

Managerial Functions of an Independent Coordinating Body in the Governance of Waste Management

Massimo Beccarello¹ & Giacomo Di Foggia¹

¹ Department of Business and Law, University of Milano-Bicocca

Correspondence: Giacomo Di Foggia, Department of Business and Law, University of Milano-Bicocca, Italy.

Received: August 9, 2022

Accepted: September 19, 2022

Online Published: September 27, 2022

doi:10.5539/jms.v12n2p48

URL: <https://doi.org/10.5539/jms.v12n2p48>

Abstract

Policies adopted to improve the competitiveness of public services include those designed to reform governance. Good governance of the waste management industry is becoming one of the most thought-provoking themes in heading toward a more circular economy. Given the complexity of this industry, the starting point for improving waste management performance must be at the industry structure and governance level. Although the economic literature on waste management has deeply investigated economic efficiency, business models, environmental performances, and citizens' behavior, governance's role in supporting the market's healthy functioning has received little attention. In such an evolving industry, securing a competitive market while ensuring the universality of waste management services and reaching circular economy targets is challenging. Based on both a theoretical approach and empirical analysis, we provide insights into the managerial functions of an independent body aimed at performing tasks that help policymakers to implement policies, waste management operators make decisions, and stakeholders, get information. We identify the economic and managerial functions that shall be entrusted to an independent coordinating body to coordinate and support the operators and institutions involved in the waste management industry. Focusing on municipal solid waste, we justify our proposal since it is a public service with environmental and economic implications at the center of the transition toward a more circular economy. Given its complexity, it needs to be properly governed to avoid policy and strategic drifts that may hinder the transition path.

Keywords: waste management, agency, public services, network industry, economic regulation, public governance, waste market, municipal solid waste

1. Introduction

The municipal waste management industry provides a service of economic relevance with increasing environmental protection goals; consequently, studies on the sustainability of waste management organization and strategies are gaining momentum (Camana, Manzardo, Toniolo, Gallo, & Scipioni, 2021). The new circular economy action plan was endorsed by the European Commission in 2020. It is a key component of the new European strategy for sustainable growth and introduces measures targeting areas where action at the EU level creates added value.

The governance of the waste management industry must reach a challenging equilibrium among balancing technical efficiency through the most suitable forms of competition policies and economic regulation, economic efficiency through market forms to guarantee the production of the service at the lowest cost for the community, and universality of the service for citizens and a fair and nondiscriminatory level playing field for the companies operating in this industry (Di Foggia & Beccarello, 2021). The importance of effective governance has emerged following the European circular economy legislation that has prompted a new phase in waste management, especially regarding targets on recycling and disposal options (European Commission, 2015).

Widely speaking, the governance of the waste management industry is the combination of processes that institutions and delegated bodies implement to oversee, manage and monitor the industry, comprehending different levels of regulation. That is why independent bodies are needed in many network services characterized by multilevel regulation and environmental targets to provide technical and operational support for proper market functioning (Cave & Stern, 2013). Many of these activities relate to a role in implementing circular economy goals, which requires operational skill, typically out of the scope of political and regulatory entities' roles.

Based on the demands of the circular economy package, literature on waste management industry trends and empirical analysis of the evolution of the Italian industry, we foresee the economic and managerial functions of an independent coordinating body within the municipal waste management system considering circular economy goals.

Several factors impact an independent body's definition: ownership, market forms, levels of regulation, and functions, to mention a few. Ownership and market forms influence the role of public intervention as well as the efficiency and equity with which the service is provided, with different objective values that dominate the private economic sphere and the traditional public sphere, respectively.

In the first area, there is rationality, understood as means-ends adequacy, of the economic operator that manifests itself in the choice of means and modes of action appropriate to the efficiency goals that characterize it. In the second area, the public operator's rationality also manifests itself in the choice of means and modes of action adequate to the ends of justice (Bocken, Short, Rana, & Evans, 2014; Steiner, Kaiser, Tapscott, & Navarro, 2018). Typically, private economic actors pursue efficiency through a system of production and exchange choices aimed at achieving welfare goals. These are the ends of action, and the instrument is the system of choices made in the market. In the case of the public, the end is the achievement of social justice, and the instrument is the constraints placed through the law on behavior.

Both the number parties involved and levels of regulation impact how an independent coordinating body interacts with the market operators and institutions due to the role of each level that, in turn, influences the economic and managerial functions needed to perform the duties and functions assigned to it effectively.

