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How Sustainable is Recycling?

Reconciling the Social, Ecological, and Economic Dimensions in Argentina

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In cooperation with:

Labl&EC
Laboratorio Abierto de Innovación y Economía Circular

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Abstract

Due to the prevailing economic crisis, Argentina has been facing a growing number of informal workers, many of them urban recyclers. Following the Covid-19 pandemic and the associated decline in formal employment, this number can be expected to rise even further. Increased recycling activity is, in principle, a positive development. However, the working conditions of urban recyclers often do not correspond to the ILO definition of “decent work”.

It is therefore important to ask how the recycling system in Argentina can be shaped to be socially sustainable, as well as environmentally and economically sustainable. Based on qualitative stakeholder interviews, our research aimed to collect and synthesise the ideas and expectations of a diverse set of actors in the recycling sector of Buenos Aires City and selected municipalities of Buenos Aires Province. This enabled us to identify four key areas of dispute and potential action.

First, work in urban recycling is a form of social safety net in Argentina, as in many countries with persistent poverty. This can lead to a trade-off between maintaining the social function of the sector and subjecting it to the kinds of efficiency requirements placed on other sectors. Given the inherent power asymmetries between large companies and individual urban recyclers, the latter may be crowded out once the sector becomes profitable.

Second, it is important to avoid viewing urban recyclers as recipients of charity. By re-introducing materials into the resource cycle and reducing pressure on landfills, they create positive externalities and offer a valuable service to society. Paying urban recyclers for the service component of their work in addition to the value of the raw materials collected would constitute a significant step towards ensuring both decent incomes and broad social recognition of the workers’ value.

Third, the knowledge and experience gathered by urban recyclers holds great potential for grassroots innovations, such as making productive use of materials that do not currently have a market. With the cooperation of other actors, such as universities, and the provision of resources and support via the removal of red tape, these innovators could more easily employ their ideas to the benefit of society.

Fourth, as a cross-cutting issue, all solutions aimed at unlocking the potential of urban recycling for a transition of the waste sector towards economic, ecological and social sustainability require a careful navigation of the political economy dimension. Constellations of interests have led to incentives that are, in many cases, not conducive to economic efficiency and bind resources that could otherwise be used to improve recycling schemes. Reform of these incentives requires a careful analysis of power constellations and potential change coalitions.

Keywords: Waste management; urban recycling; cartoneros; sustainability; Argentina

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Bonn, October 2020 Anna Pegels

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Abbreviations

Aca	academia
AMBA	Area Metropolitana de Buenos Aires (The Metropolitan Area of Buenos Aires)
ARS	Argentinian Peso
CABA	Ciudad Autónoma de Buenos Aires (The Autonomous City of Buenos Aires)
CE	circular economy
CEAMSE	Coordinación Ecológica Área Metropolitana Sociedad del Estado
CGT	Confederación General del Trabajo
CNCT	Confederación Nacional de Cooperativas de Trabajo
Coop	urban recycler cooperative
CTA	Central de Trabajadores Argentinos
EPR	extended producer responsibility
EU	European Union
FACCyR	Federación Argentina de Cartoneros, Carreros y Recicladores (Argentinian Federation of Cartoneros)
FARN	Fundación Ambiente y Recursos Naturales
MTE	Movimiento de Trabajadores Excluidos (Movement for excluded workers)
NGO	non-governmental organisation
OECD	Organisation for Economic Cooperation and Development
OPDS	Organismo Provincial para el Desarrollo Sostenible (Provincial Organisation for Sustainable Development)
PrivS	private sector
PRO	producer responsibility organisation
PubS	public sector
USD	United States Dollar
WIEGO	Women in Informal Employment: Globalizing & Organizing

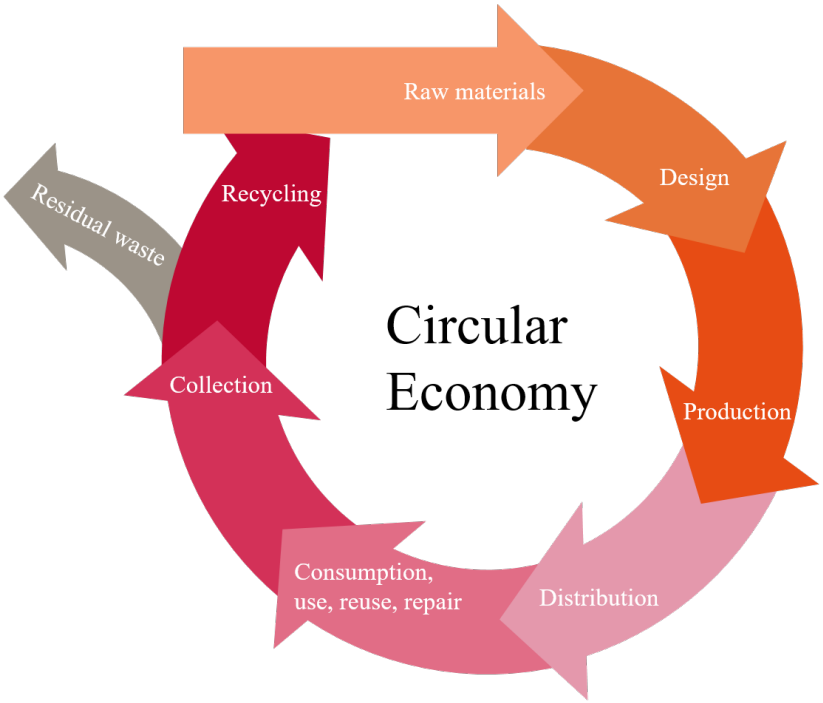
1 Making the case

1.1 The concept of a circular economy

There is increasing awareness that growth in materials use, coupled with increasing resource scarcity and resource waste, is causing widespread environmental damage and jeopardising the future well-being of humanity. The unprecedented rise in demand for a finite supply of resources calls into question our current, predominantly linear, economic system. In a linear model of resource consumption, new resources are continually extracted and used as inputs for the production of goods, which are taken out of the cycle and cast aside at the end of their productive use. To stay within planetary boundaries, economic activity has to be decoupled from resource extraction and environmental degradation, and a substantial improvement in resource performance is necessary (Altenburg & Rodrik, 2017; Organisation for Economic Co-operation and Development [OECD], 2019).

In this context, the concept of the circular economy (CE) (see Figure 1) is rapidly capturing attention as a way of decoupling growth from resource constraints. It aims to minimise both material input and waste generation by recycling and re-using products and materials and by resource-saving product design. Through recycling, waste is turned into a resource and production input. This approach looks at the complete life cycle of a resource – from extraction of the raw materials to product design, production, and consumption, and all the way through to waste management, such as collection and recycling. In reducing resource consumption, there are two principal strategies: to use less material by increasing resource efficiency and waste prevention via better eco-design of products and processes, and to use materials more than once by increasing the use of secondary raw materials via improved re-use and recycling (Neligan, 2016; Ellen MacArthur Foundation & McKinsey & Company, 2014).

Figure 1: Conceptual diagram of a circular economy



Source: Adapted from European Commission (2014)

The sustainable waste management hierarchy promotes waste prevention, reuse, recycling, and recovery, in that order, over waste disposal. Waste disposal leads to the loss of the economic value of waste and, moving up the hierarchy, implies re-introduction of resources into the economy (Kaza, Yao, Bhada-Tata, & Van Woerden, 2018). In this paper, we focus on waste collection and recycling as fundamental steps towards the circular economy. In the absence of zero-waste societies, sustainable solutions for managing and re-using waste are still required. We emphasise the concept of *sustainable* waste management, which aims to maximise recovery of reusable and recyclable materials and, in so doing, protects human health and the environment (Medina, 2010). In addition to managing the *impacts* of waste, sustainable waste management aims to make the *process* of waste management sustainable. This approach emphasises all dimensions of sustainability, including the social dimension. While labour protection laws and regulations for work in the waste sector are relatively advanced in most industrialised countries, waste workers in developing countries are often informal actors living at or below the poverty line and without access to protective gear and other necessities. Thus, the social dimension of sustainability is of even greater importance in the analysis of circular economy concepts in developing countries.

1.2 Research gap: inclusive circular economy models

Practitioners and academics alike have been developing the concept of the circular economy since the late 1970s (Ellen MacArthur Foundation, 2013). While the circular economy is the subject of many research papers and widely discussed in both the private and public sectors, there are varying strands of research with different approaches to resource efficiency. The general concept of the circular economy has been refined and developed by several schools of thought, such as industrial ecology, performance economy, and research on product design (Ellen MacArthur Foundation, 2013).

Concepts of a circular economy first emerged in the 1970s. In 1981, Stahel and Reday outlined an early vision of a circular or loop economy by suggesting that resources can, to a certain extent, be substituted by manpower through repairing and reusing products. In close association with industrial ecology, Braungart and McDonough (2002) went on to develop the cradle-to-cradle framework, a new product-design perspective. The framework focuses on design for effectiveness in terms of products with a positive impact on the environment. It envisions a system where waste does not exist; all materials flow within either a biological or a technical metabolism.

The circular economy has emerged and rapidly expanded as a dominant narrative and political imperative in Europe and high-income countries elsewhere, but little work has been done to apply the concept in developing and emerging economies (Velis, 2017). While the CE places emphasis on the redesign of processes and the recycling of materials, which may contribute to more sustainable business models, it rarely includes the social or, more specifically, the poverty dimension inherent in sustainable development (Murray, Skene, & Haynes, 2017). The applications mostly focus on ecological and economic benefits, generally making no comment on the need for resource recovery as a means to support the livelihoods of low-income individuals in developing countries. In these countries, the number of people depending on the waste sector for their incomes can be substantial. Medina (2008) as well as Binion and Gutberlet (2012) report that 15 million informal workers worldwide, and up to 2 per cent of the population in Asian and Latin American

cities, depend on waste picking as a source of income. In many countries, the sector not only provides urban recyclers[1] with regular employment, but also acts as a safety net for those with temporary or precarious employment elsewhere who may need to fall back on waste collection periodically. Transferring circular economy solutions developed in and for the Global North may result in the loss of livelihoods for such people in the Global South. Therefore, there is an urgent need for socially adapted models of a circular economy for countries with low-income groups who rely on urban recycling for their livelihoods (Gutberlet, Carenzo, Kain, & Mantovani Martiniano de Azevedo, 2017; Gutberlet & Carenzo, 2020).

To develop these adapted models, a solid understanding of actors along the circular economy loop is indispensable. Actor-centred research on the circular economy, however, is relatively scarce. The debate is often technology-centred, at times resulting in system designs that are infrastructure driven and not adapted to societal contexts. This mismatch can lead both to social costs and to high rates of residual waste leaving the materials cycle (Chaturvedi, Guarev, & Gupta, 2017; Velis, 2017). Furthermore, it disregards the positive social potential of a well-managed waste sector. Urban recyclers can extract solid waste as a resource, a source of income, and thereby as a means of sustaining a livelihood (Binion & Gutberlet, 2012). Resource recovery can create employment for unskilled workers, reduce poverty, and reduce municipal spending on solid waste management, as well as conserve natural resources (Medina, 2008). Recyclers, often informal, thus play a valuable role in urban waste governance systems in developing and emerging countries. By becoming organised, e.g. through cooperatives, they can strengthen their integration into the recycling value chain, improve their bargaining power with industry and government, and drive new forms of entrepreneurship and innovation (Medina, 2008; Gregson, Crang, Fuller, & Holmes, 2015; Gutberlet & Carenzo, 2020). In the absence of organisation and targeted policy support, however, working conditions are often precarious.

These gaps in the literature lead to our overarching research question: How can actors in the Global South contribute to a recycling system that is economically, ecologically, and socially sustainable?

To further structure the investigation of this issue, we differentiate three sub-questions:

1. Who are the actors and the institutional context of the given recycling system?
2. Which synergies and trade-offs emerge between the ecological, economic and social dimensions in the system?
3. What can the actors do to take advantage of the synergistic benefits and manage the trade-offs?

Addressing these questions in an empirical manner required a geographical focus. We selected Argentina and, more specifically, the Buenos Aires Metropolitan Area (AMBA), and detail the rationale for this selection in the following section.

1 This term is used to describe those involved in the extraction of recyclable and reusable materials from mixed waste. Other possible terms are waste pickers, scavengers, or cartoneros (Spanish). We prefer to use the term "urban recyclers" to emphasise the important role of these actors in the urban recycling system.

1.3 Making the case for Buenos Aires, Argentina

With a Gross Domestic Product (GDP) of more than USD 628 billion, Argentina is one of the largest economies in Latin America. Argentina was the top performer in the region in reducing poverty and boosting the incomes of the lower part of the income distribution between 2004 and 2008. Though diminished in scale, this trend continued after 2008. Nonetheless, the Argentinian economy has been affected by several severe economic crises over recent decades. As a result, Argentina periodically lost substantial ground in terms of incomes and wellbeing relative to other countries both within Latin America and globally. The year 2018 ended with a recession caused by severe drought and compounded by a currency and external debt crisis and the ensuing tightening of macroeconomic policy, accompanied by capital flight and financial speculation. Inflation of the Argentinian Peso (ARS) strongly accelerated to over 50 per cent in 2019 and remained high in 2020. The global economic crisis following the Covid-19 pandemic in 2020 can also be expected to have a severe impact on Argentina. Private consumption and investment are expected to remain depressed due to lower real incomes and high interest rates, while unemployment is expected to rise. The government has implemented a wide range of social welfare policies to address the social effects of Covid-19, such as a ban on worker layoffs and the provision of an additional social income for informal and autonomous workers. Despite these efforts, poverty rates can still be expected to increase in 2020. According to the Argentinian National Institute of Statistics and Censuses (Instituto Nacional de Estadística y Censos, 2020), in the second half of 2019, 35.5 per cent of the population lived below the national poverty line, while 8 per cent were in extreme poverty. Poverty currently affects close to a third of the population, and a third of employment is informal (World Bank, 2018; OECD, 2017; OECD, 2018).

