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Typology of Operational Models within Informal Waste Management and Recycling Sector

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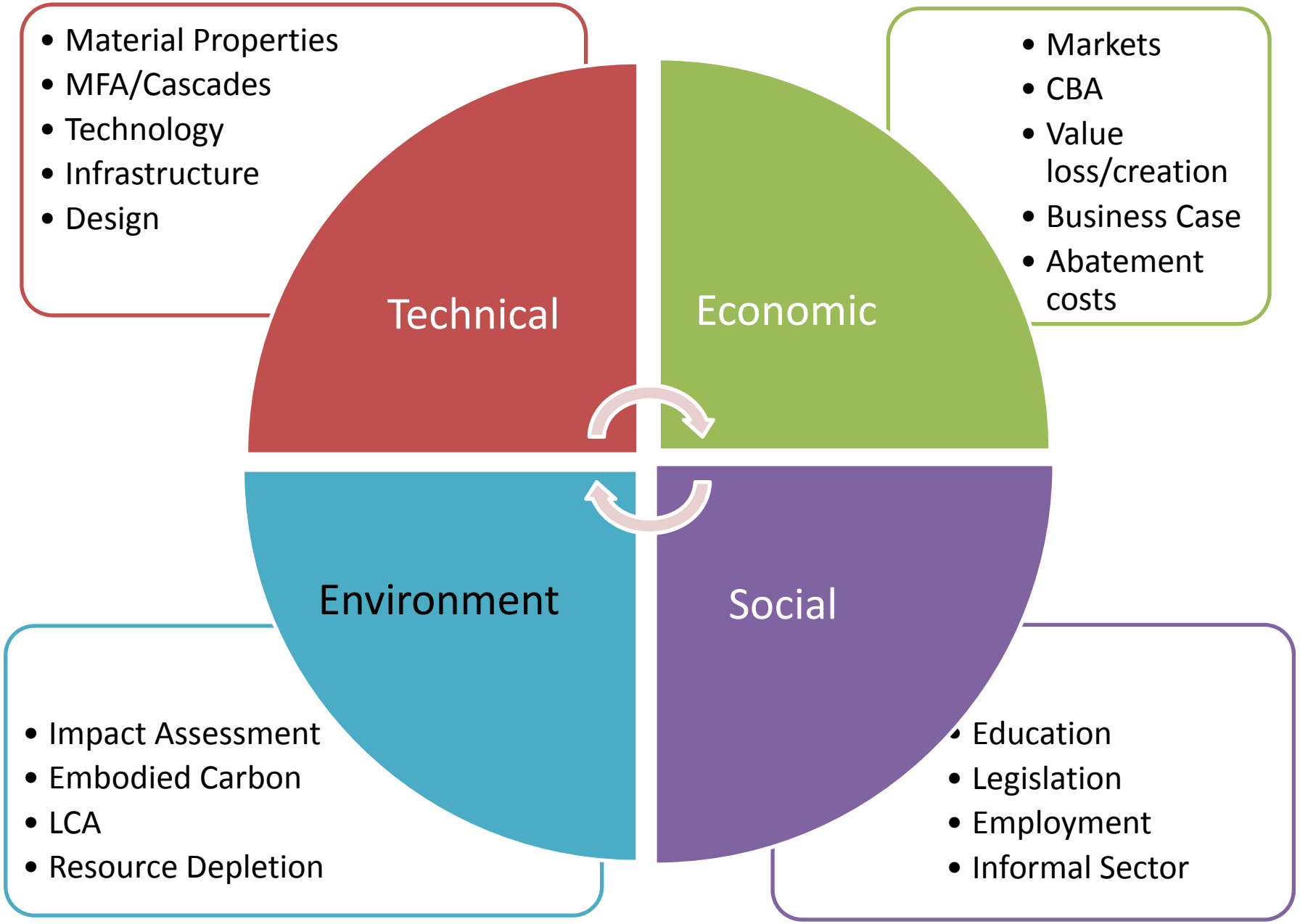
CERRY: Circular Economy & Resource RecoverY



Informal Recycling Sector (IRS)

