularly in the global South context, in so-called developing countries a significant contribution to waste management, to the recycling industry and consequently to the circular economy comes from these workers. In order to improve the performance of their work some of these individuals and groups have developed innovations that have allowed them to make a technological, strategic or management contribution that benefits their group of waste pickers, other groups or even the wider society. This column will provide some visibility of the developments that happen at the people's level, among waste pickers in different world regions and that make important contributions to the transition towards sustainability. This first article introduces grassroots social innovation theory and brings some reflections on the concept of innovations from below, by waste pickers, based on results of a international research collaboration through the Recycling Networks and Waste Governance project, which involves academics and waste pickers from Argentina, Brazil, Canada, Kenya, Nicaragua, Tanzania and Sweden.

Background to grassroots innovations

Grassroots innovations are bottom-up solutions for sustainable and community-oriented developments, involving creative individuals, activists or organizations. The answers they find tend to address specific local contexts and respond to the interests and values of the communities involved. These innovations happen with minimal resources and mostly without formal support.

What characterizes many of these novel solutions are the democratic processes that give rise to grassroots innovations, actively engaging community members in the design, development or creation of alternatives. The focus of their innovations can vary from technological improvements, strategic approaches in waste management, commercialization schemes, environmental education initiatives to governance practices involving waste picker organizations.

They are called social innovations because they tend to benefit the public and bring social change, which is developed, approved and owned by the grassroots (Seyfang and Smith, 2007). Here, the innovation takes the form of community-based initiatives that emerge in a specific local context and explore whatever alternative configurations they can identify through their everyday praxis and long-term local experiences (Smith et al., 2016).

Waste pickers are increasingly being recognized both by society and by scholarship for their manifold and significant contributions to cities. The vast number of organized and autonomous waste pickers recovers a diverse array of recyclable materials and by doing so they reduce the urban carbon footprint and they help preserve the environment, besides generating an income for unemployed and vulnerable individuals. While facing innumerable challenges, waste picker organisations can be important innovation spaces for sustainability and social justice.

The waste collection, recycling, education, reusing and repairing practices enacted by waste pickers, individually and organized in groups, fit the grassroots innovation concept. Often born out of informal settlements and precarious housing and working situations, they can constitute new approaches and ways that can lead to the improvement of the quality of life of residents in informal settlements, and their own professional and human development.

Innovations as sociotechnical transitions are relevant issues studied in the economic and policy analysis fields which applies a broad multilevel perspective (MLP) (Geels, 2011). Transitions are seen as the outcomes of interactions between three levels: the landscape (macrolevel), the sociotechnical regime (mesolevel), and the niche (microlevel). This layered perspective helps understand and analyze complex and nonlinear phenomena such as historical, political, socio-economic and structural factors as well as sociotechnical transitions. The microlevel, or the niche is the spot where innovations are grounded, where innovations might evolve similar to an incubation room. Waste picker organisations are sometimes the space where new approaches and innovative ideas start, in the search for ways that can improve the working conditions or the outcomes of their work. Thus, they become innovative niches with the potential to be diffused and that thus prompt wider societal transformations and benefits. The flexible, improvised and not formalized nature of the work of waste pickers facilitates the emergence of innovation. Yet, as Morone and Cottoni (2016) posit niche spaces are also highly unstable and characterized by dispersed alternative technological niches, which usually lack the needed coordination between them to thrive and which can actually also be in competition with each other. In fact, "not every niche can survive for a long time, and only few of them will get to a point where they will really challenge the incumbent socio-technical regime" and bring desired innovations to a faulty and deficient system (Morone and Cottoni, 2016, p. 68).

For an innovation to flourish it progresses through different stages until it reaches maturity and is fully developed. For that to happen, the following three condi-

tions need to coexist: (1) willingness and level of collective involvement and sharing among niche actors, (2) the presence of powerful actors with valuable assets for the development, and (3) accessibility and existence of compounding knowledge and accumulated experiences. When all three conditions are in place there is likelihood for an innovation to reach maturity. However, it is not a given that the incumbent regime might be destabilized by the niche innovation or that the benefits from it are shared equally and properly. Exploitation, corruption or manipulation can tint the social outcomes also of technological grassroots innovations (Morone and Cottoni, 2016).

