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The emergence of hybrid co-regulation: empirical evidence and rationale in the field of e-waste management

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Sub-theme 32: the privatization of regulation

Introduction

According to Michel Foucault, neoliberal governmentality is closely linked to the issue of making individuals responsible (Foucault et al., 2010; Hache, 2007). In this perspective, unilateral public action (command and control) is considered not only inefficient but also illegitimate, and shall be replaced by different government techniques and governance methods aiming at making them responsible (accountable) and equip them with new capabilities (empowerment). Thus, the State does not give up its regulation power but make it change towards more negotiated forms of governance, based on flexible and incentive instruments. This phenomenon has been labeled *hybrid regulation* to capture the idea that complementary forms of public and private regulations coexist in transnational governance (Levi-Faur, 2011; Djelic & Sahlin-Andersson, 2006). However, under this label, heterogeneous practices have been developed, with different degree of hybridization (Cafaggi, 2012), ranging from forms of loose co-shaping between private and public regulations to stronger co-regulation where explicit governance structures are purposefully set to organize role-plays and subsidiarity rules between the different parties. This paper addresses the latter form of hybrid regulation. Despite numerous experiments, hybrid co-regulation has received little attention and is under theorized, especially in law and economics.

However, the practice of hybrid regulation is constantly growing and often actively promoted. How is it implemented in practice? What are their rationale, effects, limits and conditions of exercise?

This logic of hybrid co-regulation is nowhere as visible and widespread as in the field of the environment, which traditionally refers to the world of externalities, i.e. to a domain, which is outside the scope and interest of economic actors. In this domain, traditional command and control regulation, where firms are designated as polluters, intensively used as the dominant mode of regulation for decades have failed to address complex issues, where uncertainties are strong and control is difficult to implement (Aggeri, 1999).

Since the mid-70's, a third way, by means of a logic of accountability has been identified as a way to solve environmental crisis by making economic actors and citizens responsible of the concrete environmental problems (Salles, 2011). The implementation of such logic does not exclusively focus on incentive mechanisms but also on hybrid regulations within sectorial negotiated approaches.

The case of waste management in Europe illustrate this logic of negotiated accountability through the concept of extended producer responsibility (EPR), which is implemented in all European countries since the 90's.

In order to disclose the logic of hybrid regulation, the article will be developed as follows. The next paragraph will expose the theoretical framework and research gap that conduce to the problematization at stake. In the second part, the concept of hybrid regulation will be analyzed through a practical case, which is the electrical waste sector. The empirical findings will lead to the authors' contributions and open to discussion.

Theoretical framework and research gap

In the standard economic framework, regulation deals with the design of public instruments (command and control or market-based instruments) that are considered, in terms of incentives, based on an individualistic perspective where actors respond to signals (Laffont & Tirole, 1993). These modes of regulation suppose also that the object to regulate is well known and that social behaviors are predictable. However, in complex situations these classical modes can become insufficient. Bleischwitz et al. discuss the market and the hierarchy failures to bring about sustainability improvements (Bleischwitz et al. 2004). Market-based economists advocate profit-oriented instruments that are incompatible with public interest services and conflicting with long-term approaches. Likewise, public

instruments tend to fail because of governments' lack of resources and knowledge of the object to regulate. In the standard law theory, the tropism toward individual responsibility is also visible, emphasizing regulation mechanisms (property rights, sanctions, regulations) aiming at enhancing accountability and liability (Ackerman et al., 1985; Sachs, 2006).

It is in the institutional and governance theories that authors have identified the transformations of international regulation processes and logics. Several works have analyzed such transformation as a consequence of the rise of transnational activities, which led to a "profound re-ordering of our world" (Djelic & Sahlin-Andersson, 2006; Ewert & Maggetti, 2016). The rise of privatization, deregulation and liberalization logics led to the explosion of rule-making in organizations and in society. At the same time, "a decline in trust" accompanied the liberal movement, which led to the expansion of public and private monitoring and auditing activities in order to assure transparency (Moran, 2002). In fact, theories of governance do not suggest a withdrawal of the State but rather a change in the role and practices of governing, e.g. "the new governance" and the "new regulatory states" (Moran, 2002). Not only are new organizations emerging to issue rules but, at the same time, they also participate in the elaboration and implementation of the rules, which creates novel highly complex interactions between public and private actors.