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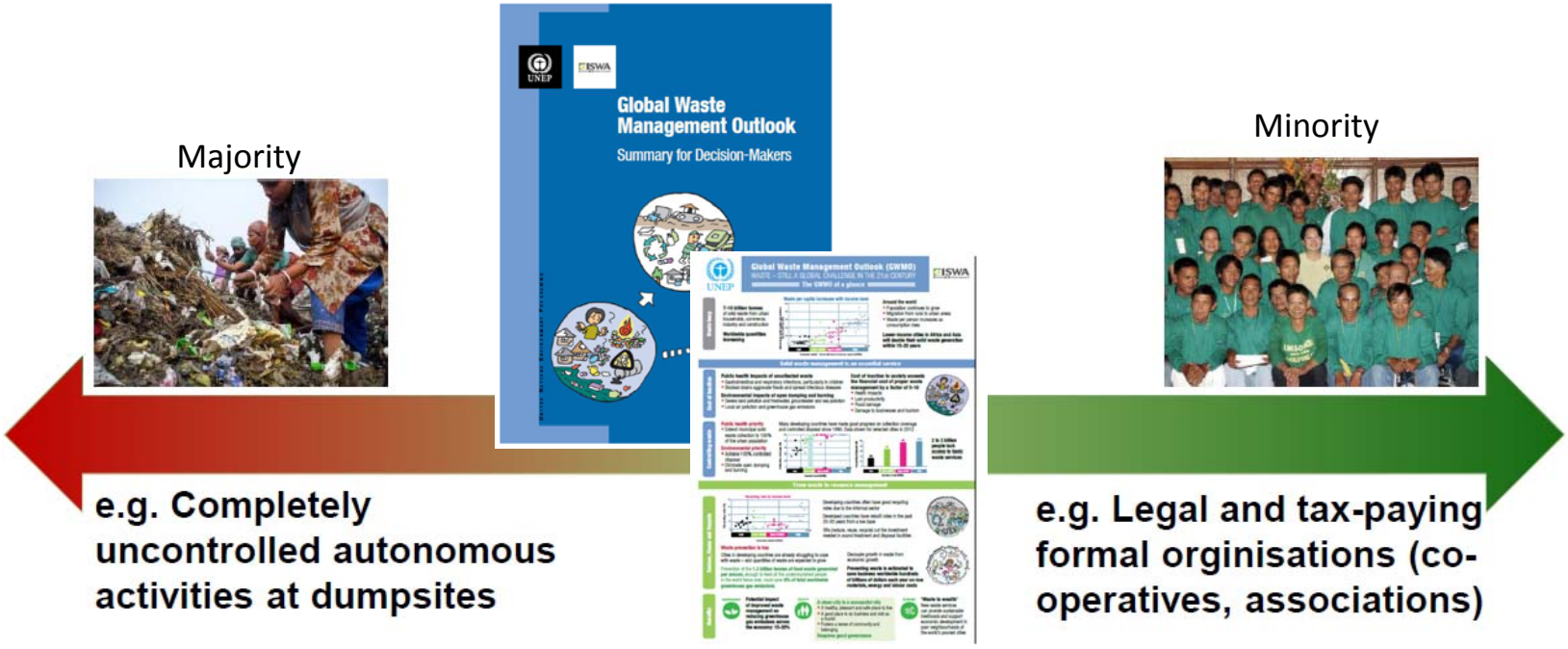
- Solid waste management (SWM) - essential service
- Materials recycling/reuse valuable for environment and society
- Informal sector is diverse and innovative
- Need to understand 'ecosystem' of actors and how they interact



IRS analytical and decision support tools

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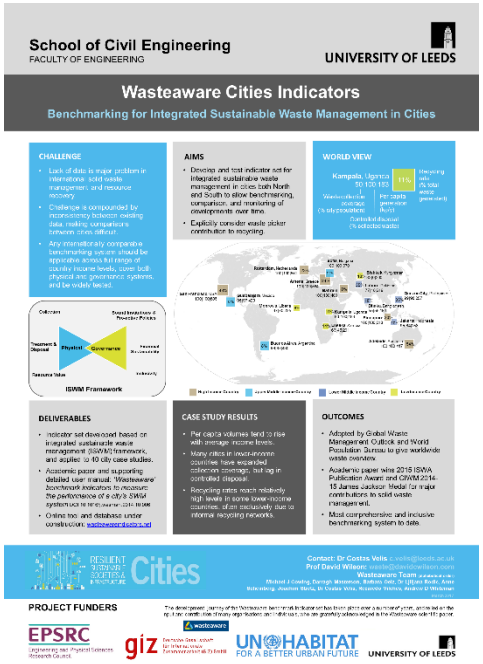