Based on these assumptions, the role of an independent coordinating body is outlined in line with the guarantee of the universality of service, which is one of the pillars of the public interest (Huang, 2022). In economic terms, the concept of universality of service is used primarily in regulated sectors, referring to the practice of providing a basic level of services to the community with objectives that, by way of example, include promoting the availability of quality services at affordable prices and at the same time guaranteeing an adequate level of quality and promoting the availability of such services to all citizens, including those in low-demand areas or geographic areas with high production costs at prices reasonably comparable with those in areas with lower production costs (Luthra, 2019). The concept of universal service has been widely adopted in Europe in policies accompanying network services' liberalization and privatization processes.

Previous literature has scarcely addressed this topic in the context of waste management. In contrast, many studies are available, especially on the energy and telecommunication industries, since both the energy and telecommunication industries have gone through reform paths earlier than the waste management industry, which is now facing a particularly challenging period (Granderson, 2019; Pollitt, 2012).

Governing the transition of such a complex industry in which there are remarkable ongoing changes in waste production (Chen, Bodirsky, Krueger, Mishra, & Popp, 2020), treatment and disposal technologies (Makarichi, Jutdamrongphan, & Techato, 2018), policy and regulation (Jenkins, Kopits, & Simpson, 2009; Wilts, Von Gries, & Bahn-Walkowiak, 2016), strategies (Zhang, Qin, Li, & Tseng, 2021), and environmental objectives is complex.

In a modern waste management industry, business and consumption decisions are left to firms that operate in one or more phases of the chain and individuals who, through their behavior, can contribute to efficiency and the healthy functioning of the market. Governments are sometimes involved in owning the means of production. Some intervention is needed; therefore, there are degrees of public intervention via different functions. We focus on the economic functions advocating for an economic agent to coordinate and support the industry while ensuring the quality and universality of the waste management service. More specifically, an independent coordinating body could assume the role of coordinator by guaranteeing the proper functioning of the waste management market and the protection of technical quality, transparency and data providing, support, and subsidiary functions to ensure economic efficiency, social equality and circular economy targets (Di Foggia & Beccarello, 2022b). In addition to balancing the demand for the waste management service and the provision of the service, an independent coordinating body shall forecast future changes in the demand for waste management service.

We test our idea through a business case analysis, a sound methodology in social sciences. Our results can serve scholars and policymakers worldwide since the managerial functions of service operators may be similar, given the globally increasing circular economy targets that require a modern waste management industry organization. We focus on the role that an independent coordinating body shall play within the waste management industry, and on the managerial function it shall exercise.

The remainder of this paper is organized as follows. Section two provides insights into the industry's multilevel governance and structure. Section three contains the detailed analysis of our business case discussed in section four. Conclusions follow.

2. Governance and Market Structure

Public provision of network services was the rule across Europe for most of the twentieth century. However, the last forty years have witnessed a major change in this practice, as several economic, political, and social factors have led to a reconsideration of the public role. Policies adopted to improve the competitiveness of public service provision include those designed to increase competition through liberalization, alter the nature of regulation, and change ownership structures through privatization with controversial opinions on the externalities. It has brought about industrial restructuring, and the role of the state often transformed from that of monopolistic service provider to that of regulator (Palcic & Reeves, 2011). Consequently, governments have increasingly learned to better address market failures in important sectors while helping attract investments and focusing on innovation and competitiveness. Compared with other services, such as energy, telecommunications, and transport, waste management has only recently entered an era of deep transformation. Focusing on Italy, one of the most important pieces of waste legislation was Legislative Decree 22/97, which shaped the national waste management system, introduced targets for the separate collection of municipal waste, established the National Packaging Consortium and provided for the progressive replacement of the old waste tax with a new waste tariff; Legislative Decree 152/2006 replaced it, keeping most of its provisions. Law 205/2017 was assigned to the Regulatory Authority for Energy, Networks, and the Environment (ARERA) functions for regulating and controlling the municipal solid waste industry. The functions attributed to the Authority include disseminating knowledge and transparency of the conditions for providing services for the benefit of users and protecting users' rights.

Legislative Decree 116/2020 amended Legislative Decree 152/2006. It changed Italian environmental legislation regarding the environmental marking of packaging, the circular economy targets, and the extended responsibility of producers for the waste they produce, waste management and transport.

The mentioned legislative framework is the basis of the current governance model. A sound organization and governance architecture must carefully consider the role of the various institutional actors involved in the sector's multilevel regulation, including overlapping their responsibilities on specific issues. From a hierarchical perspective, different parties and policies are involved. Global political commitments on climate and environment, international institutions that set targets and supranational policies, central government that sets national goals and incentives, local governments that implement national policies on the territory, local authorities and municipalities that organize and define the local service, environmental agencies that set technical and economic rules, market regulatory bodies that foresee the respect of market functioning and laws.