Waste pickers and their potential to innovate

How do waste pickers themselves define grassroots innovation? We asked this question during a research workshop conducted in Kisumu, Kenya in 2018, by the international research project Recycling Network and Waste Governance, involving waste pickers and academics from Brazil, Argentina, Nicaragua, Kenya and Tanzania (Azevedo et al., 2018). Waste pickers expressed the following: “Grassroots innovation processes develop human assets, they are emancipatory and promote social inclusion”. In grassroots innovations “the focus is on the process” and for an innovation to be bottom-up in the context of waste pickers, “any idea, process or product, etc. must involve waste pickers as active partners in the design and development”. The benefits can be various, e.g., “reducing the

costs and time to make something”, and they can also impact the self-esteem, inducing “a sense of excitement that makes us happy” or that “gives us pride”. It is something that “fits the needs”. The participants’ opinions underlined the importance of process: “the way is more important than the outcome”. Finally, there was a consensus that “innovation brings social change developed, approved and owned by the grassroots”.

Further extensive research conducted by the team mentioned earlier, applying a survey and key informant interviews in the 5 countries of study reveals a wealth of findings (Kain et al., 2022). Waste picker organizations often face multiple challenges, which makes it difficult for them to develop as niche for innovation (Table 1). They encounter the limitations imposed by informality and illegality, followed by persecution, exclusion and stigmatization, lack of initial capital or lack of appropriate technology to advance their work process. They experience the difficulties of formalizing their operations and the impacts of not being formalized, often punishing them by limiting their access to waste or banning waste picking in general.

Working as a collective and particularly under resource scarce conditions, as it is normal for waste picker organizations, is difficult, resulting in many additional challenges. The construction of trust between the members, with individuals who have been lifelong socially and economically excluded requires skills and patience. There are also diverse market-related challenges, due to global price fluctuations, competition with large companies and operations in deprived neighborhoods with low-income residents and low quality of recycling material that configure additional barriers that need to be overcome by these individuals and groups.

Despite the many challenges that still prevail the scenario of inclusive waste management and recycling important achievements can be highlighted as innovative, in terms of technology and product development, commercialization, creation of alliances, adapted management form, knowledge creation and formation of strong identity. The following image shows the cooperative Jovenes en Progreso in Buenos Aires, Argentina, whose members are primarily female, as they engage in partnership building with the local council, to address local waste management issues (Figure 1).

TABLE 1: Setbacks to social grassroots innovations among waste picker sector (source: Azevedo et al., 2018).

Resources	<ul style="list-style-type: none"> No starting capital, lack of trust from financial institutions Donated resources (e.g., machines) are often inappropriate Lack of facilities (e.g., for storage) machines, tools and transportation or operating in inappropriate locations (causing environmental pollution)
Markets	<ul style="list-style-type: none"> Low material prices Market price fluctuations Competition with other recycling enterprises Difficulties in commercialization (lack of knowledge of retailers, sales of materials, supply chain, low bargaining power)
Legislation	<ul style="list-style-type: none"> Difficult formalisation process (required certifications, permits, fees, etc.) Illegality impeding certain activities, polyethylene bag ban in Kenya, police persecution, harassment, bribes
Management	<ul style="list-style-type: none"> Internal conflicts Lack of trust, lack of group cohesion Lack of experiences in administration, management, conflict resolution, etc. Bad leadership, bad management, absenteeism, lack of transparency Culture of working solo and lack of experience of collective management Precarious working conditions
Social	<ul style="list-style-type: none"> Insufficient inclusion of women Social exclusion, alcoholism, conflicts, high member turnover Unequal distribution of benefits, funds Unhealthy and risk prone working conditions
Knowledge, identity	<ul style="list-style-type: none"> Limited knowledge and capacity (e.g., to treat machines, to reach retailers) Advocacy skills Society’s lack of knowledge of waste pickers and waste products, stigmatization instead of valorization



FIGURE 1: Members of the Youth Cooperative in Progress joining the Lomas de Zamora Deliberative Council to address the municipal resolution for inclusive recycling.