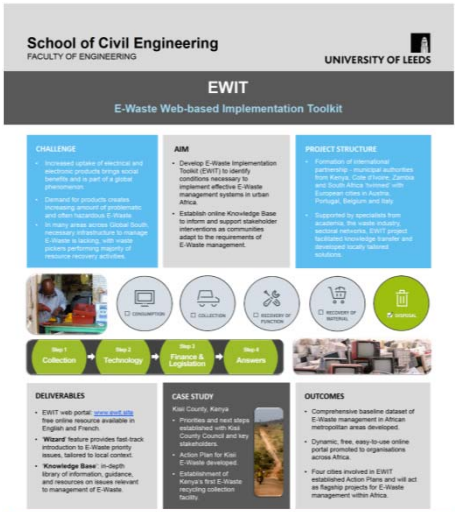

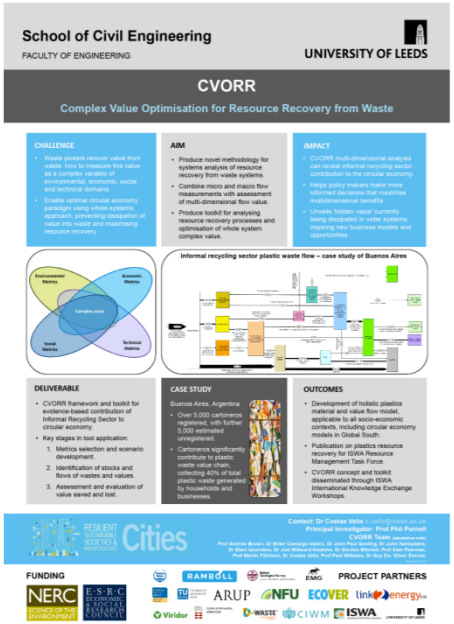

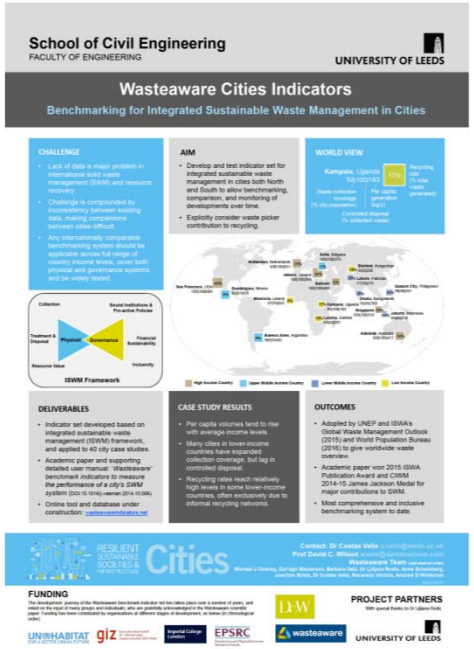

SoCo: Solidary Selective Collection and Inclusive Recycling Analysis Tool

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