Figure 1 resumes a multilevel regulation framework.

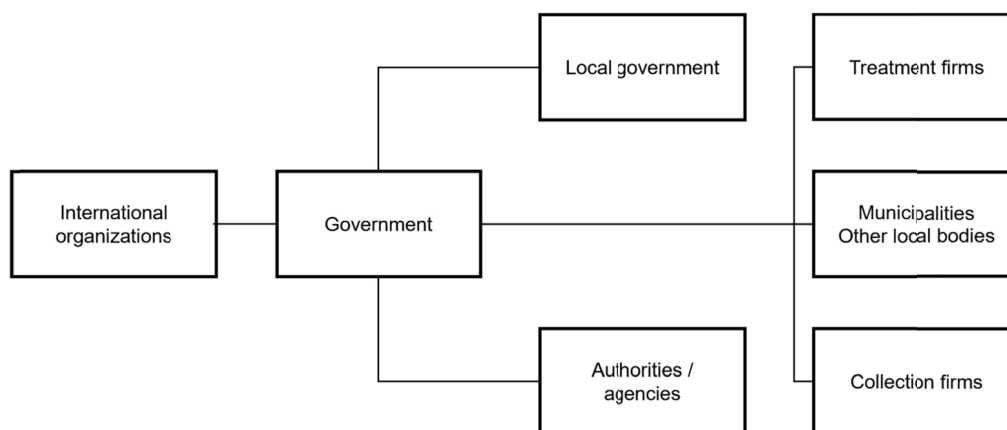


Figure 1. Multilevel governance scheme

Regarding the market forms in the different phases of the municipal waste management chain, it is important to recall that the waste collection phase is a typical monopoly, while the activities of the waste treatment phase take

place in both a competitive and monopolistic manner according to the type of service; the degree of concentration also influences the cost of service (Bryant, 2016; Gradus, Schoute, & Dijkgraaf, 2018).

In addition to improving the waste management system to ensure homogeneous accessibility, usability and dissemination throughout the country as well as adequate quality levels, there is also the objective of waste treatment infrastructure adaptation to circular economy targets (Di Foggia & Beccarello, 2021).

We deem that there are economies of scale and scope in service provision, although previous literature shows different results (Dijkgraaf & Gradus, 2015; Leal Filho, Brandli, Moora, Kruopienė, & Stenmarck, 2016; Swart & Groot, 2015; Warner, 2011). In general, terms, economies of scale refer to the relationship between increasing the scale of production and decreasing the unit cost of production. For example, economies of scale occur when a company's output increases and causes fixed costs to become a smaller percentage of each unit. In such circumstances, a monopolistic provision of waste management service may be the first best; consequently, the role of regulation is crucial (Joskow, 2007; Massarutto, 2007).

Concerning the scope and drivers of economies of scale, internal economies of scale may be due to technical improvements, management efficiency, financial capacity, and market power, while external economies are those where companies can influence the economic priorities of a sector. It should be noted that this is typically not a relationship that always occurs as the scale of production increases; indeed, three macroconditions: economies of scale, constant returns and finally, diseconomies of scale that, in some cases, may occur when a firm becomes too large losing all or part of the efficiencies initially acquired.

Economies of scope emerge when providing two or more activities together is more efficient than providing them separately (Worthington & Higgs, 2014). Economies of scope also include situations where two or more activities are structurally dependent on each other and can be performed more efficiently by the same entity (Chavas & Kim, 2010; Saal, Arocena, Maziotis, & Triebs, 2013). An additional element to be considered within a multilevel regulation model concerns the different orientations of local governments regarding market forms and service standards.

The heterogeneity of authorities' preferences in terms of organizational strategy plays an important role since local authorities may differ in their preferences on the quantity or quality of service due to, for example, different socioeconomic or morphological conditions, which impact the type of regulation (Cahill, Grimes, & Wilson, 2011). The heterogeneity in authorities' preferences may make it more difficult to reach a consensus on the optimal level of service. Economies of scale, scope, and heterogeneity of local policies impact efforts to improve waste collection, treatment, and disposal services considering the universality of service and homogenization of service quality standards.

The role of the environmental authorities within the efficient governance of the service is also fundamental for greater functional collaboration between the regulator, which establishes the general principles for the recognition of service costs, technical and commercial quality standards according to circular economy goals, and the local government, which integrates the criteria within the procedures of procurement, local guidance, and control of the service. Indeed, the solid waste management industry has involved complex and multifaceted trade-offs among many waste treatment technologies, economic tools, and regulatory frameworks (Pires, Martinho, & Chang, 2011).