Many of the informally employed try to make a living as urban recyclers. Buenos Aires is known for its long history of urban recyclers and is considered to be a good-practice example in terms of their integration into the formal waste management system (Gutierrez, 2014; Hemetsberger, 2014). Increasing recognition is given to the informal workers' positive contribution to recycling activities (Gutberlet et al., 2017). According to the OECD (2016), several groups of policy makers are interested to learn from the experiences gained there and to identify best practices: policy makers in middle-income countries where most of the estimated 20 million informal waste workers are located; donors supporting middle-income countries to develop their solid-waste management sector (Lerpiniere, 2014); and some higher income OECD countries, where anecdotal evidence suggests that the global financial crisis has fostered the development of a large and active informal recycling and re-use sector (OECD, 2016).

Emerging discussions in Argentina concerning the implementation of an extended producer responsibility (EPR) scheme in the context of a circular economy makes the inclusion of urban recyclers in the waste management system an even more pressing topic. A comparison of EPR systems in developing country contexts by the OECD (2016) has shown that a failure to involve informal workers can seriously weaken the performance of EPR systems. In addition, there are several potential benefits to including the informal sector in EPR systems. The City of Buenos Aires is praised for recognising the importance and rights of informal waste-pickers, as well as for processing municipal waste sustainably. The municipalities in the Buenos Aires Metropolitan Area, however, provide an interesting comparison to the City. They typically need to economise more, since they have fewer financial resources.

Waste-picker integration models are not as advanced, but waste-picker cooperatives and other stakeholders have developed interesting models of cooperation with the public and private sectors, to be discussed in subsequent sections. These models represent approaches that may be particularly suitable for transfer to other developing countries, since they take particular account of constraints on public budgets.

In the context of this geographical focus, the objective of this paper is to contribute to the implementation of a sustainable recycling system by presenting and synthesising the various stakeholder positions. We thereby hope to contribute to the identification and management of synergies and trade-offs between the three dimensions of sustainability. With this aim in mind, Section 2 continues by elaborating on sustainable waste management as the conceptual framework of this paper. Section 3 details our research design and methods. In response to research question (1) above, Section 4 focuses on understanding the actors and institutions in the context of waste management in Buenos Aires. Section 5 responds to the above research question (2) by applying the three sustainability dimensions to Buenos Aires' recycling sector and aiming to understand their interdependencies and interactions. It proceeds to answer research question (3) by assessing the role of the identified main actors in establishing a sustainable recycling system. In addition to elaborating on the contributions of all relevant actor groups, we broaden the analysis of extended producer responsibility schemes as policy options to include producers in a sustainable recycling system. Section 6 concludes.

2 Conceptual framework

2.1 Sustainable waste management

The management of waste remains one of the main sustainability challenges, not only in Argentina but in the entirety of Latin America and the Caribbean. Waste management plays a critical role in the transition from a linear economy to a circular economy and impacts many aspects of society and the economy. It has strong linkages to a range of other global challenges, such as health, climate change, poverty reduction, food and resource security, and sustainable production and consumption. The political case for action is significantly strengthened when waste management is viewed as an entry point to addressing a range of such sustainable development issues, many of which are difficult to tackle. Such a system, directed towards sustainable development, must take into consideration the environmental, social and economic aspects of waste management. These correspond to the three "pillars" or "dimensions" of sustainability (United Nations Environment Programme [UNEP], 2018).

Environmental aspects of sustainable waste management include the reduction of resource consumption and the protection of water and land resources, with positive implications for biodiversity. Globally, waste disposal contributes to the generation of greenhouse gases (GHG), thus exacerbating climate change. The largest contribution in this respect comes from anaerobic decomposition of waste in landfills or unmanaged dumpsites.

The social dimension includes the identification and involvement of all concerned public and private actors, including the integration of the informal sector. It promotes community development and empowerment, builds capacity, and develops social capital in the form of social interactions, trust, behavioural patterns, and values (Vanclay, 2003). Formal and

informal education promoting the necessary changes in consumption habits and participatory engagement are also important social aspects. Furthermore, the social dimension relates to the avoidance of threats to health from waste pollution or disposal.

The economic dimension of sustainable waste management encompasses, on the one hand, cost-effectiveness in achieving the aforementioned environmental and social aims and, on the other hand, the creation or protection of jobs and support for industries. Appropriate financing of sustainable waste management requires, inter alia, the identification of true costs, appropriate economic incentives to guide investment decisions, and the creation of revenue systems based on financing needs and ability to pay.

These three dimensions need to be balanced and given equal attention in order to achieve a sustainable result and an inclusive circular economy. In particular, economic criteria should not be maximised without taking into consideration environmental and social needs (Rogers, Jalal, Boyd, & Boyd, 2008).

Sustainable waste management will not only play a leading role in the preparation of an agenda for sustainable development, but also provides a number of co-benefits, depicted in Table 1 below.

Table 1: Co-benefits of the sustainability dimensions of waste management

Environmental benefits	**Social benefits**	**Economic benefits**
Reduction of greenhouse gas emissions through the application of tested, available technologies for sustainable waste management.	Improvement of sanitary conditions and public health.	Job creation, in particular through the construction and operation of new facilities, and through labour-intensive urban recycling.
Reduction of local pollution and environmental degradation, especially through the eradication of open dumps.	Improvement of human resources, especially in local communities, through education and training of workers.	Potential for increased investments and adoption of new technologies.
Generation of secondary raw materials through reuse and recycling, contributing to materials and energy savings.	Potential for social inclusion and reductions in poverty and vulnerability.	Reduction of health costs.
Generation of energy, e.g. through biogas from organic waste. Potential trade-off between waste-to-energy and recycling.	Improvement of institutions.	Protection of natural capital and touristic activities.
	Cities with a higher quality of life.	Access to international financing through multilateral lending organisations.

Source: Adapted from UNEP, 2018, p. 31.

The present research focuses on waste collection and recycling within the circular economy loop. Actors involved in these steps in countries with persisting poverty usually differ from those in industrialised countries. The contribution of urban recyclers to recycling activities in developing countries is essential for the functioning of sustainable waste management

systems. Thus, any functioning model of a circular economy in countries with persisting poverty, and any policy reform moving the waste sector in these countries towards more circularity, has to take the social needs of those who depend on the waste sector for their livelihoods into account. With this in mind, we turn towards developing a deeper understanding of the embeddedness of the informal sector in a sustainable waste management system and its integration in the value-creation chains of waste management.

2.2 The informal sector in sustainable waste management

Progress is needed in the formalisation and recognition of informal recycling (UNEP, 2018). Urban recyclers are an integral part of the circular economy (CE) in the Global South (Gutberlet, Carenzo, Kain, & Mantovani Martiniano de Azevedo, 2017), but they often operate as an unregulated public service that is performed under precarious or hazardous working conditions (Binion & Gutberlet, 2012). Despite having been recognised by the legal system in several countries, comprehensive professionalisation and formalisation of the informal sector has yet to take place. Formalisation in the sector would contribute to productivity and promote health and the protection of children, as well as access to decent employment with adequate labour rights and protections (UNEP, 2018).

Based on an actor-centred approach to a circular economy (CE), any achievements in waste management must embrace a perspective of social and economic inclusion (Gutberlet et al., 2017). The European Bank for Reconstruction and Development (2017) argues that economic inclusion, meaning the provision of economic opportunities to previously under-served social groups, is integral to achieving a transition towards sustainable market economies. However, there are limits to what unsupported and informal urban recyclers can achieve regarding their contribution to a CE. Gregson et al. (2015) argue, for example, that urban recyclers play a valuable role in systems of urban waste governance in the Global South, and that they should be integrated into formal municipal waste-management systems, but that they often require an upgrading of their activities for this to be successful. Therefore, in support of transformational efforts towards a CE, it is important to actively empower urban recyclers (Gutberlet et al., 2017; Velis, 2017). Throughout the existing research on urban recycler activities, the terms “inclusion”, “integration” and “formalisation” are used ambiguously, with no clear consensus on the best methods of organisation and empowerment (Velis, 2017). Still, formalisation of some kind and recognition of their activities are some of the more successful interventions with regard to improving the conditions of urban recyclers (Kaza et al., 2018).

Formalisation is expected to eliminate social problems related to the informal sector, such as working conditions that endanger health and safety, social rejection, exploitation and poverty. However, it is simply assumed that formalisation leads to the reduction or elimination of such problems even though the effects have not been precisely measured and evaluated (Aparcana & Salhofer, 2013). Different formalisation approaches exist; usually they involve registering as microenterprises, cooperatives, or public–private partnerships and agreeing to comply with tax laws and business norms (Gregson et al., 2015). These efforts are expected to lead to more efficient recycling and more effective poverty reduction. By becoming formalised, urban recyclers can strengthen their bargaining position with industry and government, and enter into formal contracts, which could improve social inclusion in the

solid waste sector (Medina, 2008). The requirement to comply with sector regulation and to pay taxes, however, can be perceived as a downside of formalisation by informal actors.

Besides official formalisation processes, other approaches focus on recognition of the environmental, social, and economic benefits of informal recycling. This aspect is typically unacknowledged, when urban recyclers are, in fact, assisting in reducing solid waste and working toward more recycling and reuse of goods and materials in society. Assisting and legitimising their employment is crucial for economies struggling to cover the costs of formal waste management (Binion & Gutberlet, 2012). Under this approach, authorities not only support the formalisation of recycling activities but also promote the recognition of urban recycling as a service (RedLACRE, 2020). Commonly, a cooperation scheme is based on the formation of public–private partnerships and the establishment of collection and recycling contracts with municipalities and private companies (Medina, 2010). Further, it is argued that an inclusive waste-management system is inconsistent with the restriction of the contribution of waste-picker organisations to the operational side of waste management as, for example, collectors and sorters. To enhance their role as specialised service providers, their expertise regarding practices and methods related to responsible waste disposal and recyclability should be fully recognised and accredited (Gutberlet et al., 2017). Furthermore, urban recyclers may be able to communicate the importance of recycling to ordinary people and thus change established routines and habits in a way that graduated professionals find difficult to achieve (Gutberlet et al., 2017). The sharing of recyclers' tacit and experiential knowledge with industry, consumers, and policy makers provides an often-overlooked opportunity (Binion & Gutberlet, 2012; Carenzo, 2018).

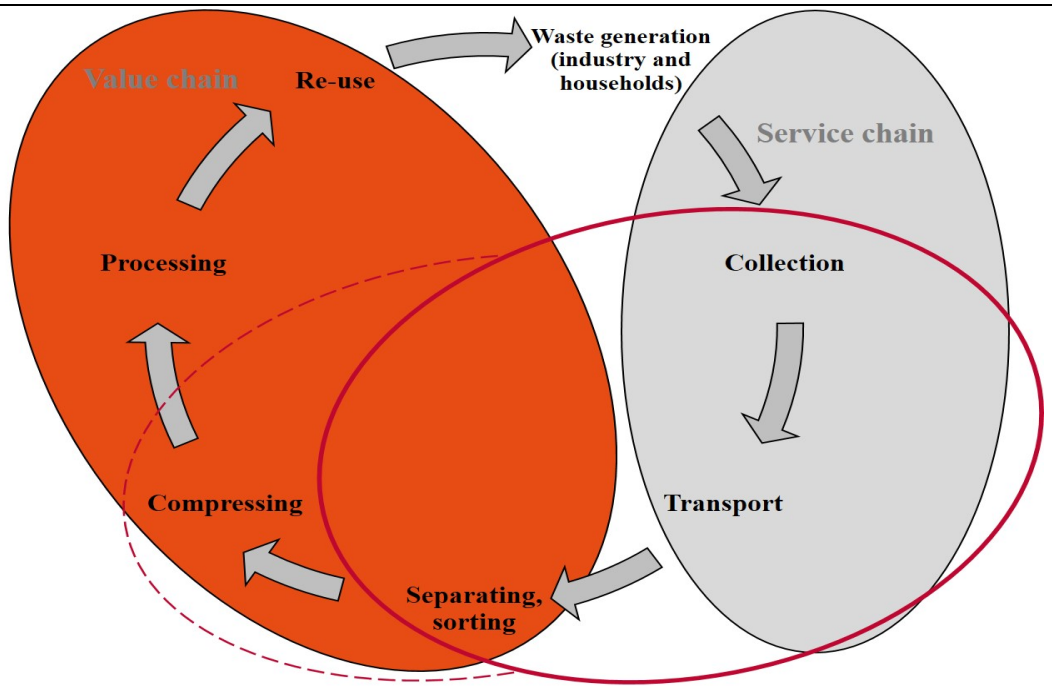
2.3 Value-creation chains in sustainable waste management

Sustainable waste management consists of two different areas of value-creation chains. First, the service chain comprises a range of services, including waste collection, transport, and disposal, as well as urban cleaning. These services are often primarily managed by the public sector. Service chains are generally local and their activities do not include pricing or trading of materials. Yet in countries with persisting poverty, these services are often performed by the urban recyclers, who, by removing contamination and collecting recyclables, provide a free, alternative service to the municipality and help to reduce the amount of waste going to landfill. This is a direct benefit to businesses and households and helps to reduce collection and disposal costs for municipalities. Their activities also help to reduce demand for the extraction of primary resources, and contribute to lowering the emission of greenhouse gases. However, in most cases, urban recyclers are not remunerated for these public services. In a sense, informal recyclers are subsidising the municipal waste system by providing alternative sinks at no cost to the city (Scheinberg, Simpson, & Gupt, 2010; Wilson, Velis, & Cheeseman, 2006).