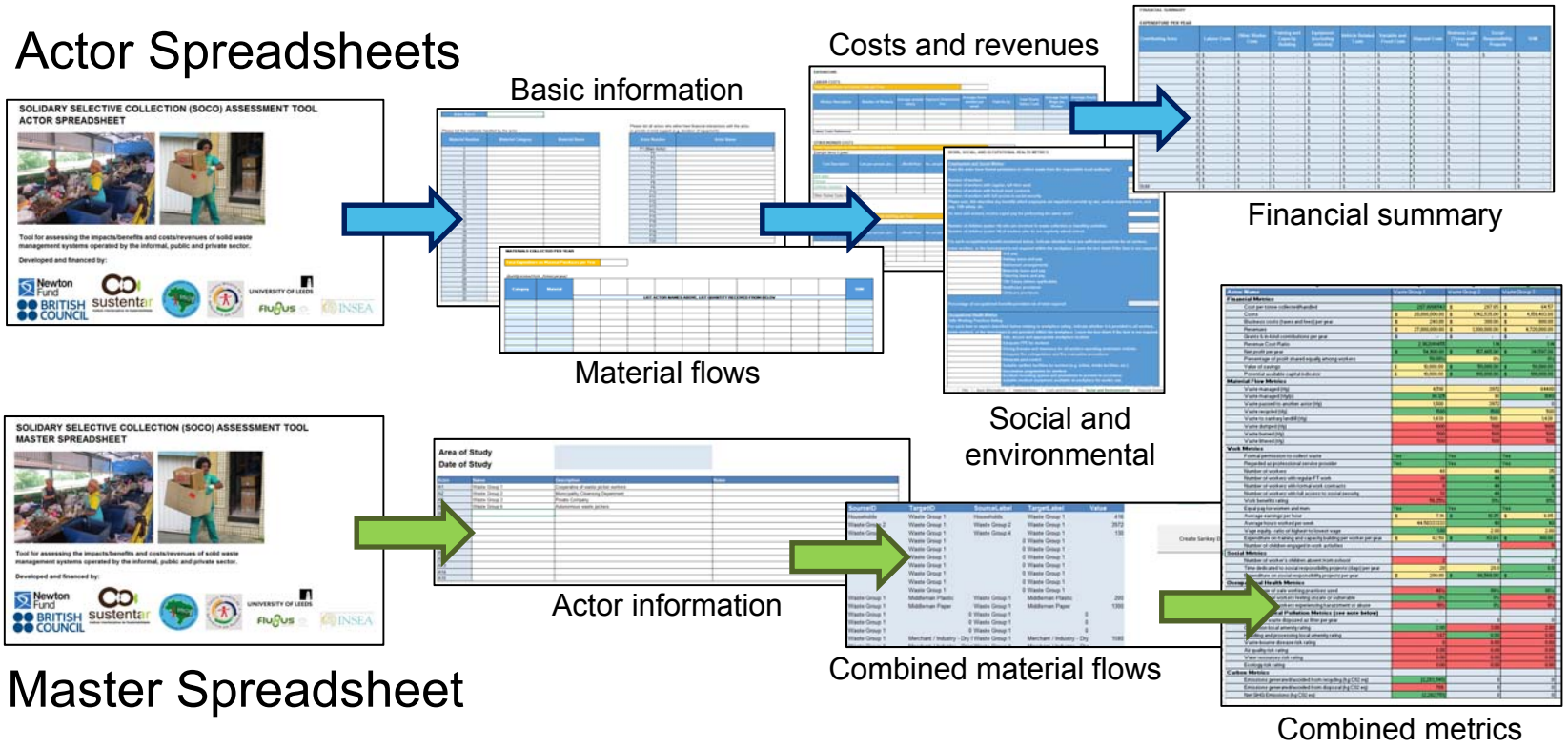

Method

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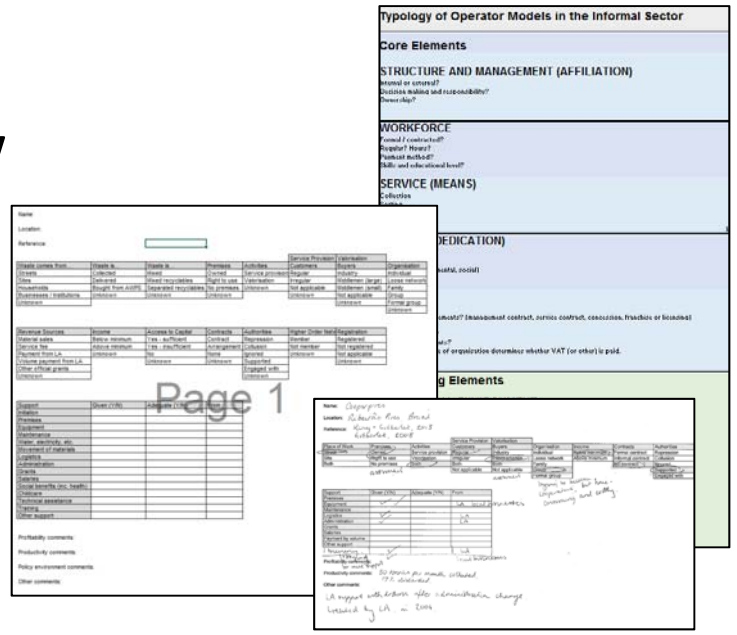
- Systematic literature review
- Screening of literature
- Extraction of information
- Analysis