In the multilevel governance model, we hypothesize the need for a third-party operator with public economic and management functions to perform strategic and operational tasks. In short, activities to support multilevel governance and market functioning are carried out by an independent coordinating body third party that is also intertwined with operators to coordinate and facilitate interrelationships among market players to achieve circular economy goals.

There are many economic and managerial functions, and the following is a non-exhaustive list of some of the required activities. To support policymaking, reporting the environmental results of the waste management chain is important to tailor specific convergence policies. Due to the increasing EPR systems, coordination between such systems and public administrations is necessary. Due to different performance levels across the country, activities regarding the universality of the service are deemed essential to guarantee the equity of treatment for citizens. Planning and monitoring environmental objectives and the performance of the various EPR systems are also important. Coordination of agreements and understandings between the various actors in the supply chain is needed to reduce information asymmetries and transaction costs.

The power of substitution and intervention in the market to carry on the service in lagging areas or struggling firms is crucial to guarantee the service. Supporting local authorities in pursuit of environmental objectives and

helping them in designing and implementing sorted collection strategies is important for quality-level convergence purposes. Technical support for operators is another essential service due to the fragmentation of the service providers, especially in the collection phase; indeed, at the time of this writing, activities such as sweeping, cleaning, collection, transportation, recycling, treatment, and disposal of municipal waste may all be managed by a single operator or, as is most often the case in Italy at present, there may be different operators for each activity. Defining and implementing policies for modulating the fee according to the actual reuse and recycling of waste is functional to improve the system efficiency. Finally, providing data and managing statistical information is useful for the operations among chain operators and stakeholders in general.

3. Business Case

Case study analysis is a sound methodology in social sciences; the analysis can refer to an organization, a sector or a location using qualitative and quantitative approaches (Lyu, Buts, & Jegers, 2020). To contextualize our research, it is anticipated that the policy area is Italy; however, our results can easily be extended to other countries since the managerial functions of service operators may be similar, given that circular economy targets are deemed to converge, and that waste management organization complexity is increasing to comply with such targets. With respect to the specific purposes of our business case analysis, we focus on the role that an independent coordinating body shall play within the waste management industry, particularly if managerial functions are concerned. Consequently, this is a single case study starting from the Italian case, and we use a qualitative analysis.

The municipal waste management chain has two phases: one relating to waste collection and the other relating to waste treatment. Assuming the organizational separation of the two phases, it is possible to verify important functional complementarities concerning plant organization in the treatment and disposal phase and the general objectives of the circular economy.

From the point of view of industrial organization, municipal waste management is a service that can be separated into two consecutive phases of activity, as shown in Figure 2. The first relates to the collection and transport phase, in which the need to guarantee the objectives of efficiency and homogeneous quality has led to the emergence of the procurement or competition model as the prevailing market organization model. The second relates to the treatment and disposal phases, in which the dominant market form depends to a large extent on the regional planning of waste flows.

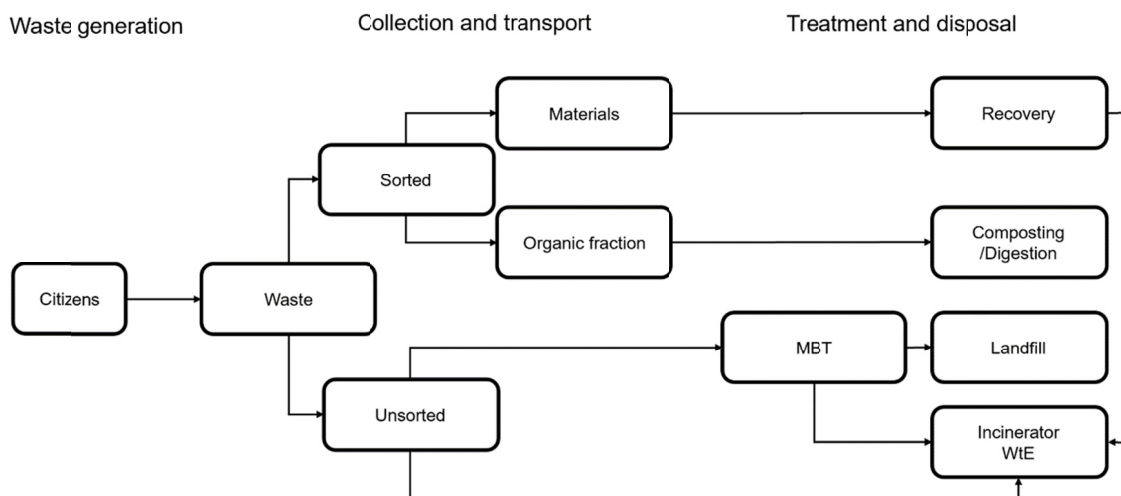


Figure 2. The waste management chain

Therefore, the peculiarity of the sector is the coexistence of the public interest, environmental targets, different market structures, the need to apply both competition policy and market regulation tools, and the presence of multiple market players that are essential for the system's functioning. Protection and public purpose are found in the need for an independent coordinating body to coordinate and ensure the achievement of recycling and recovery targets. With the setting up and entering into force of the consortium system, the Italian waste industry began to transition toward a system based on prevention, packaging recovery, and recycling. The consortium