Second, the value chain includes the extraction and commercialisation (valorisation) of valuable materials from the waste stream. Valorisation involves the extraction or separation of valuable materials from residual waste, cleaning, processing and selling them as usable material. The value chain is primarily managed by private-sector companies, including multi-national businesses. Because of this, recycling in middle-income countries is often limited to high-value fractions of waste, while less valuable fractions are discarded. Urban recyclers often operate at the beginning of the value chain. The core business consists of

finding and harvesting recyclable materials with monetary value, which can then be sold to intermediaries or junk shops. Urban recyclers are paid for the material by weight and are, in most cases, not remunerated for labour or time. Some urban recyclers perform the steps of materials processing, such as cleaning and compressing, to obtain higher prices. The two chains and their relationship to each other are shown in Figure 2. The depiction in this figure is, of course, schematic; the more detailed steps of the value chain depend on the material in question (personal interview Aca4, 2019).

Figure 2: Service chain and value chain, with typical activities of urban recyclers



Notes:
The red circle depicts typical activities of urban recyclers. The compression of materials and early-stage processing are only performed in some cases.

Source: Adapted from OECD (2016).

As mentioned previously, formalisation and recognition approaches can help to strengthen the position of the informal sector in the value chain. Governments and other actors can improve urban recyclers' income prospects by ensuring fair and stable prices from intermediaries or by helping waste-picker cooperatives establish direct contracts with large waste generators or buyers of recyclables (Kaza et al., 2018; OECD, 2016).

There is, however, little research available on the impacts of policies for a circular economy relating to the position of urban recyclers in the service and value chains (Gregson et al., 2015). Recycling markets vary significantly, depending on both the proximity of large value-chain buyers and the intrinsic economic value of the waste stream. In other words, there must be a market or practical economic demand for the materials (Gille, 2007; Bauman, 2004). The economic viability of the recycling value chain is often constrained by market failures, such as an abundant supply of materials but a lack of collection and processing capacity to connect them to buyers. This results in little or no local economic demand even for materials that are technically recyclable. Extended producer responsibility

schemes, which require producers to take on financial and/or physical responsibility for their products in the post-consumer stage, are considered as one option to respond to such market failures (OECD, 2016).

2.4 Instruments of sustainable waste management

The concept of extended producer responsibility (EPR) aims to make producers responsible for the entire product chain, from product design through to the post-consumer stage. Its intention is threefold:

1. to hold producers accountable and financially responsible for the environmental impacts of their products
2. to alleviate municipalities and taxpayers from the financial burden of waste management and recycling
3. to increase recycling rates and to reduce the waste sent to final disposal (landfill) by providing incentives for environmentally friendly packaging and eco-design of products.

EPR can therefore be an important cornerstone of the transition towards a circular economy. It provides incentives for producers to improve product and packaging design, thereby reducing the waste produced. At the same time, it implements the polluter-pays principle, discouraging any non-circular products. There is a diversity of EPR approaches, since each approach must consider the specific circumstances of the recycling and waste sector in the respective country.

Currently there are over 400 EPR systems in place worldwide. More than 70 per cent of existing EPR systems have been introduced since 2001 (OECD, 2016). In most cases, legislation has been the driver of the EPR introduction. First, EPR systems can be differentiated by product type. Consumer electronics account for 35 per cent of EPR systems, followed by tyres (18%) and packaging (17%) (OECD, 2016). Second, EPR systems can be either mandatory or voluntary. In many mandatory systems, the producer pays a fee that is proportional to the amount of waste or product that they contribute to the market. These fees are often collected by a producer responsibility organisation (PRO), which may be run as either a public or private enterprise, and is used to finance the collection and recycling infrastructure. In contrast, voluntary models appear to be limited to specific cases and products where the producer has a profit incentive to collect and reuse material. Whether the EPR system is mandatory or voluntary, the degree to which producers assume responsibility differs; some systems aim to place full responsibility with producers, while others only expect producers to bear a portion of the responsibility.

The systems also vary with respect to structure. Most EPR systems are take-back schemes, which require firms to either recover their own products and dispose of or recycle them, or to fund a PRO to perform these activities collectively. Other systems may make use of deposit/refund systems or advance disposal fees, charged either at the time of purchase or at the time of disposal. Deposit/refund and advance disposal fee systems may be combined with take-back schemes or may simply be used in combination with the existing public collection infrastructure. Thus, EPR schemes can either hold producers financially

responsible or assign them operational and/or organisational roles in the recycling process, such as in waste collection.

A variety of policy instruments are used for the implementation of EPR systems. These can include regulatory, economic, and informative instruments (OECD, 2016). Regulatory instruments, for instance, are reuse and recycling targets, emission limits, or product standards. Economic instruments can include subsidies, product taxes, deposits, and disposal fees. Finally, informative instruments include information provision to recyclers, product labelling, and environmental reporting. Given the specific circumstances in a country, each EPR system varies in the extent to which these different policy instruments are applied.

There are several key aspects of EPR systems that demand attention, including design and governance to address competition issues, set environmental incentives and include informal waste workers. According to the OECD (2016: 4), any EPR system should incentivise producers for better product design and promote innovation, define clear institutional responsibilities, choose a variety of mandatory or voluntary policy instruments suitable for the particular context, make use of stakeholder and consultation processes, avoid economic misallocations, provide a sound financial framework, and consistently run evaluations. Credible mechanisms, such as a producer registry, sanctions, and monitoring systems, ought to be at the heart of any EPR system. Introducing competition between PROs can also be an important element to safeguard efficiency. Additionally, all parts of the waste chain, from waste collection and sorting to disposal and recycling, should be organised through transparent and competitive tenders. Despite some undeniable success, many EPR systems display shortcomings that must be addressed, whether it is in the scope used for evaluating recycling rates (Arduin et al., 2019), long-distance transportation/export for downstream processing (Lodhia, Martin, & Rice, 2017), or the simple insufficiency of waste-treatment infrastructure (Nguyen, Ha, Eiji, & Huynh, 2017). Problems like these must be addressed through careful programme design and implementation.

Importantly, markets for different products behave differently. While EPR schemes involving non-durable products such as packaging are fairly straightforward, simply strengthening enforcement, targets, or norms in schemes involving *durable* products can have unintended negative consequences concerning product durability and the quantity of new production (Alev, Agrawal, & Atasu, 2019; Huang, Atasu, & Beril Toktay, 2019). Managing schemes for durable products requires more careful and strategic design of incentives and requirements. There is also a trade-off in the decision to implement a system where collection and processing are conducted collectively or individually by the producers; a collective system provides better overall cost efficiency, while an individual system may provide more incentives for eco-design improvements (Atasu & Subramanian, 2012). This trade-off, too, may be surmountable, given proper programme design (Gui et al., 2018).

A sustainable financial framework is key to the long-term success of EPR policies. Ideally, fees should account for the full net costs related to the end-of-life products in accordance with the polluter-pays principle. However, it is not sufficient merely to cover the costs. EPR fees must also be related to the end-of-life properties of the product in question, and vary based on the actual associated cost of recycling and disposal. In contrast to a simple flat fee charged on a per-unit basis, a variable fee engages the producer in the end-of-life management of the product and allows for competition and cost savings through design improvements. The use of a modulating fee is a central part of adhering to the “true cost

principle" (European Commission, 2014). Employing such fee modulation effectively may be difficult in some cases, but systems in place in both France and Italy have shown that it is possible, at least with regard to packaging waste (Watkins et al., 2017).

Involving the large number of informal waste workers constitutes a major challenge for emerging and developing countries on their way towards the introduction of an EPR system. These informal workers and their contributions to recycling activities are being increasingly recognised as a crucial aspect of waste collection, sorting, processing, and recycling. However, they find themselves in all parts of the value chain, often marginalised and dependent on volatile material prices. Therefore, EPR systems need to find ways to include informal workers in the formal waste management system. A comparison of EPR systems in the developing context by the OECD (2016) has shown that a failure to involve informal workers can seriously weaken the performance of EPR systems. In contrast, the potential benefits of including the informal sector in EPR systems can entail a higher recycling rate, which reduces the waste destined for landfills and reduces the disposal costs for municipalities, as well as more efficient waste collection and sorting, educational benefits, and the provision of sustainable livelihoods for the large number of informal workers. EPR systems can also function as a stabiliser of the volatile material prices, thereby supporting the regularity of incomes for informal waste workers. However, EPR systems can also endanger the livelihoods of existing informal workers if integration into the formal system fails. As EPR schemes generate new funds to be distributed, it becomes more likely that other actors will enter the recycling field, perhaps even some of the large waste generators. This can lead to competition and conflict between the informal and formal sectors.

Finally, while EPR systems largely differ in their performance, they have contributed to producers' internalisation of waste management costs. In the context of EPR schemes for product packaging in the EU, producers are now responsible for between 10 and 100 per cent of the net end-of-life costs, depending on the country and the scheme (OECD, 2016). EPR systems have thus helped to transfer some of the financial responsibilities from the municipalities and taxpayers to the producers and consumers. Furthermore, EPR systems have helped to reduce the waste dumped in landfills and have increased recycling rates (Richter & Koppejan, 2016; Rubio, Ramos, Leitão, & Barbosa-Povoa, 2019). The decision to implement an EPR system for the shifting of financial responsibility in accordance with the polluter-pays principle is a political one, but policy makers can at least be assured that EPR schemes have proved to be capable of achieving that end.

3 Methodology

3.1 Research design

This investigation conducts qualitative research in an attempt to achieve an in-depth understanding of stakeholder relations in a particular context. It captures and structures fragmented information and it furnishes the investigators with qualitative data, local knowledge, and direct insights obtained from local stakeholders. Semi-structured interviews help to establish a basis for understanding and contextualising the participation of actors involved by gathering focused, qualitative textual data (Leech, 2002). This type of interview enables the integration of local knowledge and priorities into the research design.

Several methodological steps have been followed in order to collect and enumerate the different existing positions in the discourse surrounding a sustainable recycling system in Buenos Aires, and to promote the identification of synergies and trade-offs between the dimensions of sustainability in the system.

First, secondary data was analysed to gain a better understanding of waste and recycling management in the Greater Buenos Aires area (AMBA), and of the actors involved. This first overview of actors and legislative milestones in the development of the recycling sector was important for the study in order to proceed with the second step, the conducting of a stakeholder analysis, to identify important actors, groups of interest, and other stakeholders of the recycling system in AMBA. An evaluation of the stakeholders in terms of their interest and influence in the waste and recycling sector was taken as a starting point for developing the list of interview partners. In the next step, the questions for the interview guidelines were developed on the basis of the analytical framework on integrated sustainable recycling management. In the fourth step, the interviews were conducted, while the information obtained was constantly reorganised interactively to consolidate it and to increase the local representation, for example through discussion sessions with our local research partners (Mat Dia, 2014). Finally, the selected primary and secondary materials were coded and analysed by means of a qualitative content analysis. This allowed the identification of the main challenges for a sustainable recycling system, the synergies and trade-offs in the relations between the sustainability dimensions, and the main challenges in the implementation of an EPR scheme in Argentina.

The combination of primary and secondary data analysis allows triangulation and adds to the reliability of the findings. Making use of interviews often means a trade-off between the quantity, relevance, accuracy, and timeliness of information. As a result, review and validation of the obtained data are crucial, especially in the synthesis phase. Therefore, interview information was combined with a review of secondary documents collected during and after the interviews in order to support and complete the statements of the interview participants.

3.2 Data collection and selection of interview partners

The secondary data sources include research papers and journals, country reports, official statistics from public institutions and international donors, and country strategy papers. In addition, data was collected on the Buenos Aires waste and recycling system and with regard to the initial framework of the research through consultation with the University of Quilmes, in particular Sebastián Carenzo and his team, as our main local partners.

We identified a broad set of relevant stakeholders who are actively involved in the waste value chain, shape the institutional context, or are responsible for potential policy reforms. The potential interview partners were selected from this list of stakeholders. With a focus on the organisational level of the recycling system, interviews were conducted with key informants, such as the heads of recycling cooperatives, executive leaders of private companies or intermediaries, department officers of public institutions, and NGO representatives. In addition, interviews were conducted with local researchers and academics. Involving participants from different sectors reduced the likelihood of organisational bias in the represented perspectives. Once key actors were identified, the snowball sampling

strategy was utilised as interview participants were questioned at the end of the interview about other actors integral to the recycling system.

The interview guidelines were developed based on the analytical framework of the research project and were adapted to the position and background of each interviewee. The aim was to draft clear and precise questions that are open-ended and easy for the interviewees to answer. The questions were intended to emphasise a neutral position and allow lengthy and descriptive answers rather than closed-ended questions ("yes" or "no" questions). At the beginning of each interview, we obtained the interviewee's consent for the recording and use of information. In total, 42 interviews were conducted over a period spanning from 11 February 2019 to 29 March 2019, with an average length of one hour.