Search Terms	Databases and Websites Searched	Results
Informal recycl* OR waste pick* OR (waste AND informal) **AND** **[Individual Latin American country names] OR Latin America OR Caribbean**	Web of Science Scopus ScienceDirect Websites of relevant organisations: WIEGO, GIZ, World Bank, Inter-American Development Bank Google	**403 abstracts** retrieved from journal databases. **103 sources** retrieved after removing irrelevant, duplicated, or inaccessible results. **28 case studies** extracted after screening for sufficient detail.

Results – Literature Review

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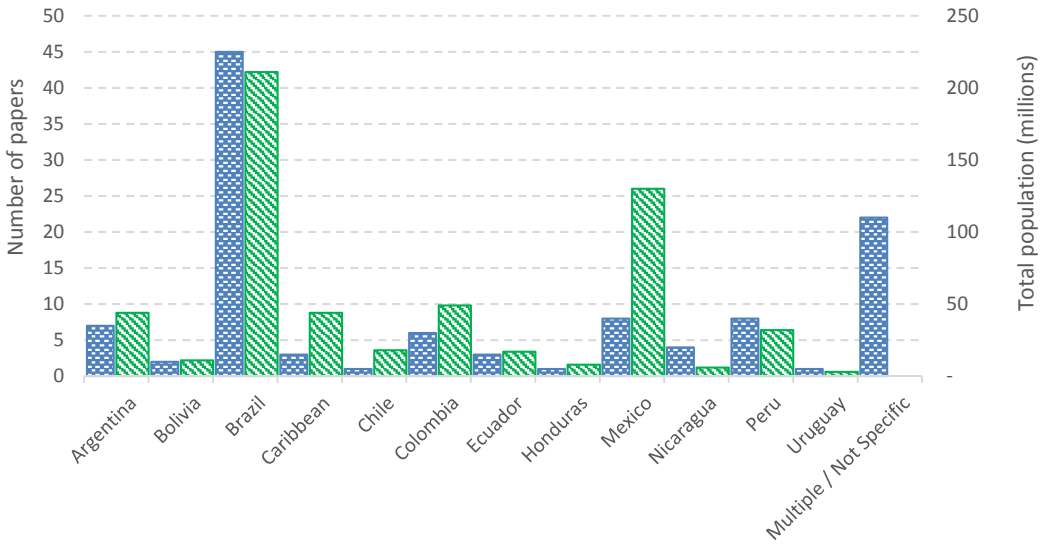

Fig.1 Geographical focus of papers retrieved from literature review and country population; population data taken from the World Bank data base