system was established as a private law body and, therefore, based on private law rules that protect its statutory and organizational autonomy but with aims that pursue public interest activities in the environmental field. Its members are packaging producers and users, covering the costs of collecting, recovering, and recycling packaging by paying a membership fee without increasing the price citizens pay. The fee is used to finance the activities of the consortium system, starting with the promotion of the separate collection through the payment to municipal administrations in compliance with an agreement with the national association of municipalities.

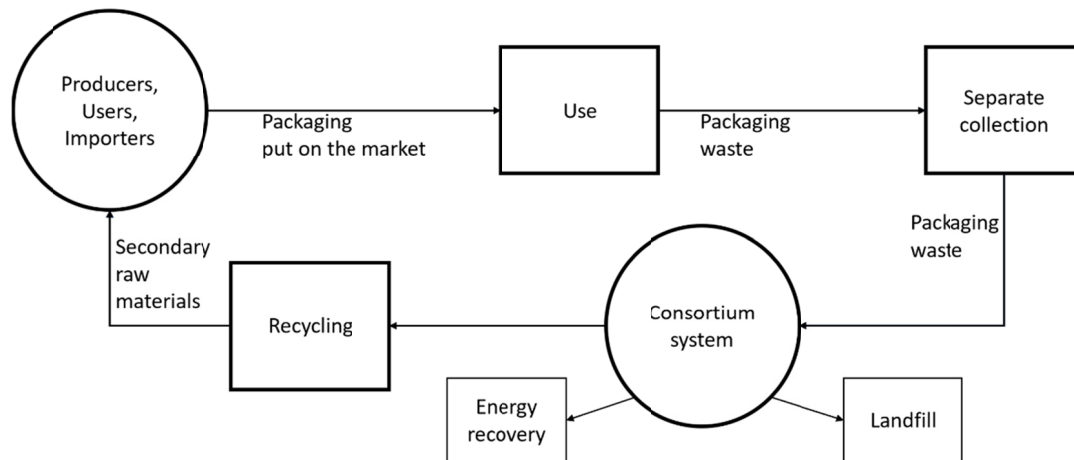


Figure 3. Material flow

The environmental objectives behind its establishment consist of achieving the goals of recovery and recycling of packaging waste, the pursuit of proper coordination of separate collection activities, and the need to foster the connection between economic operators involved in the disposal of packaging waste, material consortia and the public administration.

Among other functions, the consortium system promotes, manages, and coordinates the activity of separate collections of packaging waste according to the criteria of efficiency, effectiveness, and cost-effectiveness to ensure that the objectives of recovery and recycling of packaging waste are achieved, supervises cooperation between the consortia and other economic operators, defines the fee for the management of packaging waste, incentivizes the respect of the waste hierarchy, such as support for research and innovation in advanced recycling technologies, and encourages the recycling and recovery of raw materials. Table 1 summarizes the Italian packaging management model regarding the scheme of responsibilities.

Table 1. Packing waste governance model

Activity	Municipal Packaging Waste	Commercial and Industrial Packaging Waste
Prevention	Enterprises (producers and importers)	Enterprises (domestic producers and importers)
Collection	Local authorities	Enterprises (waste producers), EPR systems
Recycling and recovery	EPR systems	EPR systems

Source: Authors based on Di Foggia and Beccarello, 2022a.

Figure 4 synthesizes prominent economic and managerial functions of an independent coordinating body within the waste management industry. In this sense, an independent coordinating body may encourage companies to offer consumers waste management services on the most favorable terms. It encourages efficiency and innovation and reduces prices. It may help in making the industry work better, including through improved market surveillance, contributing to a level playing field and empowering businesses, ensuring the standardization and development of reporting and auditing standards, ensuring a high level of consumer protection and quality of waste management service, producing and communicating high-quality statistics and other data. Such economic and managerial functions are important so that the system operator may support the functioning of the waste management market by strengthening common market rules, as well as by taking part in initiatives and monitoring the well-functioning and transparency of the market, advising the government and

regulators on material and financial issues.