A rich literature exists revealing the re-ordering trend of the world through transnational regulations (Djelic & Sahlin-Andersson, 2006). These papers focus on the rise and diffusion of non-state actors in public regulation activities (Levi-Faur, 2005; Djelic & Sahlin-Andersson, 2006), the complex relations between private and public actors that the co-activity creates and the emergence of third parties (Levi-Faur & Starobain, 2014), as well as the level of hybridization between these actors (Ewert & Maggetti, 2016). Others propose hybrid regulation taxonomies based on the nature of the participants (Levi-Faur, 2011) or their role in the policy process (Cafaggi & Renda, 2012). However, very little research has been conducted analyzing hybrid regulation as a principle governing policy making (Cafaggi & Renda, 2012). Indeed, most of the time public policy-makers have to make with private governance ineluctable emergence and create monitoring and auditing activities *ex post facto*. However, in some cases, in particular in the field of the environment, other forms of hybrid regulation exist, such as "enforced self-regulation" and "meta-regulation", where the regulator compels the regulatee to participate to governance activities (Levi-Faur, 2011). Such policy can create very effective and flexible regulatory hybrid systems. In this perspective, more

research should focus on the synergetic dynamics of hybrid regulations. Indeed, most of the studies focus on the nature of the actors and neglect “reciprocal influence and interaction” and “the transformation and reinvention that is likely to follow regular interaction” and the “win-win” game potential to increase each regulatory power (Djelic & Sahlin-Andersson, 2006). Thus, hybrid regulation can be considered as a solution rather than a problem (Cafaggi & Renda, 2012).

Still, complex organizations that empower private actors must keep in mind the threat of opportunistic behaviors, as it has happened in the case of the financial crisis (Cafaggi and Renda, 2012). The issue for public authorities is then to maintain control over the system while reviving constantly private actors’ motivation and engagement in the renewal of a “common purpose”. Thus, implementing such regulation is not an easy task for policy makers, especially as the concept is rather eluded by traditional theories. In order to render hybrid regulation legitimate and comprehensible to all actors and controllable by public authorities, a focus on a practical case is essential to reveal the potentials and logics of such a regulation mode as well as its limits.

Our observation of the waste sector and its management highlight the importance of the notion of responsibility, and, more precisely, the complexity and evasiveness of the concept of collective responsibility in shaping hybrid regulation. Indeed, even though responsibility is rather a common and historic principle, with the industrialization and the growing number of industrial accidents, it has undergone profound mutations (Neuberg et al., 1997). Indeed, up to the 19th century, the notion of responsibility was based on the logic of accountability that focused on the culprit and its crime. Whereas at the beginning of the last century, a more socialized version emerged progressively replacing the focus on the fishing out of the guilty parties and the most appropriate sanctions by insurance and compensation mechanisms (Ewald, 1997). More recently, the complexity and the extent of environmental crises, made identifying a guilty party a tremendous challenge for authorities. The “polluter-pays” principle that emerged in the 70s enabled to tackle various environmental wrongful cases, however as it is based on an individual responsibility it has its limits, particularly when dealing with the waste issue. Indeed, beyond financial compensation, a waste reduction policy also implies prevention incentives. But, prevention measures cannot be based on individualistic mechanisms targeting individuals responsible of a crime, as no crime has occurred yet. Only a collective approach of the notion of responsibility can overcome the

dilution of liability that characterizes environmental damages. However in both standard economic and legal approaches, issues and mechanisms of collective responsibility are understudied and under-theorized.