3.3 Data analysis

The interviews were transcribed in their entirety, except for conversations at the beginning or end of the interview that did not relate to the study matter. A first document analysis involved skimming the collected material, followed by a more thorough examination to extract insights and patterns. Each of the team members reviewed the transcribed interviews and notes and independently summarised the key messages and insights that they took away from the data. These messages and insights were then discussed in a group and synthesised, ultimately serving as a basis for the creation of codes and sub codes. In order to further refine the codes, our analytical framework was again consulted, along with further secondary documents that had been recommended to the interviewers during the interview phase.

Table 2: Coding system

Code/Sub-code	**Definition**
State of data	*Marks the mentioning of existing (complementary) data, data currently being collected, and data gaps.*
Sustainability relations	
Trade-off	*Marks situations in which an improvement in one dimension leads to a deterioration of another.*
Synergy	*Marks simultaneous improvement in at least two dimensions of sustainability.*
Environmental aim	*Aims related to the environment.*
Social aim	*Aims related to social inclusion.*
Economic aim	*Aims related to economic aspects.*
Cooperatives	
Advantages	*Marks the mentioning of advantages of cooperatives as an organisational form for urban recyclers. Often used in conjunction with codes in the above sustainability relations category.*
Disadvantages	*Marks the mentioning of disadvantages of cooperatives as an organisational form of urban recyclers. Often used in conjunction with codes in the above sustainability relations category.*
Need for support	*Marks the need for (mostly) financial and institutional support from state and private companies for cooperatives.*

Table 2 (cont.): Coding system	
Challenges for recycling	
Market for materials	*Includes the issue of recyclables without markets, volatile prices and lack of innovation of recycling methods for materials without markets*
Reform of waste collection	*Encompasses the role of the cooperatives, the lack of a recycling industry, and the efficiency of current waste management*
Separation of household waste	*Relates to all aspects concerning the separation of household waste and the associated role of consumers*
Others	*Other challenges which could not be related to any of the previous categories*
Extended producer responsibility (EPR)	
Actors	*Role of different actors involved in EPR schemes*
Proposals	*Concrete ideas for the design of an EPR scheme, e.g. related to funds, payment obligations, governance structures; phasing in as an implementation strategy*
Challenges	*Refers to prejudices and difficulties in the introduction of an EPR scheme*
Others EPR	*Other issues regarding EPR which could not be related to any of the previous categories*
Other codes	
Priorities of the 4Rs (reduce, reuse, recycle, recover)	*Advantages of waste reduction, reuse, and recycling to incineration; elaboration of arguments pro and con; positions of the actors*
Incineration	*Other issues regarding incineration, including its potential impact on cooperatives*
Jurisdictional differences between City and Province	*Relates to differences in the jurisdictional configurations of the waste management system between the City and the Province, such as the legislative framework, availability of finance, waste separation and collection, involvement of cooperatives, etc*
Economic crisis	*Related to the current economic and political situation and its relation to the waste-management sector*
Balance between centralisation and fragmentation	*Tension between pluralism of cooperatives and decentralism in the waste-management system – at all levels, institutions, infrastructure and actors. Related questions are, e.g.: Do municipalities need more decision-making authority or less? Is an economy of scale necessary?*
Source: Authors	

As a next step, the data from the interview transcriptions was coded and analysed using a software for qualitative content analysis, ATLAS.ti 8. The preliminary findings of the data analysis were discussed with our local academic partners. On 25 April 2019, we presented our findings to our interview partners and other interested actors of the recycling sector, such as representatives of cooperatives, NGOs, the private sector, and policy makers. The contents of the presentation were then addressed in a subsequent panel discussion consisting of four key stakeholders from different sectors who had been identified during the interviews.

4 Case study: Buenos Aires

This section provides an overview of the waste and recycling system in the Area Metropolitana de Buenos Aires (AMBA) as a basis for the subsequent research. To that end, there will first be a brief overview of the area and context, followed by an elaboration of key terms and definitions and the introduction of the actors and stakeholders involved in the system.

4.1 Introduction and context

Buenos Aires is the capital of the Republic of Argentina and is the biggest city in the country, with approximately 2.8 million inhabitants. The metropolitan area of Buenos Aires consists of about 15 million inhabitants and, therefore, accounts for more than 30% of the total population of Argentina. The capital is located at the western end of the Río de la Plata, on the southeastern coast of South America. The city of Buenos Aires is neither part of Buenos Aires Province nor the Province's capital, which is the city of La Plata.

Argentina generates a total of 16.5 million tonnes of solid waste a year (Secretaría de Ambiente y Desarrollo Sustentable, 2017). Buenos Aires Province (19,665 tonnes/day), the City of Buenos Aires (5,792 tonnes/day), Cordoba (3,780 tonnes/day) and Santa Fe (3,525 tonnes/day) are the districts that generate the largest amount of waste, collectively producing more than 70 per cent of the waste of the entire country (Secretaría de Ambiente y Desarrollo Sustentable, 2017 p. 648). In a country like Argentina, where the urban population accounts for 92 per cent of the total population, research on waste management in urban areas is of extraordinary significance. Thanks to the efforts of both informal and formalised urban recyclers, in addition to the effective official collection system, Argentina has a trash collection rate of 99.8 per cent, with 70 per cent of collection occurring daily (Inter-American Development Bank, 2011). In the city of Buenos Aires (CABA), more than 5,000 urban recyclers, organised in 12 cooperatives, are contracted on a formalised basis to collect waste on the streets daily. However, there are also over 9,000 informal urban recyclers in the city, who often sell to the cooperatives (World Bank, 2016, p. 85). The latter number fluctuates with the state of the national economy – in times of economic crisis, more people resort to informal urban recycling. The cooperatives set a good example for other municipalities regarding their organisation and formalisation, even if significant informal labour still persists.

According to the Consejo Económico y Social de la Ciudad de Buenos Aires (2014), 65 per cent of the population of the city of Buenos Aires separates waste. In contrast to this, other surveys have found that only 23 per cent of people separate their waste in CABA (Centro de Estudios Nuevo Milenio, 2016). The disparity in these estimates suggests that reliable data on waste-separation behaviour is scarce. However, The Consejo Económico y Social de la CABA also reports that 28 per cent of CABA's population identifies waste as a major obstacle for environmental protection. This is reflected in the fact that the public service phone line received over 42,000 complaints related to inadequate waste disposal in 2016 (Devincenzi, 2018).

Waste generation in CABA is quite high on a per capita basis. The city generates about 1.9 kg/person/day – nearly twice the national average of 1.03 kg/person/day (Secretaría de

Ambiente y Desarrollo Sustentable, 2017 p. 648). Data from the CEAMSE (Coordinación Ecológica Área Metropolitana Sociedad del Estado), the organisation responsible for managing final disposal in CABA and Buenos Aires Province, shows that AMBA has seen some improvements in diverting waste from landfills, but it lags behind the targets set by Law 1854/06 Basura Cero (the "Zero Waste Law", see Section 4.4 for more details). Notably, most of the improvement has been seen in higher composting rates, as opposed to increased recycling (Secretaría de Ambiente y Desarrollo Sustentable, 2017 p. 654).

Data concerning the amount of material recycled in Buenos Aires is difficult to find. According to the CABA government website[2], recyclable materials (paper, plastics, glass and metals) are handled by a plant for recycling PET plastics, which processes 10 tonnes per day, and an automated MRF (material recovery facility), which has a maximum capacity of 10 tonnes per hour. Even if one generously assumes that the MRF operates 24 hours a day at maximum capacity, then the city would only process 250 tonnes of material per day, which amounts to less than 5 per cent of the city's daily generation of municipal solid waste. However, the CEAMSE estimates that 11.5 per cent of the city's municipal solid waste is potentially recyclable (CEAMSE, 2015 p. 101). Thus, there appears to be room for further improvement.

4.2 Actors and stakeholders

The waste and recycling system of AMBA is a heterogeneous field that encompasses a large set of various actors. These actors participate in the related activities and collaborate across different sectors and governmental levels (Hemetsberger, 2014; Saidón & Verrastro, 2017). Therefore, the waste and recycling system of AMBA can be considered to be a good example of a multi-stakeholder setting.

The involved actors play different roles in the system and carry out a varied set of tasks ranging from waste production through waste collection and transport, the treatment and recovery of the recyclable materials, to the reinsertion of those materials into the market or, alternatively, delivery for final disposal (Hemetsberger, 2014). All actors have an interest in the proper management of urban solid waste, whether from ecological or health concerns, such as managing limited resources in a sustainable way, or maintaining a clean city in order to prevent the spread of disease. Others rely more on economic or social considerations, since recyclables have value and build the foundation of economic value chains (Sonnhammer, 2016).

The most important stakeholders are identified here as the urban recyclers and their respective cooperatives, public institutions (municipal, provincial and national governments), private companies and intermediaries, civil society organisations (e.g. worker organisations, NGOs, foundations), and academia, see Table 3.

2 https://www.buenosaires.gob.ar/ambienteyespaciopublico/higiene/centro-de-reciclaje-de-la-ciudad

Table 3: Actors of the waste and recycling system in AMBA

Actor	Role and function	Institutional examples and potential interview partners
National government	• Proposition of general policies aimed at the recovery of materials and applied at the national and regional level	Instituto Nacional de Economía Social Ministerio de Ambiente y Desarrollo Sostenible (MAyDS)
Province of Buenos Aires	• Provision of technical advice to the urban recycling cooperatives, and generation of ties between cooperatives and private companies • Reception of complaints and fiscal control • Establishment of norms and promotion of an integrated waste and recycling system on a large scale • Financing of infrastructure, treatment, and final disposal of urban solid waste (only in cases delegated by the judiciary; in most cases, this task is the responsibility of municipalities)	Organismo Provincial para el Desarrollo Sostenible (OPDS) Secretaría de Medio Ambiente, Higiene Urbana y Turismo
Municipalities	• Local management of the system • Financing of the collection, infrastructure, treatment, and final disposal of urban solid waste • Definition of norms and oversight of their implementation • Responsibility for the social inclusion of urban recyclers	CABA: Dirección General de Ordenamiento del Espacio Público (CABA) Directivo de Reciclado de Reciclado Tratamiento y Nuevas Tecnologías (CABA) Compras Publicas (CABA) Ministerio de Ambiente y Espacio Público (MayEP) AMBA: Municipality of La Plata Municipality of Vicente Lopez
Individual national, provincial and local policy makers	• Proposition and adoption of laws for the waste and recycling system and the social inclusion of urban recyclers at the national, provincial, and/or local levels • Assessment of national laws concerning packaging policies, e.g. EPR	Congress: Guillermo Snopek, Soria/Castro, Juan Carlos Villalonga Secretaria de Control y Monitoreo Ambiental: Thierry Decoud, María Candela Nassi
Judiciary	• Making legal decisions and promotion of agreements between parties for environmental and social reasons	Municipal, provincial, and national courts
Private waste collection/ disposal companies	• Collection of differentiated waste in addition to the urban recyclers • Commissioned by public agencies or private companies	Martin & Martin Veolia

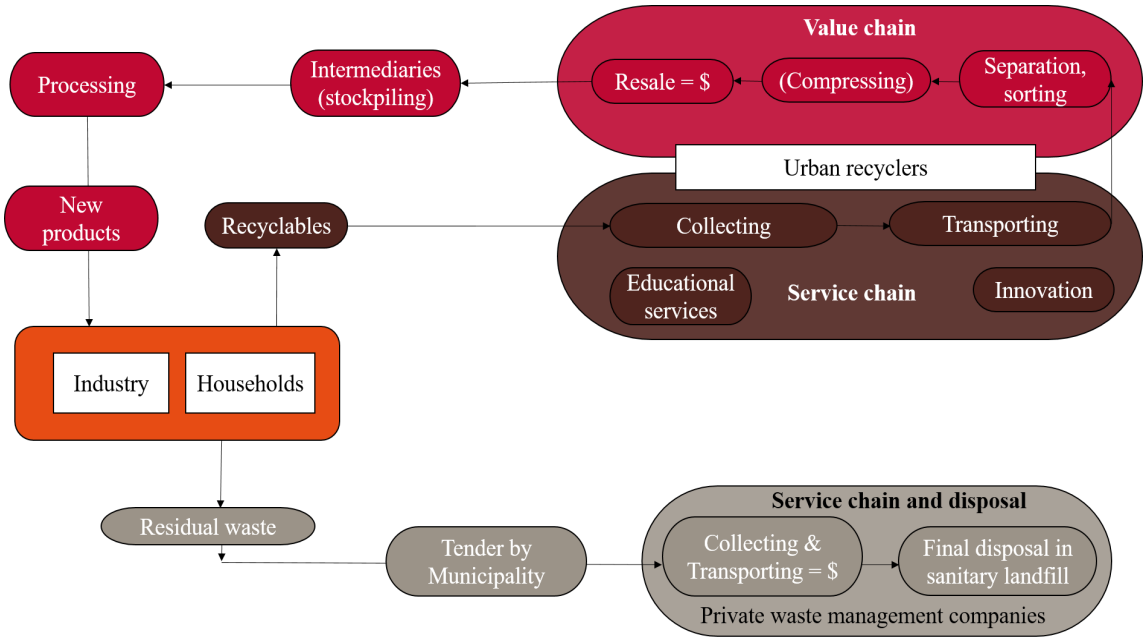
Table 3 (cont.): Actors of the waste and recycling system in AMBA		
Material purchasers/ intermediaries	• Key role in the waste and recycling system, as they recover and reintegrate the recyclable materials into the value chain • Purchase of recyclable materials from urban recyclers, and either direct reuse of materials (e.g. packaging or paper producers) or stockpiling and resale at scale (intermediaries)	Smurfit Kappa Asociación de Fabricantes de Celulosa y Papel de Argentina (AFCP) Private intermediaries
Large waste generators/ business associations	• Play a crucial role in the production of waste and its insertion into the market • Have a responsibility for the final disposal of their products and packaging	Danone Nestlé Pirelli Coca Cola CAIP CAIRPLAS COPAL Carrefour Instituto de Envase
CEAMSE (state-owned enterprise)	• Public–private company that pertains both to CABA and to the province of Buenos Aires • Responsibility for the collection, transport and final disposal of the non-recyclable waste (wet waste) in CABA and the province of Buenos Aires	CEAMSE
Households	• Separation and provision of household waste	Local residents
NGOs	• Promotion of an environmentally and socially sustainable waste and recycling system • Advocacy for urban recyclers' rights • Mobilisation of community engagement • Voicing local concerns	Fundación Avina Fundación Ambiente y Recursos Naturales (FARN) Fundación Metropolitana Greenpeace Women in Informal Employment: Globalising & Organising (WIEGO) Fundacion ARS, ISWA
Urban recyclers and their respective organisations	• Key actors in the Argentinian recycling sector • Collection, separation, and sale of recycling materials • Working in door-to-door or kerbside waste collection, or on landfills • Engaging in demands for better working conditions	12 official recycling cooperatives in CABA (el Amanecer, el Ceibo, Cartoneros del Sur, among others) Federation of Cartoneros (FACCyR) Provincial recycling cooperatives