Figure 4. Prominent managerial functions

Source: Adapted from (Di Foggia & Beccarello, 2022b).

4. Discussion

To assess the consortium system's role, considering the increasing competition in the waste management market, it is necessary to start from its current intervention functions in the sector. The definition of general take-back conditions for sorted waste and the development of prevention programs are regulatory and planning functions in the sector, emphasizing the public function at the very basis of the consortium design.

Alongside these functions, there is also a direct intervention role, for example, the organization of information campaigns aimed at engaging citizens, management, and distribution of financial resources for covering the costs of running the separate collection at defined quality standards, data collection, and information providing services. This latter information function represents an element that reduces information asymmetries, which in a multilevel regulatory setup are among the causes of market failures. The above functions assume an economic and regulatory role on the one hand and an intervention role on the other.

A further role is related to horizontal subsidiarity functions. Interventions to improve equity or distributive outcomes can improve the distribution of market outcomes, ensuring that people in similar circumstances are treated equally and have equal access to services, i.e., horizontal equity. A significant body of literature considers the reasons and best intervention methods to improve equity. Considering the above, it is worth emphasizing the concept of horizontal subsidiarity of the consortium system, which operates according to the principle of subsidiarity, temporarily running the service instead of waste management companies in the event of failings or inadequacy of the collection systems that struggle to achieve recovery and recycling targets.

To this end, the changes in the financial requirements to cover the cost of separate collection, recycling, and recovery of packaging waste reflect the role of the consortium system as a subsidiary to the market and able to cope with crises in the recycling market, counterbalancing resources according to the context.

Emblematic are recent novelties in multilevel regulation according to which, if public administrations do not activate adequate systems of differentiated waste collection, substitute actions may be activated, using public or private parties identified through transparent and selective procedures on a temporary and emergency basis, if this takes place within suitably identified optimal areas for the organization and integration of the service deemed insufficient. This gives the consortium a second-tier role since territorially competent bodies are responsible for waste management. Therefore, the consortium plays a supporting role in the initiatives taken by the latter since these are actions, in the first instance, the responsibility of the territorially competent bodies. This provision is marginal given that the territorially competent bodies should exercise the prerogatives of public bodies in organizing the separate collection service.

Recent legislation stipulates that packaging must be labeled following the applicable technical standards to facilitate the collection, reuse, recovery, and recycling of packaging and to provide consumers with correct information on the end uses of packaging. Producers must also indicate the packaging materials to identify and classify packaging.

To provide interpretative guidelines to companies, the consortium also issues guidelines. Thus, to understand how the waste management system should be structured, it is essential to refer to the concept of market subsidiarity, given that it makes it possible to support regulatory activity and consider the balancing act between environmental protection and competition. Subsidiarity takes place along two levels. The first is the downstream one, in the management of packaging waste, given the universality of the service guaranteed throughout the country. The second is the upstream one concerning the fulfillment of EPR obligations.

Based on the prevalence of environmental requirements, the market structure is being upgraded toward a complex system in which economic efficiency, environmental targets and competition laws are combined. This may make it possible to better achieve, for example, through potential competition between the various autonomous systems and the environmental protection requirements according to the canon according to which environmental objectives are also achieved using market instruments.

In the context of this multifaceted system, the consortium is recognized as the beating heart of the system, and it acts as the intermediary between the institutional subjects responsible for the phase of public competence and the economic operators responsible for the subsequent phases. On the other hand, it acts as the subject capable of identifying and remedying the system's flaws. In such a context that sees an increase in the number of operators within the waste management chain, the need for an actor to direct, coordinate and connect this plurality of actors with each other and local and national public administrations appears urgent. The consortium could be a natural candidate for this role, as it coordinates the activities of autonomous systems and public administrations.

5. Conclusions

Governments face many complex problems and are constantly asked to deliver public services in the most cost-effective, efficient, and environmentally sustainable way. The need to shed light on how waste management governance can lead the way toward a more efficient industry and thus toward a more circular economy has justified the scope of this article. We have underlined that given the complexity of this industry, the starting point for improving waste management performance is proper governance that must head at boosting competition within the chain, guaranteeing the universality of the service, securing adequate quality standards, and meeting environmental targets. At this time, the waste management industry has seen a remarkable breakthrough in technology, citizens' engagement, market structure, and value creation, especially from recycling. Using a multilevel governance framework, we have proposed the introduction of an independent coordinating body in the governance of this industry to support institutions and firms. Distinct from governments and regulators, the independent coordinating body shall perform specific tasks that help institutions and firms implement policies and make decisions. More specifically, we have highlighted some priorities regarding functional and operational activities to support multilevel regulation aimed at identifying the role of the system operator. The most prominent activities are as follows. Reporting the results of circular economy goals is functional to policymaking and international commitment. Guaranteeing the universality of the service regardless of market conditions and territoriality is critical for social equity. Planning, monitoring, and coordinating agreements and understandings between the various industry players resume the main activities of a typical independent coordinating body that we deem necessary in waste management. Applying the principle of subsidiarity, which includes direct intervention in the market to deal with production inefficiencies, is a prerequisite for homogeneous quality of the service and service continuity. Supporting local authorities in designing sorted waste collection systems is needed to meet circular economy. Defining and implementing policies to modulate the financing mechanism according to the reuse and recycling of waste is important to comply with the polluters pay principle. Finally,