Indeed, to delegate individually is rather simple, the difficulty is to delegate to a group of actors and make sure that they will organize themselves in the interest of the common good. In institutional theory, different scholars, including the Nobel Prize Elinor Ostrom, have highlighted the importance of collective responsibility when the governance of commons is engaged, i.e. situations characterized by strong interdependencies and/or the preservation of pooled resources (Ostrom, 1990). In Ostrom's perspective, collective responsibility does not always require State intervention. She analyzes situations in which collective forms of self-regulation are put in place by communities to govern common resources. The underlying assumption is that communities do already exist and commons are clearly identifiable. In this approach, regulations are implemented and controlled by private actors. For certain scholars or actors from the civil society, such practices of negotiated regulation run the risk of regulatory capture and should be avoided (Laffont & Tirole, 1993).

Thus, Ostrom's framework does not encompass all possible situations of commons governance. As we discussed, public authorities can comply private actors to engage in a public issue and, in that sense, commons may result from purposeful public initiatives. In Europe, setting a framework for waste management is negotiated with economic actors and stakeholders. For specific waste streams, declaring that producers are made responsible of waste treatment and valuation, de facto creates a *common purpose* where producers are collectively in charge of addressing the waste treatment and valuation issue. Commons may also be unclear from the beginning due to important uncertainties about the actions to be taken and strong interdependencies. Finally, structured ecosystems or communities may not exist and shall be the purpose of collective action. In such a context, hybrid regulation, we argue, has a potential value to address these complex and evolving issues. The question remains how to perform hybrid regulation in practice. Ostrom has proposed principles for the governance of natural resources in the shadow of the State. The issue is to adapt this framework for the analysis of hybrid regulation in waste management.

Instead of traditional approaches focused on ostensive arguments (how regulation should work in principle), we will adopt a performative approach, where the objective is to give

account of regulation practices and their dynamic effects (Latour, 1986; Feldman & Pentland, 2003). Indeed, not without pointing at Latour's performative definition when analyzing organizations and society, "it is impossible *in principle* to define the list of properties that would be typical of" hybrid regulation, as the concept has emerged out of classical frameworks, "although *in practice* it is possible to do so". The concept of hybrid regulation cannot be theorized by an ostensive approach, as it has no pre-defined assumptions, but is rather the consequence of the collective action. Thus, in order to identify the founding principles of hybrid regulation, an empirical analysis is needed. For that purpose, we analyze, through the e-waste case, the historical emergence of this form of hybrid regulation, the underlying rationale provided by actors, the experiments and organizations put in place, the regulation practices invented along the way and their effects on collective learning. Analyzing hybrid regulation in practice will enable us to propose founding principles.

Hybrid co-regulation process in the electrical waste sector

Methodology

In order to better understand the dynamics of hybrid regulation in practice, we have conducted an empirical analysis. The case chosen is the materialization of the Extended Producer Responsibility (EPR) in the electrical waste (e-waste) sector. EPR is a new concept put in place since the late 90's in Europe and aiming at making producers responsible for the sound treatment and prevention of waste they generate. Its significance and implementation has constantly evolved since then. In order to capture such dynamics, the methodology adopted is based on a longitudinal research methodology (Pettigrew, 1990) that was used to fully capture the emergence and evolution of hybrid regulation guiding the waste management system. Different materials have been considered: regulation documents (European directives and laws), reports concerning the EPR principle (OECD, 1999) and previous literature on the history of waste. The empirical analysis relies on forty interviews of producers, recyclers, and other various actors of the e-waste sector (annex 1), some of whom have been operating in the sector since the beginning.