Table 3 (cont.): Actors of the waste and recycling system in AMBA		
Academia	• Conducting research on the waste and recycling system • Elaboration of proposals promoting improved social inclusion, capacity building/training, and the establishment of platforms for exchange (e.g. roundtables)	Sebastian Carenzo (Universidad de Quilmes) Pablo Schamber (Universidad Nacional de Lanús) Santiago Sorroche (Universidad de Buenos Aires)
Media	• Disseminating information about waste and recycling management projects and government decisions on public waste policies • Informing and raising awareness	Daily newspapers (Clarín, La Nación, Página/12) Alternative newspapers (Prensa Obrera, Infobae, Prensa de Frente, Revista Infocartonero, Revista Villa Crespo Digital, Noticias Urbanas) Television (Telefe, Canal 7) Social Media (Twitter/Facebook: MTE, FACCyR)
Labour Unions	• Advocacy and promotion of workers' and urban recyclers' rights • Organisation of strikes and demonstrations	Movimiento de Trabajadores Excluidos (MTE) Confederación de Trabajadores de la Economía Popular (CTEP) Confederación General del Trabajo (CGT) Confederación Nacional de Cooperativas de Trabajo (CNCT) Central de Trabajadores Argentinos (CTA)
Sources: Authors, following information from Saidón & Verrastro, 2017; Sorroche, 2017; Gutierrez, 2015; consultations with Sebastian Carenzo		

4.3 Waste management organisation and incentive system

Solid waste management in Argentina is regulated at municipal level. Both the City and Province of Buenos Aires consist of several separate service and value chains, as Figure 3 shows. At the beginning of both is the generation of waste, either through household or industrial waste. In theory, there should be household waste separation between wet and dry waste, but this often does not happen in practice.

Figure 3: Schematic depiction of waste management in Argentina



Source: Authors, based on personal interviews with Sebastián Carenzo

Residual waste management in municipal jurisdictions of AMBA is based on privatised waste collection and transportation, and centralised disposal in the CEAMSE landfill. Some municipalities pay the private contractors based on the amount of collected waste, while others base payments on the size of the area to be cleaned, independent of the amount of waste collected. CEAMSE charges municipalities according to the volume of waste they dispose of. In this sense, privatisation and commodification of waste have been the main drivers shaping the system and its incentives, in turn translating into recycling disincentives. Where private actors are paid on the basis of the quantity of disposed waste, there is an incentive to maximise said quantity. This system forces urban recyclers seeking to recover part of the materials to enter into competition with waste-management companies (Carenzo, 2017).

The municipalities of the Province and the City of Buenos Aires share the costs of the CEAMSE landfill. One might expect that the municipalities would have an interest in fostering the activities of the recycling cooperatives in order to reduce the amount of waste destined for final disposal, thus reducing the public costs for final disposal. However, at about USD 7.00 per tonne[3], the municipalities of Buenos Aires Province pay very low fees for final disposal (interview, PubS6, 2019). The remaining gap in financing the costs of the CEAMSE landfill is mainly covered by the City of Buenos Aires and the Province of Buenos Aires (interview PubS6, 2019). Therefore, supporting the recycling cooperatives with additional funds would not necessarily mean reduced costs for the municipality. CEAMSE is expected to reach its maximum capacity by 2023, so the City of Buenos Aires has tried

3 ARS 300.00 according to our interviewee. At the time of the interview from which this information was obtained (March 2019), ARS 44.00 was equivalent to USD 1.00. ARS 300.00 thus corresponded to about USD 6.80.

to relax restrictions on waste incineration but has been met with fierce opposition from environmental organisations and urban recyclers (cf. Section 4.4 on the legislative context).

In contrast to the private companies that are paid for their services, urban recyclers often find themselves at the bottom of the value chain (Carenzo, 2017). They filter out recyclables from household and industrial waste. Some recyclers sell the raw materials directly to intermediaries, while others process, transform, and/or stockpile materials before trading (interview Aca4, 2019). To this end, some organise themselves into cooperatives of varying sizes. Some of these cooperatives manage large recycling facilities with professional equipment, while others work under somewhat adverse circumstances with almost no infrastructure. What they have in common is that material prices are volatile and barely sufficient to provide stable incomes (interview NGO4, 2019). The integration of material prices into the global value chain exacerbates that volatility (Schamber, 2016). In addition, urban recyclers are in a weak negotiating position when selling to intermediaries, and often do not receive fair remuneration for their materials (interviews PubS6, NGO6, 2019). In general, negotiating power increases according to the position in the value chain, with industries holding the most powerful position (interview Aca4, 2019). In the case of some materials, such as paper, the capacity to stockpile for certain periods gives the larger intermediaries the possibility of periodically withholding materials from the market until prices have increased. According to one interviewee, this can even cause disruption in industries' production processes, granting the intermediaries additional negotiating power when entering into contracts with firms (interview PrivS4, 2019).

There is a large difference in the working conditions and livelihoods of cooperative members in the City of Buenos Aires as compared to those in Buenos Aires Province. Additionally, disparities exist between those who are part of the official system with governmental support and those who are not. In Buenos Aires City, there are currently 12 cooperatives with over 5,000 officially registered urban recyclers in operation (interviews NGO1 & PubS8, 2019). Each officially registered recycler receives a monthly incentive of approximately USD 270[4] (interview Coop13, 2019). This incentive is a public subsidy from the city authorities. These workers also receive a payment from their cooperative based on the quantity of materials they have collected. The recyclers who work at recycling plants also receive an additional payment from their cooperative. There are, however, an additional 5,000 to 6,000 urban recyclers active in the city who are not part of the official system and only receive payment for the collected materials they can sell (interviews NGO1 & PubS8, 2019). In Buenos Aires Province, the situation of recyclers depends on the local municipalities, and the level of support offered to cooperatives by those municipalities varies widely. None of the AMBA municipalities offers individual subsidies such as those provided by CABA, but some provide assistance with infrastructural facilities or the procurement of operational materials, such as fuel. Some recyclers additionally receive a monthly social salary from a national programme (*salario social complementario*) of about USD 115[5] (interviews PubS5 & Aca1, 2019). However, each cooperative only has a limited number of slots for the social salary, leaving thousands more recyclers subsisting exclusively on selling collected materials.

4 ARS 12,000 according to our interviewee. See footnote 3 for the conversion rate.

5 ARS 5,000 according to our interviewee. See footnote 3 for the conversion rate.

Starting in early 2012, AMBA urban recycler cooperatives entered into cooperation with OPDS, the environmental authority of Buenos Aires Province, with the aim of increasing their recognition and improving their working conditions and income. Around 25 cooperative representatives, assisted by academics from the universities of Quilmes, Lanús, and Arturo Jauretche, as well as by technical advisors of INTI (National Institute of Industrial Technology), joined a "technical table" to assist OPDS in drafting regulations 137, 138, and 139 (interview Aca1, 2019). Sanctioned in 2013, these regulations mandate that large producers of recyclables contract a registered cooperative or company for the collection and processing of their materials (interview PubS1, 2019). Several cooperatives have since registered with the OPDS as "sustainable destinations"[6] of waste produced by large generators. This allows the registered cooperatives to enter into waste management agreements with supermarkets, hotels, or industrial enterprises, and to issue a certificate recognised by OPDS stating the volume and type of treatment of collected recyclables. It improves their access to recyclables and, in some cases, guarantees them additional payment for the service of waste collection. That said, there is still room for improvement on the implementation of the OPDS regulation. Not all contracts involve compensation for the service aspect of the cooperatives' work (interview Coop2, 2019). In some cases, the cooperatives' only revenue is the value of the materials they receive from companies. Overall, fees are subject only to negotiation between the cooperative and the client company without the oversight of any official entity, and cooperatives are often in a weak position to negotiate (interviews PubS1 & Coop2, 2019). Furthermore, the OPDS lacks the database and the human and financial resources to enforce the regulation, so many enterprises do not comply (interviews PubS1, PrivS11 & Aca4, 2019).

In some cases, cooperatives successfully enter into joint ventures with the private sector to jointly register as a sustainable destination, which helps them to benefit from the physical infrastructure and equipment of waste-management companies, such as dustcarts. In this framework the private companies usually collect and transport the waste from the large generators and then hand the waste over to the cooperatives, where the waste is sorted and treated. Because cooperatives do not receive public funds for purchasing vehicles and have little to no access to credit, this removes the pressure for them to make a large and potentially impossible purchase of equipment.

This "contract model" between industry and recycling cooperatives may be seen as a first attempt at a small-scale model of extended producer responsibility (EPR). However, it is important for cooperatives to have the opportunity to become an official part of such a system. Otherwise, they risk losing access to large quantities of high-quality materials (interview Aca1, 2019). If enforced, this "contract model" may improve the cooperatives' access to income from sales of high-quality materials and service provision, reduce the amount of waste going to landfills, and implement the *polluter pays* principle. Moreover, it can reduce public costs for waste management, which is among the largest budgetary item in Argentina (interview PrivS1, Aca1, 2019). Given that the services offered by cooperatives encompass not only waste collection, but also public education about waste separation and innovation in new products and technologies (Carenzo, 2018), their position to negotiate payment for the service aspect of their work needs to be strengthened.

6 *Destinos sustentables*, according to OPDS, are places for the physical treatment of urban solid waste registered under the terms of Regulation No. 367/10.

4.4 Legislative context

To understand the sustainable management of waste in a given country context, it is important to consider the main aspects of the legislative framework. The context provided in this section covers the legal support for urban recyclers, the legislative progress towards limiting the quantity of waste sent to landfills, and the state of the legislative debates surrounding implementation of EPR programmes.

Rights of urban recyclers

Law 992/02 (2002) was the first law in Buenos Aires to officially recognise the contribution of urban recyclers to the recycling sector. The law was adopted in light of the 2001 economic crisis and the surge in the number of recyclers, especially in the Metropolitan Area of Buenos Aires. The law establishes the incorporation of recyclers into the public hygiene system of Buenos Aires and notes the importance of cooperatives (Schamber, 2016). It also contains provisions to design a plan for household waste separation and to reduce indiscriminate dumping of recyclable materials into landfills. According to the law, any additional profits generated by recycling and waste separation activities should be used to facilitate the work of urban recyclers, including measures to build their capacity, and to protect their health, hygiene and labour security. Last, but not least, the law foresees a permanent register of recyclers and cooperatives (REPyME), as well as education campaigns for the population of Buenos Aires about the role of recyclers (Federación Argentina de Cartoneros, Carreros y Recicladores, 2013).

Basura Cero

In 2005, the *Basura Cero* (Zero Waste) law was adopted in Argentina (officially, Ley de gestión integral de residuos sólidos urbanos – Comprehensive law on urban solid-waste management). The government introduced the law following pressure from civil society and cooperatives, and in light of the diminishing capacity of the landfills. The urban recycler cooperative El Ceibo and non-governmental organisations such as Greenpeace elaborated the law, together with the national government. Basura Cero foresees the progressive reduction of landfill waste while enhancing the recycling activities of the cooperatives. The original targets for landfill reduction were 30 per cent by 2010, 50 per cent by 2012, 75 per cent in 2017, and a total ban on final disposal of recyclables in landfills in 2020, with 2004 levels set as the baseline (Greenpeace, 2018). In addition, the law prohibits incineration of recyclables after 2020 and states, though it does not clearly define, the responsibilities of manufacturers for their products. *Basura Cero* aims to improve the inclusion of recyclers in the collection and transportation of recyclables. Furthermore, it seeks to improve access to loans, equipment, transportation, and technical assistance to enhance the inclusion of registered cooperatives into the formal waste management system. While the law was welcomed as a positive measure by many recyclers, *Basura Cero* has never been fully implemented. Moreover, the Basura Cero targets were modified in 2018 (Fundación Vida Silvestre, 2018).