providing information to increase transparency in the sector is a viable way to prevent market failures. Most of the tasks mentioned above are necessary to lead the industry toward circular economy goals, the implementation of which requires operational skills out of regulators and policymakers' scopes.

References

- Bocken, N. M. P., Short, S. W., Rana, P., & Evans, S. (2014). A literature and practice review to develop sustainable business model archetypes. *Journal of Cleaner Production*, *65*, 42–56. <https://doi.org/10.1016/j.jclepro.2013.11.039>
- Bryant, G. (2016). Creating a level playing field? The concentration and centralisation of emissions in the European Union Emissions Trading System. *Energy Policy*, *99*, 308–318. <https://doi.org/10.1016/j.enpol.2016.06.007>
- Cahill, R., Grimes, S. M., & Wilson, D. C. (2011). Extended producer responsibility for packaging wastes and WEEE—A comparison of implementation and the role of local authorities across Europe. *Waste Management & Research*, *29*(5), 455–479. <https://doi.org/10.1177/0734242X10379455>
- Camana, D., Manzardo, A., Toniolo, S., Gallo, F., & Scipioni, A. (2021). Assessing environmental sustainability of local waste management policies in Italy from a circular economy perspective. An overview of existing tools. *Sustainable Production and Consumption*, *27*, 613–629. <https://doi.org/10.1016/j.spc.2021.01.029>
- Cave, M., & Stern, J. (2013). Economics and the development of system operators in infrastructure industries. *Utilities Policy*, *26*, 56–66. <https://doi.org/10.1016/j.jup.2013.06.001>
- Chavas, J.-P., & Kim, K. (2010). Economies of diversification: A generalization and decomposition of economies of scope. *International Journal of Production Economics*, *126*(2), 229–235. <https://doi.org/10.1016/j.ijpe.2010.03.010>
- Chen, D. M.-C., Bodirsky, B. L., Krueger, T., Mishra, A., & Popp, A. (2020). The world's growing municipal solid waste: trends and impacts. *Environmental Research Letters*, *15*(7), 74021. <https://doi.org/10.1088/1748-9326/ab8659>
- Di Foggia, G., & Beccarello, M. (2021). Designing waste management systems to meet circular economy goals: The Italian case. *Sustainable Production and Consumption*, *26*, 1074–1083. <https://doi.org/10.1016/j.spc.2021.01.002>
- Di Foggia, G., & Beccarello, M. (2022a). An Overview of Packaging Waste Models in Some European Countries. *Recycling*, *7*(3), 38. <https://doi.org/10.3390/recycling7030038>
- Di Foggia, G., & Beccarello, M. (2022b). Introducing a system operator in the waste management industry by adapting lessons from the energy sector. *Frontiers in Sustainability*, *3*, 984721. <https://doi.org/10.3389/frsus.2022.984721>
- Dijkgraaf, E., & Gradus, R. (2015). Efficiency Effects of Unit-Based Pricing Systems and Institutional Choices of Waste Collection. *Environmental and Resource Economics*, *61*(4), 641–658. <https://doi.org/10.1007/s10640-014-9811-y>
- European Commission. (2015). *The circular economy: connecting, creating and conserving value*.
- Gradus, R., Schoute, M., & Dijkgraaf, E. (2018). The effects of market concentration on costs of local public services: empirical evidence from Dutch waste collection. *Local Government Studies*, *44*(1), 86–104. <https://doi.org/10.1080/03003930.2017.1380629>
- Granderson, G. (2019). The impact of firm membership in an Independent System Operator (ISO) on production cost and cost efficiency in the generation sector of the U.S. electric utility industry. *Managerial and Decision Economics*, *40*(2), 159–168. <https://doi.org/10.1002/mde.2990>
- Huang, W. (2022). Public service provision with a limited budget: Service design, privatization and subsidies. *Computers & Industrial Engineering*, 108374. <https://doi.org/10.1016/j.cie.2022.108374>
- Jenkins, R. R., Kopits, E., & Simpson, D. (2009). Policy Monitor—The Evolution of Solid and Hazardous Waste Regulation in the United States. *Review of Environmental Economics and Policy*, *3*(1), 104–120. <https://doi.org/10.1093/reep/ren018>
- Joskow, P. L. (2007). Regulation of Natural Monopoly. In A. M. Polinsky & S. B. T-H. of L. and E. Shavell (Eds.), *Handbook of Law and Economics* (vol. 2, pp. 1227–1348). Elsevier. [https://doi.org/10.1016/S1574-0730\(07\)02016-6](https://doi.org/10.1016/S1574-0730(07)02016-6)