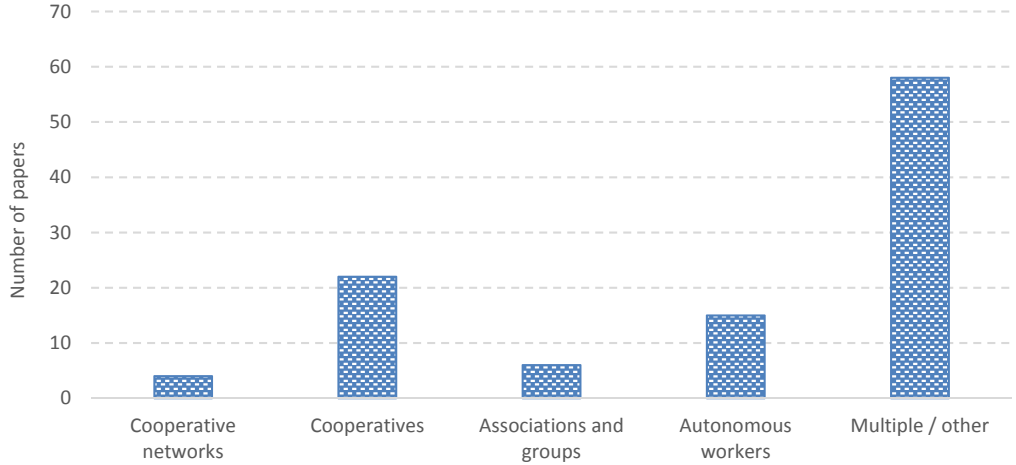

Fig. 2 Organisational models mentioned and discussed in the papers retrieved from literature review

Results - Typology

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Primary focus is:	Type	Activities	Primary purpose is:
Removing waste	I	Waste collection service	Service provision
	II	Waste collection service Recyclables are separated	Service provision and valorisation
Collecting recyclables	III	Recyclables collected	Valorisation
	IV	Recyclables collection service Rejects are separated	Service provision and valorisation

Ten common configurations identified from literature review and case studies

Results - Typology

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Type	Configuration	Description	Example
Ia		Waste collection service – waste is collected directly from households and disposed (either at a landfill or open dumpsite) by the IWMRS.	Carroceiros, Belo Horizonte, Brazil, prior to intervention [1]
Ib		Waste collection service – waste is collected directly from households by the IWMRS and deposited at a transfer station. Waste is then collected and disposed by the LA.	Carroceiros, Belo Horizonte, Brazil [1]

[1] Dias, S.: Recycling in Belo Horizonte , Brazil – An Overview of Inclusive Programming Recycling of Materials from Domestic Waste. WIEGO Policy Br. (Urban Policies) No 3. 1, 1–8 (2011)
[2] Medina, M.: Border scavenging: A case study of aluminum recycling in Laredo, TX and Nuevo Laredo, Mexico. Resour. Conserv. Recycl. 23, 107–126 (1998). doi:10.1016/S0921-3449(98)00019-6
[3] Hernandez, O., Rawlins, B., Schwartz, R.: Voluntary recycling in Quito: factors associated with participation in a pilot programme. Environ. Urban. 11, 145–160 (1999). doi:10.1177/095624789901100213
[4] Campos, M.J.Z., Zapata, P.: Switching Managua on! Connecting informal settlements to the formal city through household waste collection. Environ. Urban. 25, 225–242 (2013). doi:10.1177/0956247812468404
[5] Scheinberg, A., Simpson, M., Gupt, Y., Anschütz, J., Haenen, I., Tasheva, E., Hecke, J., Soos, R., Bharati, C., Garcia-Cortes, S., Gunsilius, E.: Economic Aspects of the Informal Sector in Solid Waste Management. , Eschborn, Germany (2010)
[6] Medina, M.: Waste Picker Cooperatives in Developing Countries. WIEGO/Cornell/SEWA Conf. Membership-Based Organ. Poor, Ahmedabad, India, January 2005. 1–36 (2005). doi:10.4324/9780203934074
[7] Purshouse, H., Rutkowski, J.E., Velis, C.A., Rutkowski, E.W., Da Silva Estevam, V., Soares, A.: Social Technology in Brazilian Informal Material Recycling Facilities. 15th International Conference on Environmental Science And Technology. 31st August - 2nd September. Rhodes, Greece (2017)
[8] Rutkowski, J.E., Rutkowski, E.W.: Expanding worldwide urban solid waste recycling : The Brazilian social technology in waste pickers inclusion. Waste Manag. Res. 33, (2015).
[9] King, M.F., Gutberlet, J.: Contribution of cooperative sector recycling to greenhouse gas emissions reduction: A case study of Ribeiro Pires, Brazil. Waste Manag. 33, 2771–2780 (2013). doi:10.1016/j.wasman.2013.07.031
[10] Gutberlet, J.: Empowering collective recycling initiatives: Video documentation and action research with a recycling co-op in Brazil. Resour. Conserv. Recycl. 52, 659–670 (2008). doi:10.1016/j.resconrec.2007.08.006
[11] Inter-American Development Bank: Regional policy dialogue 1. http://brik.iadb.org/handle/iadb/80838. (2002). Accessed 1 December 2016