In 2008, the so-called *Centros Verdes* (Green Centres) were founded by the City of Buenos Aires (City of Buenos Aires, 2019a). The Centros Verdes are sorting centres managed by the cooperatives, and are part of a plan for the separation of dry and wet waste (City of Buenos Aires, 2019b). Since 2011, a new bidding process for residual waste management has been

introduced by the municipality. This has resulted in the signing of a contract between the Government of Buenos Aires, private waste management companies, and 13 cooperatives.

Incineration

In May 2018, Law 5.966 introduced several modifications regarding Basura Cero (Legislatura de Buenos Aires, 2018). In light of the estimation by CEAMSE that the landfill for Buenos Aires would reach its maximum capacity by 2023, the City Legislature of Buenos Aires decided to approve incineration. The modification was initially approved by 36 votes to 22 (Polack, 2018). According to the law, several waste-to-energy plants should be built within the next years. However, the technical specifications and costs were unknown and were not part of the political debate. Furthermore, the law changed the baseline year for zero waste from 2004 to 2012, introducing new landfill reduction goals of 50 per cent by 2021, 65 per cent by 2025, and 80 per cent by 2030 (Fundación Ambiente y Recursos Naturales, 2018). The advocates of incineration see no alternative to burning waste and argue that only non-recyclable materials would be burned, leaving recyclable materials to the cooperatives (Polack, 2018). However, the 2018 law provoked the formation of a broad alliance against incineration, led by the Federation of Cartoneros (FACCyR) and NGOs such as FARN, Greenpeace, and other environmental organisations. The critics argue that incineration comes with high costs and generates local air pollution as well as greenhouse gas emissions, while also risking the livelihoods of recyclers. The alliance against incineration and the opposition accused the Legislature of Buenos Aires of lacking transparency. Several cooperatives and NGOs thus filed a lawsuit against the Legislature. The 2018 law was revoked by court decision, as the court found violations against the principle of a "second reading" in the legislative process. It was ultimately declared unconstitutional in October 2019.

Extended producer responsibility

Chile is the only country in Latin America to have introduced a full EPR system so far, while a few other countries, such as Brazil have cautiously phased in EPR-like policies for certain products (e.g. tyres). In Argentina, there are currently no EPR policies in place. Several proposals are being discussed, most prominently for packaging, tyres and electronic waste. For the recycling industry and the urban recyclers, EPR policies in the packaging sector are most relevant. This is why our interviews largely focused on EPR in packaging.

Several important questions regarding this are at issue. First, it is not clear for which types of products EPR should be introduced. For example, an EPR policy is currently being developed for electronic waste by the Argentinian Environmental Ministry (Ministerio de Ambiente y Desarrollo Sustentable: Secretaria de Control y Monitoreo Ambiental) (Hartmann, 2018), while the case for an EPR law for packaging waste is, by contrast, politically challenging. It is unclear whether the producers of the final products or the producers of the packaging materials themselves would be directly responsible for the costs related to the packaging. Additionally, there are companies that act on the fringes of informality. Large producers have expressed concerns that some "informal actors" would be exempted from the obligation, providing them with an unfair advantage. Second, industries and the municipalities are in dispute over the question of who pays what share of the relevant costs, whether a voluntary or mandatory scheme should be applied, and which entities should manage the EPR system and distribute the funds. Third, there remains the question as to whether any EPR system should involve the urban recyclers in its official structure and, if so,

how it would do this (interview Aca1, 2019). The urban recyclers see EPR systems as a potential way to finance their activity and to affirm their role as public service providers. However, not all stakeholders share the view that recyclers should play a key role in a packaging EPR system (interviews PubS8 & PrivS10, 2019). This debate has proved to be one of the main obstacles for the adoption of an EPR law concerning packaging.

In 2018, two proposals for EPR in packaging were discussed in the environmental commission of the Argentinian Chamber of Deputies (Punto Verde, 2017). However, no final agreement could be achieved between the proposals. The Deputies Soria and Castro presented the first proposal, which was criticised by the urban recyclers for lacking any provisions for their inclusion. At question is whether they should play a formal role in the EPR implementation, given preference over other recycling actors, or whether there should be open competition between the private recycling sector and urban recyclers. The political demand of the urban recyclers is exclusivity in any EPR scheme. They argue that competition would lead to the destruction of several thousand livelihoods.

Deputy Snopek (who is now Senator) and Deputy Soria, together with the urban recycler federation (FACCyR), developed a second proposal (*Ley de envase con inclusion social* – Packaging law with social inclusion), stating that any EPR policy must include the urban recyclers (interview Aca1, 2019). FACCyR organised several demonstrations against the Soria/Castro proposal, claiming this EPR policy would favour private companies and jeopardise the livelihoods of the urban recyclers by preventing them from accessing materials. While Argentinian industry does not wholly reject the idea of contributing to an EPR system, the argument against urban recyclers is that their collection system carries high costs due to inefficiencies, such as overly frequent collection (Colautti, 2018). They do not believe that they ought to be held responsible for the creation of what they consider to be an excessive number of formal jobs for recyclers. Therefore, the legislative process is currently interrupted and its continuation does not appear to be a strong priority in the political agenda. In general, other issues, such as the economic crisis, overshadow environmental topics.

5 Results and discussion

5.1 Synergies and trade-offs between the three pillars of sustainable waste management

Analysing the sustainability of a waste-management system requires an assessment of existing and potential synergies, and trade-offs between the economic, social and ecological dimensions. The interviews conducted with a broad range of actors involved in the waste-management system offer insights into these relations.

5.1.1 Social and economic relations

The social dimension in the given context is mainly characterised by the work of the urban recyclers and the cooperatives that fulfil an important social function. Notably, the possibility to work as urban recyclers and the organisation of that work through cooperatives provides a means of income generation to workers with low levels of formal education.

They offer jobs for newcomers to the labour market, as well as for people who cannot currently find employment in the formal sector. Importantly, labour opportunities in cooperatives are available to women, as well as men. The flexibility of the work allows it to be combined with domestic responsibilities, which predominantly fall to women in Argentina. In times of economic downturn, the collecting and reselling of recyclables provides a tremendously important, if imperfect, fall-back option that complements the incomes derived from the public social security system. Therefore, any discussions about changes to the system of waste management in Buenos Aires intrinsically include a social dimension. The importance of this function of the cooperatives and urban recyclers in the waste-management system is an important insight regarding the challenges involved in reaching a circular economy that is sustainable in all three dimensions (Gutberlet & Carenzo, 2020).

There are several synergies between the social and economic dimensions of recycling. First, recycling activities re-introduce materials into the productive process and are the economic foundation of cooperatives and collectors of recyclable materials. The processing and sale of collected materials is not only financially essential for the cooperatives, but also ensures the continued fulfilment of their social function.

Second, by diverting waste from the landfill, the recycling activities of cooperatives have a positive impact in terms of reducing the cost of the final disposal of waste. Currently, the municipalities and the city pay for every tonne of waste that is transferred to the landfill. Reducing that quantity through improved recycling activity would relieve some of the burden on public actors. The cost reduction for the public actors releases a surplus, raising the question of the redistribution of that surplus.

Third, there is potential for cooperation between the cooperatives and the private sector, which could produce both economic and social synergy effects. Our interviews have shown that many actors from the private sector already collaborate with urban recycling cooperatives. For example, private companies and business or industry associations contract recycling cooperatives to manage their corporate waste separation; they provide them with their recyclable waste, and they buy their processed materials for the creation of new products. This cooperation allows the cooperatives to easily and efficiently acquire new materials for resale, while reducing the costs associated with waste collection and transport. In addition to the economic benefits for the private sector and the recyclers, such cooperation contributes to the implementation of regulations 137, 138 and 139 of OPDS in the province of Buenos Aires. In addition, the cooperatives act as suppliers of domestic materials, which is particularly important in times of currency devaluation or when prices on global material markets fluctuate. Such a link would appear to be beneficial for all actors.

Unfortunately, many of these potential synergies are not currently being exploited, as both groups of actors – the private sector and the cooperatives – have reservations about the precise details defining their cooperation. Sometimes this collaboration is a mutual win–win situation, since urban recyclers achieve better access to materials and offer a cheap service for private companies. However, power asymmetries can lead to advantages clearly favouring one side if, for example, companies do not pay any service fees to the cooperatives.

The question of service payment for recycling cooperatives plays a crucial role. We have found that it only exists in a very limited number of collaborations with the private sector.

The majority of recycling cooperatives remain without any service payment. Instead, they are expected to benefit from improved access to a larger quantity and better quality of materials, which allows them larger profit margins and the access to new markets. Despite this, one of our private-sector interviewees stated that their company has faced additional costs through such cooperation in comparison to other service providers also registered with OPDS as "sustainable destinations" (personal interview PrivS8, 2019). However, they view collaboration with cooperatives as a part of their corporate social responsibility or corporate environmental responsibility strategy, and see indirect benefits in co-innovating with cooperative members.

It remains unclear what determines whether a company's direct costs rise or fall as a result of cooperation with recycling cooperatives as a sustainable destination for their waste. Some potential determining factors could be the existence or absence of necessary infrastructure; the composition, quality, and quantity of the corporate waste; geographical distances; or the degree of facilitation provided by the public sector.

Contracting recycling cooperatives as suppliers of input material, however, can be less expensive for companies than sourcing supplies from the private sector. Indeed, one of the interviewees from the private sector confirmed to us that they had saved costs through their cooperation with recycling cooperatives in this regard (PrivS4). Many companies clearly stated, however, that informality is an obstacle to contracting cooperatives (interviews PrivS4, PrivS6, PrivS8 & PrivS9, 2019). Progress towards formalisation and inclusion in the market incentivises cooperatives to professionalise and increase efficiency. It may also, however, endanger some of the aforementioned social advantages.

At the same time, the cooperatives note that they often feel that they occupy a weak position compared to other actors in the negotiation process (interviews Coop1, Coop2, Coop13, 2019). This demonstrates that a relationship of trust between the individual actor groups is of supreme importance in achieving a more efficient system through improving cooperation. This not only applies to the relationship of cooperatives with the private sector, but also with consumers and intermediaries.

While the situation and needs of the cooperatives vary with the circumstances of the municipalities in which they operate, a point frequently raised in the interviews concerns the general shortage of infrastructure as a bottleneck to increasing efficiency. This has a negative impact not only on the profits of cooperatives, but also on their function as a social safety net. The cooperatives lack machines and the necessary sources of financing, especially when it comes to increasing the value of materials through the different steps in the processing. Improved access to these production goods could improve the position of the cooperatives and help to generate higher revenues. The financial incentive also motivates cooperatives to invent new products and production steps. The invention of new recycling processes and the creation of new markets for produced materials is particularly environmentally friendly and can make a decisive contribution to strengthening the recycling economy in Argentina. Without access to machinery, however, the efficiency and innovative potential of the cooperatives is limited, compounding the difficulty of profitable implementation of the aforementioned cooperation models with the private sector.

5.1.2 Social and environmental relations

There are also synergies to be found between the social dimension and environmental protection. Due to the fact that a state-supported recycling system has not been fully established, the urban recyclers are currently central players in Argentina's recycling branch. However, this potential is not fully exploited. In addition to the structural difficulties with economic efficiency, the activities of the cooperatives are weakened by the low and volatile market prices of the materials they collect. This limits the range of materials cooperatives can profitably collect, with a high share of potential recyclables still going to the landfill.

A good example of this is the recycling of glass. Due to the high ratio of weight to volume and the consistently low market price, cooperatives often decide against collecting glass, leaving empty bottles and other glass products in the waste containers or on the kerbside next to them. Offering an incentive or stable price to support the collection of less profitable materials would have a significant positive effect on the amount of material that is recycled and on the stability of incomes of cooperative members. The introduction of an EPR scheme for packaging may be one way of financing a stabilisation of the market for these materials with low and volatile prices.

Another synergy between the activity of the urban recyclers and environmental protection is the engagement of recyclers in education and information campaigns on household waste separation. The General Directorate of Recycling of the municipality of Buenos Aires, for instance, engages recycling cooperatives as environmental promoters to foster and teach recycling behaviour to local households and neighbourhoods. Waste separation is a challenge for the implementation of a sustainable recycling sector in most Argentinian municipalities, with the notable exception of some progress made, for example, in Buenos Aires City. Many of our interviewees noted a need for improvement, in particular in the separation of organic waste (interviews NGO1, NGO4, PubS8, Coop2 & Coop5, 2019). In the interviews, the public's overall lack of environmental awareness and education was highlighted as a problem. In general, interviewees signalled a desire for more active communication with regard to urban recyclers and their work. However, one interviewee noted that many households face challenging economic times, exacerbated by the steeply rising cost of public services and frequent strikes by political parties or powerful trade unions (interview Coop13, 2019). This may limit social cohesion and the general willingness to contribute to public goods, such as environmental protection.

> The social organisations, the political parties, and the labour unions come out every day to block the streets for one reason or another, so you can't get to your work. Public transport goes to hell, and the public hospitals… And you are asking me to separate? You are asking me to separate glass and plastic when you have just raised electricity tariffs by 400 per cent? (interview, Coop13, 27 March 2019)[7]

7 "Las organizaciones sociales, los partidos políticos y sindicatos salen a cortarte la calle todos los días por algún evento, entonces vos no podés llegar a tu trabajo. El transporte público anda para el carajo, el hospital público… ¿Y me pedís que separe? ¿Me venís a decir que separe el vidrio y el plástico cuando acabás de subir 400 per cent la luz?" (interview Coop13, 2019).