Waste management and regulation: a brief genealogy

Waste management is an old issue but its purposes, stakes and forms of regulations have profoundly evolved over the last decades. We can identify three representative periods that we will briefly outline, based on the French case. The periodization chosen reflects the transformation of waste perception over time and the evolution of the relation between regulators and regulated that this change produces.

i. Waste, from ancient times to urbanization

In ancient times, the concept of waste did not exist, consequently, neither waste management. In France, it was probably introduced in the 15th century deriving from the verb to wane, « déchoir » in French, from which the term « déchet » (waste) is derived (Dagognet, 1997). Everything was reused by the intermediary of scrap merchants (the private sector) or left to natural putrefaction. It was probably in the Antiquity in influential cities that the society started to be concerned about their leftovers. In Athens, toilets were invented in order to take away the sludge. In Rome, they added pits out of the city for animal bones. Indeed, since the Middle Ages, cities have gotten bigger and the quantity of filth has increased and was becoming detrimental to social life. People would leave their litter in the streets and in nearby rivers, where they would also draw the water from. They would also reuse crafts waste (metal, used paper, old rags).

As urbanization increased, the cycle of nature was breached. The more people would live in cities, the more congested the streets would get with organic filth and sewage. Cities became more and more unbearable to live in. As streets started to smell heavily measures were implemented. First, streets were cobbled. In France, Philippe Auguste cobbled the street in 1185 and created septic tanks in main areas of Paris. People would be given some hygiene advice and would be asked to bring their waste in specified spots. However, no one would care much. Thus, epidemic arose, the most harmful one being the black plague in 1347. At that time, it was believed that the smell was responsible of the diseases. Despite of few decrees to oblige inhabitants to get rid of their waste in a proper way, they would still mostly through their garbage out of the window. In that context, the ragman activity emerged. Ragmen would practice door-to-door collection and gather old items of clothing, rags, animal bones and all sorts of things that could be reused. It is only in the 17th century that order is starting to become the norm because of dissuasive taxes. However, major policies were not taken before the 19th century.

One important factor that changed people perception of waste was Louis Pasteur's discoveries. Louis Pasteur, a French scientist, was the one bringing to light the link between hygiene and health in 1870. At that point, sanitary issues became a political preoccupation. In France the emblematic prefect Eugène Poubelle compelled Parisians to put their house wastes in « boxes » that would be collected by municipal service. His name was given to a new artifact the « poubelle », which means bin in French. This new phase categorized waste as a contaminant substance causing diseases. In 1896, Paris implemented its first treatment centers and in 1907 its first incinerator. These centers would use grinding and incineration techniques. Thus, waste management was ruled by the public sector. Ragmen, originally free merchants, had to comply with the new regulation. First, in 1828 they had to wear medals with their identification, but unwilling to comply with legislative formalities the obligation was revoked in 1873. However, the up scaling sanitary policy of the beginning of the 19th century was too strong for ragmen to thwart any of it and they were proposed municipal employments as official refuse collectors. From then on, the waste management became more and more institutionalized.

ii. The setting of a public agenda (1950-1990)

Even if communal waste collection started gradually to develop itself it remained an urban privilege. In rural areas initiatives were very scarce. No general law existed at that point. In France, it is the out-line law of 1975 that officially defined waste in legal terms and made municipalities responsible for the management of domestic waste. Treatment choices strongly depended on the degree of knowledge. At one point, incineration was preferred because of its ability to generate energy and to heat up cities. However, later in time, incineration revealed to be more costly than what it could produce and revealed to be a major source of pollution. Around landfilling and incineration, the so-called “Not In My Back Yard (NIMBY) syndrome” emerged. This syndrome is characterized by the mobilization of local residents that protest against the implementation of incinerators or landfills near their homes.

Since then, waste treatments became a source of numerous conflicts, particularly as waste composition became more and more complex with the emergence of novel technologies (mobile phones, computers, etc.) and integrated harmful pollutants (plastics, heavy metals, etc.). This complexification of waste, as well as its continuous growth, made landfilling and

incineration problematic and controversial solutions. Public policy remained strongly based on classical instruments such as landfilling taxation (TGAP) or regulation (for incineration) rather than on making producers responsible. But these measures revealed to be ineffective. Indeed, as the amount of waste still continued to grow even more rapidly, as municipalities became incurred increasing costs of collection and treatment and as illegal landfilling has become major issue, a new policy orientation became urgent.