Results - Typology

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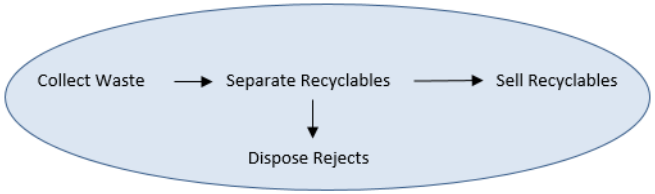
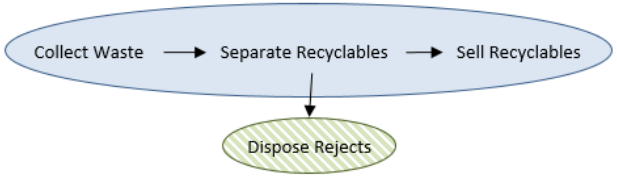
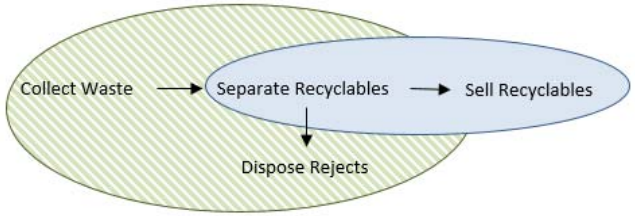
Type	Configuration	Description	Example
IIa		Waste collection service with recyclables diversion – waste is collected directly from households, recyclables are separated and sold, and remaining waste is disposed (either at a landfill or open dumpsite) by the IWMRS.	Recyclers in Laredo / Nuevo Laredo, USA/Mexico [2]
IIb		Waste collection service with recyclables diversion – waste is collected directly from households and recyclables separated and sold by the IWMRS. Remaining waste is deposited at a transfer station, and disposed by the LA.	Micro-enterprises, Quito, Ecuador [3] Manos Unidas, Managua, Nicaragua [4]
IIc		Waste collection service with recyclables diversion – waste is collected directly from households by formal municipal solid waste workers. Recyclables are informally retrieved from the waste during their collection rounds, and are diverted to material buyers.	Medina and Scheinberg et al. [5, 6] discuss the separation of recyclables during municipal solid waste collection rounds

Informal Recycling Sector
Local Authority
Private Industry

Results - Typology

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Type	Configuration	Description	Example
IIIa		Recyclables collection - separated recyclables are collected by the IWMRS (picking from the street, collecting directly from households, or picking from landfills), then sorted and sold.	Recyclers in Laredo / Nuevo Laredo, USA/Mexico [2]
IIIb		Recyclables collection - separated recyclables are collected by the IWMRS (picking from the street, collecting directly from households, or picking from landfills) and sold to another informal actor (e.g. cooperative group) who may perform further segregation and aggregation. The recyclables then may be sold directly, or sold through another IWMRS actor (e.g. cooperative network).	Coopesol Leste, Belo Horizonte, Brazil [7] Coopert, Itauna, Brazil [8]

Informal Recycling Sector
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Results - Typology