5.1.3 Economic and environmental relations

In general, the current situation in Argentina leads to economic topics such as growth, poverty reduction, and private-sector development taking precedence over environmental issues in public debates. If a sustainable recycling sector is to be created, it is important to identify synergies between the economic and environmental incentives.

In principle, municipal governments have an economic incentive to divert as much material as possible from disposal in landfills, since they pay by quantity for the disposal of waste (per tonne). As long as the alternative treatment is more cost effective, it is preferable in economic terms. Recycling or composting part of the material is one option.

However, disposal of municipal waste in sanitary landfills is often subsidised by national or provincial governments in order to relieve the communities financially (interview PubS6, 2019). Many municipalities of AMBA benefit from public funding regarding their final waste disposal in the landfills of CEAMSE. In many cases, this leads to municipalities being charged low waste-disposal fees and to limited economic incentives for improved recycling systems to be implemented at municipality level. A system of disposal fees that reflects the true costs would be more in line with economic efficiency and with environmental protection.

Another challenge is to increase the efficiency of waste collection. In most areas of AMBA, collection takes place seven days a week, which is considered excessive by many of our interviewees. It also represents one of the main budget items of the municipalities. Most actors recommended reducing the number of collection days per week, with one day reserved for differentiated collection of recyclables (interviews PubS4, PubS5, PubS8, PrivS10, PrivS11, 2019). However, a challenge for this kind of change was highlighted by one interviewee, who stated that municipal governments often hesitate to change waste collection contracts for fear of political opposition from truck drivers' unions (interview NGO3, 2019).

5.2 Contributions of stakeholders to a sustainable recycling system

After highlighting potential synergies and trade-offs between the three dimensions of sustainability, the next step is to outline the contributions that can be made by the different actors in the waste and recycling system towards achieving sustainability. With a view towards contributing to improved transparency in the waste and recycling system, this section collects the demands and expectations made of the various actors in the interviews conducted.

Consumers and local households

Consumers and local households are asked to increase their awareness about the separation and disposal of their post-consumer goods and products, and to contribute to a functioning waste and recycling system through domestic waste separation (interviews NGO1, NGO4, PubS8, Coop2, Coop & PrivS4, 2019). Since consumers play a crucial role in the recycling process, at the intersection of consumption and waste collection, they are called upon to take more responsibility in that role. Recycling cooperatives, environmental promoters, and the

public and private sectors ask that private households separate their domestic waste and that they either make it available on the indicated dates for the urban waste collectors and private waste disposal companies, or dispose of it at the Green Points or in the indicated recycling containers.

> [...] another problem is that in our country there are many other unmet needs at the societal level, which people will always confront you with, for example: 'You come to ask me to go to the trash can to separate the plastics, but I go out on the street and they kill me or rob me. (interview PrivS5, 14 March 2019.) [8]

Since contaminated material can often not be recycled at a reasonable cost, private households are also asked to separate their waste properly into "dry" (recyclable) and "wet" (non-recyclable) waste, as well as sorting out hazardous waste that could lead to serious environmental damage. The positive experience of the General Directorate of Recycling of Buenos Aires City in engaging urban recyclers in awareness campaigns could become a role model for other municipalities. At the same time, interviewees mentioned that households' propensity to contribute to the common good may be low as long as the public sector has not found solutions to other pressing problems, such as crime rates and poverty (interviews PrivS5 & Coop13, 2019).

Public sector

Interviewees from civil society, the private sector, and recycling cooperatives request that the municipalities of AMBA comply with their responsibility to manage urban waste and to put in place an adequate recycling system (interviews NGO1, PrivS1, Coop2, 2019). To ensure the proper realisation of such a system, the municipalities are called upon to coordinate and monitor implementation. Moreover, they ought to assist in the creation of new markets for recycled materials and products in order to expand economic gains and the profitability of recyclables.

> […] in general, in each municipality, and no matter how small, there are *cartoneros* [...], and they should be included in a formalised recycling system, because in principle we don't have much more. Obviously, we say that this has to include pension expenses, that is, retirement; what is called here the *monotributo social*; a salary; work tools; and the necessary infrastructure so that you can do the job. And that should be provided by a municipality. (interview NGO1, 14 February 2019.)[9]

Many also demand that the public sector strengthen and integrate recycling cooperatives in the provinces. In many cases, interviewees from recycling cooperatives, academia, and

8 "[...] otro problema es que en nuestro país existen muchas otras necesidades no satisfechas a nivel sociedad, en donde la gente siempre te va a sacar a relucir, por ejemplo: 'Vos me venis a pedir a que yo vaya al tacho de basura a separar los plásticos, pero yo salgo a la calle y a mi me matan o me roban." (interview PrivS5,.2019)

9 "[...] en general en cada municipio, y por más chico que sea, existen cartoneros [...], y esos deberían estar incluidos dentro de lo que es un sistema de reciclados formalizado, porque en principio no tenemos mucha más. Obviamente decimos que eso tiene que incluir los gastos previsionales, es decir, jubilación, lo que se llama acá el monotributo social, que tiene que tener un salario, que tiene que tener herramientas de trabajo y que tiene que proveerse de infraestructura necesaria para que pueda realizar ese trabajo. Y eso lo debería proveer un municipio." (interview NGO1, 2019)

NGOs criticised the lack of public support for recycling cooperatives, especially in the province of Buenos Aires. They ask that more support be provided to the cooperatives in the following areas:

- The formalisation and administration of their respective organisations (interviews NGO1, NGO2, 2019)
- Inclusion into the social wage (Salario Social Complementario), more paid positions, and higher subsidies in the province of Buenos Aires, in line with what is observed in CABA (interviews NGO1, NGO6, 2019)
- The provision of social security and childcare options for cooperative workers (interview NGO1, 2019)
- The provision of necessary infrastructure to recycling cooperatives (machinery, transportation, working clothes, capacity building, public funds, public space for stockpiling of materials) (interviews NGO1, NGO4, Coop1, Coop2 & Coop13, 2019)
- The assurance of equal workers' rights to recycling cooperatives (interviews NGO1 & Coop13, 2019)
- Payment for the service aspect of urban recycling, similar to the management of residual waste (interviews NGO4, Aca1, Coop1 & Coop13, 2019)
- Support for bottom-up innovation processes (interviews Aca1 & Coop1, 2019).

The Provincial Organisation for Sustainable Development (OPDS) is expected to foster and to facilitate more partnerships between private companies and recycling cooperatives, according to existing provincial law regulations 137–139 (interview Coop2, 2019). The OPDS is called upon to promote and to activate new contracts between "large waste generators" (e.g. supermarkets, hotels, large companies) and "sustainable destinations" (e.g. recycling cooperatives, private waste disposal companies). OPDS ought to engage more in environmental conservation, in facilitation of cross-sectoral agreements, and in monitoring processes. It should also contribute to the implementation of service payments for the recycling cooperatives as equal service providers.

Furthermore, the public sector should adopt a new legal framework for the waste and recycling sector. Nearly all of our interviewees suggest that waste legislation needs to be updated. In this regard, one demand is to update and expand the already existing National Strategy for Integrated Urban Solid Waste Management (Estrategia Nacional para la Gestión Integral de Residuos Sólidos Urbanos: ENGIRSU) from 2005. The critics claim that ENGIRSU does not take into account recent developments such as the discussions around extended producer responsibility and, hence, is outdated and inappropriate (interview NGO2, 2019).

Most of the above suggestions unfortunately depend on scarce financial resources. In many cases, the regulating, coordinating, and enforcing functions requested from municipalities can hardly be met with current staffing levels. Similarly, the extension of the social wage payments to new beneficiaries would require the political decision to make funding available. The solutions implemented in Buenos Aires City may not be financially feasible for many of the surrounding municipalities. The introduction of an extended producer responsibility (EPR) policy could make a contribution to financing the above measures, but the decision over the use of funds from such a system would also be a political one.

Recycling cooperatives

The key demand on the recycling cooperatives is the need for greater efficiency and a higher degree of professionalism. Actors from the public and private sector have certain doubts about the quality of the work of recycling cooperatives relative to that of private waste disposal companies (interviews PrivS10, PubS1, PubS2, Aca3, 2019). They name certain obstacles that prevent recycling cooperatives from working in a more environmentally friendly and economically efficient way, such as ongoing territorial and political conflicts between cooperatives, a lack of resources, and limited access to the market (interviews PubS2, PubS7, 2019). It is also noted that machinery, once acquired, cannot always be adequately protected from theft or destruction in the challenging working environment faced by cooperatives (interview PubS1, 2019). Accordingly, these determinants lead to smaller quantities of processed waste, lower-quality recyclables, a less reliable supply, and a smaller range of recycling materials being collected and processed. In general, building mutual trust between urban recyclers and fostering the will to cooperate in an organised fashion is a process that, in many cases, takes time and effort (interviews Coop1, PubS2, 2019). In order to improve the efficiency and professionalism of recycling cooperatives, they are asked to carry out self-evaluation and prioritise the acquisition of more contracts with private-sector companies.

In addition, interviewees suggest that cooperatives reorganise their internal structures and work processes to achieve more transparency and (public) accountability. Recycling cooperatives were criticised for not providing concrete data and information regarding, for example, the types of materials and quantities processed (interviews PrivS7, PrivS10, PubS8, 2019). According to our interviewees, this absence of information fosters prejudice about inefficiency, causes mistrust, and inhibits the implementation of an efficient and inclusive waste and recycling system. Hence, recycling cooperatives are asked to record more information about the waste they collect, process, and recycle, and to make this data accessible in order to contribute to more transparency in the waste sector. Currently, some cooperatives do lead the way as examples of significant steps towards this transparency. For instance, the cooperatives in AMBA that are recognised as "sustainable destinations" by OPDS issue online certificates providing information to their clients and to OPDS authorities (interview Aca1, 2019). Similarly, Centros Verdes in CABA publish information about processed materials.

Finally, the recycling cooperatives are expected to comply with all obligations linked to formalisation. Formalisation offers certain rights, such as participation in public and private tenders, assurance of workers' rights, integration into the social security system, and a guarantee of the national minimum wage. On the other hand, it also includes obligations, such as the integration of informal urban recyclers into the existing recycling cooperatives, registration with the official registration authorities (CABA: Dirección General de Reciclado (DGREC); AMBA: OPDS), a proper tax and fee payment system, the provision of information to the public, and the following of national labour standards.

In order to help improve working conditions, interviewees from the cooperatives suggested three measures. First, better equipment and infrastructure would allow them to upgrade in the value chain and adhere to quality standards (interview Coop1, 2019). Second, being paid for their contribution to the service chain would provide a more reliable and higher income and be an acknowledgement of this aspect of their work. Third, access to space for

separation, processing, and stockpiling materials is essential (interviews NGO4, Coop14, 2019). This not only provides the possibility of cooperatives benefiting from economies of scale, but also facilitates safe and decent working conditions for their members.

> Q: After the cooperative was formed, what changed in your daily life?
>
> A: I think the best thing that changed is that we had a place, a place of our own, where we were all together, the family of *cartoneros*.
>
> Q: To separate the material, to stockpile?
>
> A: More than anything because of the neighbours, because the neighbours did not want us to be on the street because obviously there was a lot of garbage left on the street. Inside, it was like a private place, we were at our place separating the waste and working in peace. (interview Coop14, 19.02.2019.) [10]

Private sector

Interviewees criticise the fact that many companies do not properly separate, recycle, and dispose of their waste, do not reduce their use of materials, and do not pay for the service contributions made by recycling cooperatives (interviews Aca1, NGO4, 2019). Additionally, they believe that the private sector could improve its inclusion of formalised recycling cooperatives in their tenders for external material suppliers. More corporate accountability, better corporate recycling systems, and private-sector compliance with OPDS regulations 137–139 are thus expected.

Interviewees spanning all sectors are in general agreement with the official adoption and application of an extended producer responsibility (EPR) scheme and expect that the private sector will take over responsibility for the final disposal of the packaging and goods that they put on the market (interviews PrivS1, PrivS4, PrivS10, PubS8, Aca3, Coop13, 2019). In other words, producers should take on significant responsibility – financial and/or physical – for the treatment or disposal of post-consumer products and relieve the local communities and municipal governments financially. Assigning such responsibility should, in principle, provide incentives to prevent waste at source, promote ecological product design, and support the achievement of public recycling and materials-management goals. However, there is disagreement on the design details of an EPR scheme, as discussed in Section 5.3.

Academia and civil society

Our interviews have shown that public, private, civil society, and academic actors in the waste and recycling sector often cooperate with each other to gain mutual benefits and to foster inclusive recycling. For example, private companies and business associations work with environmental NGOs to jointly tackle the challenge of their rising waste generation, to

10 "Q: Después de que se formó la cooperativa ¿qué cambió en tu vida diaria?
A: Yo creo que lo mejor que cambió es que teníamos un lugar, un lugar nuestro, donde estábamos todos juntos, la familia cartonera.
Q: ¿Para separar el material, para stockear?
A: Más que nada por los vecinos, porque los vecinos no querían que estemos en la calle porque obviamente quedaba mucha basura en la calle. Ahí adentro era como un lugar privado, estábamos en nuestro lugar haciendo la separación y trabajábamos tranquilos." (interview Coop14, 2019)

raise consumer awareness, to increase credibility, and to implement corporate sustainability projects, such as returnable product systems. In addition, some also collaborate with recycling cooperatives to manage their corporate waste and to jointly explore new methods and technologies for improved recycling under the umbrella of "research and development" (Carenzo, 2018; Carenzo & Schmukler, 2018).