To sum up, the first problematization of waste focused on hygienic issues and the first actions put in place were to organize communal services to bring out of site the litter that was dumped on the street that were proved to be a precursor of diseases. The invention and diffusion of the bin artifact (poubelle) and the development of landfilling in France in the XIXth Century associated to educational programs and public support, illustrate the rise of a hygienic rationale where waste had to be contained and stored in specific places. Secondly, the simultaneous development of urbanization and the consumer society skyrocketed the amount of waste that was no longer manageable by municipalities alone, obliging public authorities to take stronger measures to address this pollution issue. However, classic regulations revealed to be insufficient and alternatives proved to be necessary.

iii. Innovation and responsabilization of producers (1990-now)

At the European level discussions begun in order to find an alternative to finance waste management and encourage prevention and cleaner production. Thomas Lindhqvist proposed, on behalf of the Swedish Ministry, the concept of Extended Producer Responsibility (EPR) based on the « polluter-pays » principle (Lindhqvist, 2000). The concept was formally introduced in EU directives related to waste management, first concerning used batteries (1991) and then packaging (1994). The purpose was to internalize the cost of waste disposal into the cost of the product, theoretically meaning that the producers will improve the waste profile of their products, thus decreasing waste and increasing possibilities for reuse and recycling. Parallel to the cost internalization, recycling targets were implemented for the first time at the European level.

First EPR experiences emerged in the 90s. The original example is the DSD German System, followed by the French Eco-Emballage setting. Producers could comply with the EPR legislation by becoming a member of these organizations. In that case, they had to pay a

license fee according to the volume of product they put on the market. In exchange, these organizations (DSD GmbH and Eco-Emballage) had to invest the total of fees in the development of collection and treatment schemes. In 2001, the Organization for Economic Cooperation and Development (OECD) formally introduced the EPR concept (OECD, 2001), clearly referring to a neoliberalism approach. In this document, the EPR principle is based on an economic rationale and associated to an individual responsibility. The report recognizes that other options are possible such as setting shared responsibility organizations as it had been experimented in the DSD or Eco-Emballages systems. However, it shall be noticed that shared responsibility was not really theorized.

In France, the first EPR system was implemented for waste packaging. Collective organizations, called « Producer Responsibility Organizations » (PRO), managed by producers were created in order to fulfill producers' responsibility (Eco-Emballage and Adelphe in 1993). In all EPR policies, producers have to choose between joining a PRO or fulfilling their responsibility individually. For economies of scale motives in collection and treatment activities, in most cases producers opted to share their responsibility by joining a PRO. Practices of collective organizations and shared responsibility have not been fully theorized yet. American scholars, for whom responsibility shall be based on individual mechanisms in order to avoid any free-riding behaviors, have expressed their skepticism about this collective settings (Sachs, 2006).

iv. Waste value and regulation modes

This brief history of waste emergence highlights that waste perception has fluctuated during time and led to very different regulation systems. When wastes are considered as “bads” (i.e. pollutants) public management is more likely to intervene (hygiene measures, treatments policies, etc.). On the contrary, as soon as waste also appears as a source of “goods” (e.g. precious metals contained in electronic waste), market regulation prevails (e.g. scrap merchants).

Today, the aim is to reduce waste negative out of “bads” value and to increase economic value out of “goods” by identifying and creating shared value out of it to the benefit of all. One example is the logic of reuse that can reduce raw material utilization and at the same time can treat waste in a sound way, which avoids added pollution by landfilling or incineration.

The idea is to consider waste as “goods”, or potential commons for collective action, referring to Elinor Ostrom’s work. Yet, the major difference with Ostrom’s approach on natural commons is that wastes composition and value are highly dependent on the rapid change of technologies. In other words, waste considered as a source of “goods” is non-stationary and depends on innovations both on products and treatment processes (to extract the value from waste).