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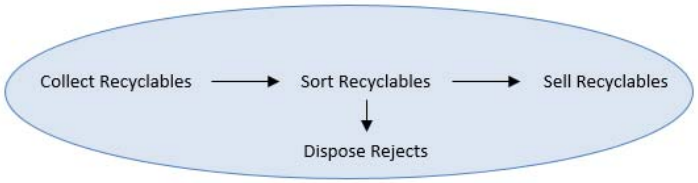
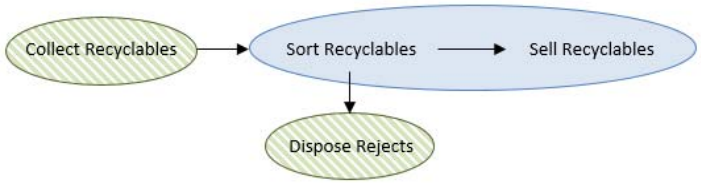
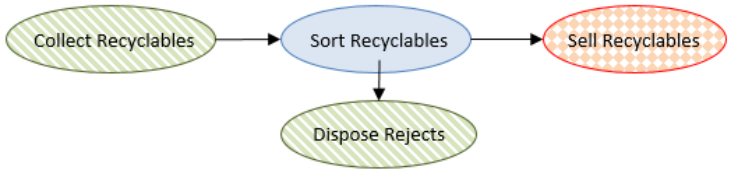
Type	Configuration	Description	Example
IVa		Recyclables collection service – comingled recyclables are collected by the IWMRS directly from households, sorted and sold, and rejected material is disposed.	Cooperpires, Ribeirão Pires, Brazil [9, 10] Coopert, Itauna, Brazil; Cocamar, Natal, Brazil; CooperRegião, Londrina, Brazil [8]
IVb		Recyclables collection service – comingled recyclables are collected by the LA directly from households, delivered to the informal actor, then sorted and sold. Rejected material is collected and disposed by the LA.	Coopesol Leste, Belo Horizonte, Brazil [7]
IVc		Recyclables collection service - comingled recyclables are collected by the LA directly from households, delivered to the IWMRS, then sorted and sold directly to a private company, who might be a reprocessor. Rejected material is collected and disposed by the LA.	Private Company and Recyclers, La Reina, Chile [11]

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Conclusions

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- Deficiency of detail in case studies
- Diversity in activities, workforce and employment characteristics, affiliation, motivations, contractual arrangements, commercial and political environments.
- 4 basic operational models and 10 commonly realised configurations identified and elaborated.
- Type IV operational model most common in case studies, with LAs formalising services around this.
- Autonomous recyclers would benefit from more attention in the literature, as they represent greater proportion.

Other IRS tools

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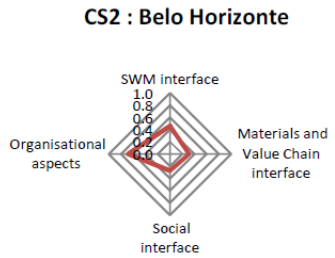
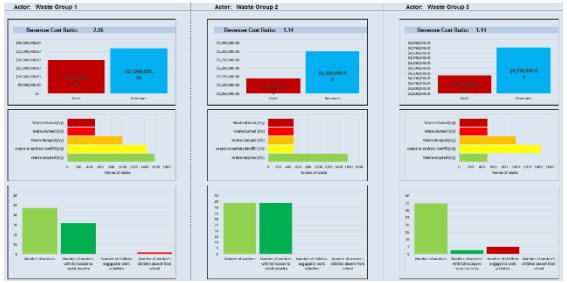
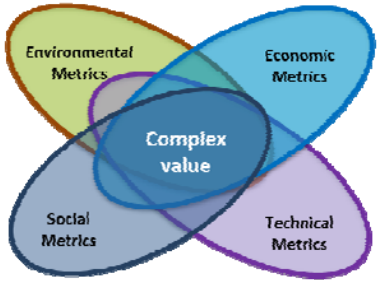
Wilson, D.C. et al. 2015. **'Wasteaware' benchmark indicators for integrated sustainable waste management in cities.** *Waste Management*. 35, pp.329-342.



Velis, C.A. et al. 2012. **An analytical framework and tool ('InteRa') for integrating the informal recycling sector in waste and resource management systems in developing countries.** *Waste Management & Research*. 30(9), pp.43-66.

Solidary Selective Collection of Waste (SoCo) – analysis tool for holistic review of impacts and benefits from informal and formal recycling. British Council / Newton Fund institutional links funding.





Complex Value Optimisation for Resource Recovery from Waste (CVORR) – toolkit for optimising potential to recover value from waste. NERC, ESRC and Defra funded.

EWIT – web portal of expert guidance addressing challenges of e-waste in Africa. EU Horizon 2020 funded.

Funding and Project partners

INSTITUTIONAL
LINKS

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Thank you for listening!

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