Academia plays an important role as a facilitator and incubator of such collaboration, and as a provider of expertise on integrated solid-waste management (interviews Aca1, Coop1, PrivS8, 2019). Researchers from local universities work closely together with NGOs, recycling cooperatives, provincial and municipal governments, and sometimes with private companies to foster overall cooperation and an integrated network approach. They also provide expertise for recycling cooperatives, help them to upscale their recycling activities, and provide advocacy and representation for their interests in political forums.

5.3 Towards a circular economy: extended producer responsibility

While there are many products that could fall under an extended producer responsibility (EPR) scheme, packaging is among the most relevant categories for urban recyclers (interview NGO2, 2019). Evidence from other contexts shows that introduction of EPR schemes for packaging are successful in contributing to the reduction of per capita consumption of packaging (OECD, 2016). EPR can also contribute to the reduction of the public costs of waste management and to creating a financially sound recycling industry. Since 2011, 15 suggestions for EPR laws for packaging have been presented to the Argentinian Congress. (See Ojeda and Mercante (2019) for an overview.) Almost all of our interviewees[11] showed interest in an EPR implementation, yet had diverging opinions on the form of implementation and the involvement of the urban recyclers in an EPR scheme.

The interviews have shown that financial resources from the private sector are essential for the functioning of EPR systems (interview NGO3, 2019). It is clear that implementation of an EPR system would, in principle, be possible in the context of an upper-middle-income country, yet it is not made a political priority (interview PubS8, 2019). Members of the private sector, also in their role as employers, are especially critical of implementing EPR in a moment of economic crisis (interview PrivS6, 2019). They argue that EPR would impose an additional cost in already difficult times for Argentinian businesses.

In addition to the general view of EPR as an additional financial burden on enterprises, the most critical points delaying the EPR implementation in the Argentinian context seem to be the role of different actors, in particular informal recyclers, finance, the use of funds raised, and administrative implementation.

Roles and participation of different actors in EPR implementation

11 Our interviews included representatives of municipalities, large companies, supermarket chains, environmental authorities, recycling cooperatives, NGOs, packaging and recycling industries, and national policymakers. In our interviews with a focus on EPR, we asked for proposals regarding EPR, obstacles for implementation, involvement of actors, and the administrative and institutional structures of a possible EPR scheme.

Different actors, such as urban recyclers, producers, and private waste-management companies, want to participate in EPR implementation and are partly in competition with one another. Cooperatives demand their formal participation as service providers for recyclables in an EPR scheme and fear the loss of their livelihoods if they must compete or negotiate with the private sector (interviews Coop13 & NGO1, 2019). Other actors, however, are not willing to grant the cooperatives exclusivity in the recycling sector (interviews PubS8, PrivS10, 2019). Some actors voiced doubts about whether the cooperatives can be a reliable and efficient service provider (interview PrivS10, 2019).

Finance

Most actors agree to the "polluter pays" principle, and thus the financial responsibility of producers for their products (interviews PubS8, PrivS1, PrivS2, PrivS6, NGO6, Coop6, 2019). The Argentinian industry does not generally refuse to pay EPR contributions, but wants to have a say in the governance of the funds. Industry interviewees voiced concerns about similar contributions of informal enterprises and the capacity of Argentinian SMEs to contribute (interviews PrivS5, PrivS10, 2019). Argentinian industry is worried about the effects of EPR obligations on their performance in the current economic crisis, wary of the financial burden and its effects on employment. They see the need to integrate urban recyclers in the EPR scheme, but consider the government to be responsible for their integration and for covering additional costs, should they accrue.

Management and use of the EPR funds

There remains the question of whether the state or the producers are to manage EPR funds. Recycling cooperatives and related NGOs demand that the government administer the EPR funds so that they can make their demands to the Argentinian state, the only actor they can hold accountable (interviews NGO1, NGO3, 2019). The private sector argues that funds originating from companies should instead be managed by themselves or by an independent non-profit organisation (interviews PrivS1, PrivS10 & PubS8, 2019). In addition, the particular uses of the funds are disputed. Some actors suggested they could be used to alleviate the additional costs of differentiated waste collection to municipalities and to raise consumer awareness about waste separation (personal interview PrivS1, 2019). In contrast, recycling cooperatives demand that EPR funds be used to pay them for their services, in the same way as private waste-management companies receive payments for the management of residual waste (interviews Coop13, NGO6, 2019).

Administrative implementation

The legislative autonomy of the Argentinian provinces is a challenge for EPR implementation (interview Aca3, 2019). Our interviewees therefore voiced their preference for a common national EPR policy that provides a legislative framework for the provinces and avoids leakage and competitive distortions (interviews Coop6, NGO3, PubS4, PrivS5, 2019). However, since the majority of material flows, and thus also the recycling industry, are concentrated in the Greater Buenos Aires Area, a nationwide recycling scheme may create logistical problems for municipalities that lie further away from Buenos Aires (interview PubS4, 2019). As such, it was suggested that the first priority should be to establish the database and to use voluntary pilot projects to phase in a national scheme (interview PrivS10, 2019).

6 Conclusion

Due to the prevailing economic crisis, Argentina has been facing a growing number of informal workers. Following the Covid-19 pandemic and the associated loss of formal employment, this number can be expected to rise even further. Many of these informal workers seek sources of income as urban recyclers. Given the increasing generation of waste in the country and the scarcity of many natural resources, increased recycling activity is, in principle, a positive development. However, the working conditions of urban recyclers often do not correspond to the ILO definition of "decent work"[12].

Therefore, it is important to ask how the recycling system in Argentina can be shaped to be socially, as well as environmentally and economically, sustainable. This question bears not only on the urban recyclers as a group of actors, but also on policy makers, the private sector, households, and other actors such as NGOs and academia. It is, in many respects, a question that does not have a straightforward answer. While some changes to the system would bring about synergies between the three pillars of sustainability, some involve trade-offs. The decision is then political, implying the necessity of an inclusive process of decision-making whereby all stakeholders can participate and make contributions.

In this context, our research aimed to collect and synthesise the ideas and expectations of a diverse set of actors in the recycling sector of Buenos Aires City and selected municipalities of Buenos Aires Province. This collection, by nature, can only show a fragment of the discourse. However, it enabled us to identify the following key areas of dispute and potential action.

Urban recycling as a social safety net

In countries with persistent poverty, the waste-management sector often acts as a social safety net for people with fewer prospects for income generation in the formal job market. This is particularly the case during times of economic crisis. Viewed from this perspective, there is a trade-off between maintaining the social function of the sector and subjecting it to the kinds of efficiency requirements placed on other sectors. Our interviewees associated with recycling cooperatives confirmed that they would likely fail if subjected to direct competition from private companies (interviews Coop6 & Coop13, 2019). This is not only due to a lack of machinery and capacity to improve productivity, but also due to reasons of political economy. Large companies usually have better access to political decision processes and stronger negotiating power than cooperative members, let alone individual urban recyclers, and may crowd them out once the sector becomes profitable.

Payment for the service component of recyclable waste management

Most urban recyclers make their livelihoods from the market value of material sales. Since material prices tend to be low and volatile, incomes are precarious and unstable. However,

12 "Decent work sums up the aspirations of people in their working lives. It involves opportunities for work that is productive and delivers a fair income, security in the workplace and social protection for families, better prospects for personal development and social integration, freedom for people to express their concerns, organize and participate in the decisions that affect their lives and equality of opportunity and treatment for all women and men." (International Labour Organization, 2020)

by re-introducing materials into the resource cycle and reducing pressure on landfills, urban recyclers create positive externalities and offer a valuable service to society. This service component is poorly remunerated, if at all. Financial acknowledgement of the service component would contribute to increasing and stabilising incomes, while societal acknowledgement of the service component would increase appreciation of the contribution of urban recyclers to sustainability and reduce marginalisation.

Potential for grassroots innovations

Urban recyclers are typically very knowledgeable about the materials with which they work. They base their actions on the demands of the market and only recycle what has value. Ignoring materials that are less profitable, such as glass or thin plastics, inhibits economic and ecological potentials, as well as potential for further innovation. Despite this, some interviewees from recycling cooperatives named a number of technologies and innovations that they had invented and used on a small scale (interview Coop1, 2019). This was achieved through their own expertise and in cooperation with other actors, such as universities. However, very few are able to upscale their technologies due to legal restrictions and regulations, or because of limited resources and limited access to the market (Carenzo, 2018; Carenzo & Schmukler, 2018). Support for these types of grassroots innovations (Seyfang & Smith, 2007) could create opportunities through further innovation in the waste and recycling sector, ultimately promoting economic expansion and socio-economic inclusion.

Economic incentives and political economy

In several areas of Argentinian waste management, economic incentives are not conducive to economic efficiency. Waste collection, for example, takes place on a daily basis in many areas, even if fewer days per week would suffice. A large share of municipal spending flows into the logistics of waste management, often with long-term contracts that are difficult to renegotiate. Resources freed up by a reform of waste collection could be used to improve recycling schemes. Furthermore, the low, subsidised fee that municipalities in the Province of Buenos Aires pay for using the CEAMSE landfill is a disincentive for them to promote waste avoidance and recycling. Constellations of interests impede substantial changes.

These aspects are far from an exhaustive description of the complexities of the Argentinian waste sector. However, they do highlight key areas of conflict that offer significant potential for improving the social, environmental and economic sustainability of the sector. Policy makers could support this potential by ensuring that existing regulations are enforced, such as OPDS regulations 137–139. Even if the traceability of the system needs improvement, the requirement for large waste generators to cooperate with certified and sustainable waste-removal operators (*destinos sustentables*) supports corporate responsibility and the economic opportunities of cooperatives.

The introduction of an EPR scheme could further improve the sustainability of the sector. However, in such a scheme, the details of policy design also present a complex challenge. An exclusion of urban recycling cooperatives would lead to high social and political costs, whereas an exclusion of the private sector would reduce willingness to pay and may lead to efficiency losses. Moving forward, government-assisted cooperation between the private sector and the recycling cooperatives may be helpful. Formalisation of their work, access to capital and land, and capacity building could enable more cooperatives to enter into contracts

with the private sector. Waste-transfer companies have the necessary infrastructure for the collection of recyclables, while cooperatives have experience in managing recycling plants, provide a workforce for more labour-intensive separation and processing steps, and have long-standing experience with processing the materials. More capital-intensive steps of material processing could then be taken over by private-sector actors.

Any reform of the system, however, would need to be based on reliable data. Most of our interviewees confirmed a large data gap with respect to types, qualities, and quantities of recycled and traded materials, and also with respect to information on the workforce employed in urban recycling. Future research could contribute, first, by mapping and consolidating existing but fragmented data, and collecting further data where needed. Second, more knowledge on communication strategies and incentives frameworks to motivate consumers to separate their waste is needed. This would not only help to improve the quality of recyclable materials, but also to protect urban recyclers' health and safety. Third, research on the political economy of the waste sector could contribute to navigating the interests and power constellations inherent in the waste sectors of many countries, including Argentina. Ultimately, such research would aid these countries in finding politically acceptable solutions that are in the interests of social, environmental and economic sustainability.

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Annex: List of interviews

Date	Category	Unique ID
Ongoing consultations	Academia	Aca1
08.03.2019	Academia	Aca2
08.03.2019	Academia	Aca3
28.02.2019	Academia	Aca4
18.02.2019	Cooperative	Coop1
20.02.2019	Cooperative	Coop2
20.02.2019	Cooperative	Coop3
25.02.2019	Cooperative	Coop4
25.02.2019	Cooperative	Coop5
27.02.2019	Cooperative	Coop6
27.02.2019	Cooperative	Coop7
27.02.2019	Cooperative	Coop8
27.02.2019	Cooperative	Coop9
06.03.2019	Cooperative	Coop10
06.03.2019	Cooperative	Coop11
07.03.2019	Cooperative	Coop12
27.03.2019	Cooperative	Coop13
19.02.2019	Cooperative	Coop14
14.02.2019	NGO	NGO1
28.02.2019	NGO	NGO2
07.03.2019	NGO	NGO3
11.03.2019	NGO	NGO4
28.03.2019	NGO	NGO5
28.03.2019	NGO	NGO6
06.03.2019	Private Sector	PrivS1
06.03.2019	Private Sector	PrivS2
13.03.2019	Private Sector	PrivS3
14.03.2019	Private Sector	PrivS4
14.03.2019	Private Sector	PrivS5
26.03.2019	Private Sector	PrivS6
27.03.2019	Private Sector	PrivS7
28.03.2019	Private Sector	PrivS8
29.03.2019	Private Sector	PrivS9
29.03.2019	Private Sector	PrivS10
25.04.2019	Private Sector	PrivS11
11.02.2019	Public sector	PubS1
19.02.2019	Public sector	PubS2
12.03.2019	Public sector	PubS3
13.03.2019	Public sector	PubS4
26.03.2019	Public sector	PubS5
28.03.2019	Public sector	PubS6
12.03.2019	Public sector	PubS8
29.03.2019	Public sector	PubS7

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