- Leal Filho, W., Brandli, L., Moora, H., Kruopienė, J., & Stenmarck, Å. (2016). Benchmarking approaches and methods in the field of urban waste management. *Journal of Cleaner Production*, *112*, 4377–4386. <https://doi.org/10.1016/j.jclepro.2015.09.065>
- Luthra, A. (2019). Municipalization for privatization's sake. *Society and Business Review*, *14*(2), 135–154. <https://doi.org/10.1108/SBR-11-2017-0102>
- Lyu, S., Buts, C., & Jegers, M. (2020). Case studies in competition policy research: A systematic literature review. *European Competition and Regulatory Law Review*, *4*(2), 5–27. Retrieved from <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85099224162&partnerID=40&md5=14d9e16eed10bba550ffdfc1c45e9d06>
- Makarichi, L., Jutidamrongphan, W., & Techato, K. (2018). The evolution of waste-to-energy incineration: A review. *Renewable and Sustainable Energy Reviews*, *91*, 812–821. <https://doi.org/10.1016/j.rser.2018.04.088>
- Massarutto, A. (2007). Municipal waste management as a local utility: Options for competition in an environmentally-regulated industry. *Utilities Policy*, *15*(1), 9–19. <https://doi.org/10.1016/j.jup.2006.09.003>
- Palcic, D., & Reeves, E. (2011). Privatisation in Europe. In D. Palcic & E. Reeves (Eds.), *Privatisation in Ireland* (pp. 8–27). London: Palgrave Macmillan UK. https://doi.org/10.1057/9780230297579_2
- Pires, A., Martinho, G., & Chang, N.-B. (2011). Solid waste management in European countries: a review of systems analysis techniques. *Journal of Environmental Management*, *92*(4), 1033–1050. <https://doi.org/10.1016/j.jenvman.2010.11.024>
- Pollitt, M. G. (2012). Lessons from the history of independent system operators in the energy sector. *Energy Policy*, *47*, 32–48. <https://doi.org/10.1016/j.enpol.2012.04.007>
- Saal, D. S., Arocena, P., Maziotis, A., & Triebs, T. (2013). Scale and Scope Economies and the Efficient Vertical and Horizontal Configuration of the Water Industry: A Survey of the Literature. *Review of Network Economics*, *12*(1), 93–129. <https://doi.org/10.1515/rne-2012-0004>
- Steiner, R., Kaiser, C., Tapscott, C., & Navarro, C. (2018). Is local always better? Strengths and limitations of local governance for service delivery. *International Journal of Public Sector Management*, *31*(4), 394–409. <https://doi.org/10.1108/IJPSM-05-2018-226>
- Swart, J., & Groot, L. (2015). Waste management alternatives: (Dis)economies of scale in recovery and decoupling. *Resources, Conservation and Recycling*, *94*, 43–55. <https://doi.org/10.1016/j.resconrec.2014.11.005>
- Warner, M. E. (2011). Competition or cooperation in urban service delivery? *Annals of Public and Cooperative Economics*, *82*(4), 421–435. <https://doi.org/10.1111/j.1467-8292.2011.00450.x>
- Wilts, H., Von Gries, N., & Bahn-Walkowiak, B. (2016). From Waste Management to Resource Efficiency—The Need for Policy Mixes. *Sustainability*, *8*(7). <https://doi.org/10.3390/su8070622>
- Worthington, A. C., & Higgs, H. (2014). Economies of scale and scope in Australian urban water utilities. *Utilities Policy*, *31*, 52–62. <https://doi.org/10.1016/j.jup.2014.09.004>
- Zhang, J., Qin, Q., Li, G., & Tseng, C.-H. (2021). Sustainable municipal waste management strategies through life cycle assessment method: A review. *Journal of Environmental Management*, *287*, 112238. <https://doi.org/10.1016/j.jenvman.2021.112238>

Copyrights

Copyright for this article is retained by the author, with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).