Table 2 summarizes some of the innovations captured in the research conducted by the Recycling Networks and Waste Governance project. The case studies provide examples of waste pickers innovating the commercialization or management processes, experimenting with knowledge transfer to the public, government or business community; or with innovations allowing them to add value and transform some of the materials that regularly arrive at their organizations, by creating specific machines or new processes to add value (Kain et al., 2022).

Concluding remarks

The innovations emerging out of everyday work situations experienced by waste pickers in different parts of the world play a pivotal role in redefining the ways in which we deal with waste and recyclable materials. The research

results underline the scope of the contributions to society and to the environment, coming from waste picker organizations. Despite this first systematization of grassroots social innovations presented here, there are many open questions still to be answered. Such as: What is the role of innovation in rethinking the work of waste pickers in different contexts? How can innovations re-examine the waste market and waste policies? Does innovation improve the visibility and recognition of waste pickers? How does innovation strengthen and redefine the organization of waste pickers?

What is the role of innovation in rethinking what is considered "non-recyclable"? These reflections are relevant, particularly given the current elaboration of a global plastic treaty, the debates on sustainable and just transition or on

TABLE 2: Country specific grassroots innovations in waste management.

Country	Technology	Commercialization	Management	Partnership	Social benefit	Knowledge transfer
Argentina	Processing new products (Reciplazas, children playground furniture).			Alliance with NGOs and authorities.	Prioritizing low-income neighbourhoods, children and people with disabilities in the creation of new products.	Awareness building, participating in the municipal council.
Brazil	Processing materials (regaining polymers, cooking oil into fuel).	Popular recycling (quality control of recycled materials), floating capital to enable collective sales, partnerships with companies (PEAD Oil, COOPERCAPS, Fundação Banco do Brasil).	Participatory decision making, self-management, transparency for all members.	Recycling contracts with local (e.g., Ourinhos), setting up conversation and support network involving other recycling networks.	Creating low barrier work opportunities. Workers' health improvement and risk reduction.	Support and capacity building (in accounting) Instituto Catasampa & Rede Cata Vida, Training program from waste picker to waste picker.
Kenya	Processing materials (reuse of charcoal dust into briquettes), new machines (bailing machine), new products (plastic fencing poles out of polyethylene bags, woven bags, mats and cushions), and new transportation means (hand carts).	Community clean-ups (as marketing and educational tool), implementation of clean-up and health clinics, educational tours, diversification of services (cleaning toilets, car washing, pit and septic tank emptying), engaging landlords in waste collection, training hotels (street food restaurants) for waste sorting, engaging youths for door-to-door sensitization.	Training in book-keeping, team building, group management.	Training and capacity building in partnership with NGOs, Universities and governmental agencies, partnering with county government for transportation to the dumpsite		Self-learning (identifying products and markets), teaching professionalism related to: materials, supply chain and markets; building partnerships with NGOs for training and capacity building.
Nicaragua	New products (jewelry).		Internal management and self-organization, learning about collective interests.	Partnership with local government and private companies (transportation by boat).	Generating income for women.	
Tanzania	Identifying the collection of new materials (e-waste), new machines (for crushing), and transportation innovations (compressor trucks).	Selling to larger retailers, partnerships with companies (e.g., Soyana), operating in rural areas, allow for bank payment system (EFD machine), preparation of educational materials for customers.	Rotating leadership.		Offering lunch, food, accommodation, loans for members; providing jobs for women, widows.	Training members in customer service and providing overall training.

caron footprint reduction. In all of these issues, waste pickers are central protagonists. Looking at innovations evolving out of this sector will help frame new solutions to these very important topics.

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