In this new problematization, “command and control” regulation is difficult to set and implement to the extent that the list of “bads” and “goods” is constantly evolving with innovation and technological progress. Furthermore, the valuation of goods requires other instruments than banning or setting emissions targets. In this perspective, the European commission introduced a new public policy based on a new driving principle: making producers responsible (the responsabilization), i.e. involving them in a kind of hybrid or joint regulation. Implicating private actors can prove effectiveness for many reasons such as proximity with the industry being regulated, flexibility reducing administrative constraints, greater compliance and greater potential to mobilize resources (Coglianese et al. 2004). As profit oriented actors it was assumed that producers would try their best to comply with environmental laws while creating value out of waste. ”In such partnership, the private sector’s dynamism is combined with the public sector’s custodianship of public interest” (Ahmed & Ali, 2006). By combining public legitimacy and legislative power control with private responsiveness and efficiency, hybrid regulation can face unpredictable environments. Indeed, this combination permits wide exploration of various possible configurations of solutions. In this new logic, public authorities develop a new rationale: the issue is not so much to ban or to regulate but rather to direct, to frame and to adapt to dynamic situations. “These modes are thought to have specific advantages: They evade the lengthy, unwieldy, and cumbersome process of legislative decision-making. [...] At the substantive level the advantages are seen in the greater flexibility of the policy measures and the greater adaptability of those measures to a rapidly changing social, economic, and technological environment” (Héritier, 2002).

In principle, hybrid regulation seems well adapted to tackle environmental issues where uncertainties are strong and control difficult to implement. However, its implementation in practice is not that obvious. Risks of implicating private actors include “conflicts of interest, inadequate enforcement and accountability, and insufficient monitoring of compliance”

(Cafaggi & Renda, 2012). Héritier has noticed how complex it could be to implement hybrid regulation and which conditions are needed. “The new modes of governance would have to rely on an entire infrastructure aimed at establishing the following conditions: the right incentives for those bearing the costs of regulation; the right participatory structure for shaping the instruments so that all those affected have a voice in shaping them; the guarantee of legal certainty; and the possibility to hold actors accountable for the consequences of particular actions. Hence, as easy as the new modes of governance may seem at first glance, when they are analyzed in detail it becomes clear that they are more demanding than expected” (Héritier, 2002). In order to give account of hybrid co-regulation practices and their dynamic effect, we analyze through the e-waste case, the historical emergence of this form of regulation, the underlying rationale provided by actors, the experiments and organizations put in place, the regulation practices invented along the way and their effects on collective learning.

The hybrid regulation process of e-waste in France

i. First experiments

E-waste have the particularity to be highly complex used products containing at the same time valuable metals (goods) and hazardous substances (bads). This growing complexity and dangerousness led producers of electrical products, on behalf of the French Ministry of environment, to experiment collectively an EPR system in a specific geographical area before setting a general national framework. Producers conducted a two-years experiment in the Nantes area supported by the French environmental agency (ADEME). Its aim was to put in place an operational system that would collect and orientate waste to treatment facilities. During these two years specific measures were carried out that enabled producers to address technical, logistical, economical and environmental issues concerning the implementation of a full-scaled e-waste operational system. One of the major lessons learnt from the experiment for the stakeholders was to consider that an engineering and organizational support was lacking in order to facilitate the emergence of an industry, of a nexus of contracts and an end-of-life economy. As a consequence, the choice was made in France to introduce an operational function (design and implement a new collection and recycling industry architecture with contracts, templates and specifications consistent with policy targets) beside the traditional financial role (subsidize costly operations such as collection and waste

treatment)¹ in the mission statement of e-waste PRO's. This experimentation had a considerable impact on the choices that led to the current structure of the e-waste stream, and even on the other EPR systems that followed in France. It enabled to conduct a collective learning based on returns on experiments.

ii. Organization and governance

After the experiment in Nantes four PROs were created on the approval of the Ministry. In addition, an EPR coordinator for the e-waste sector was created at the demand of the collectivities in order to facilitate their relations with the different PROs. PROs are organizations with a specific legal status and governance: they are non-profit private companies with a public mission statement and a multi-stakeholder governance.

Their missions are defined through legal specifications for a period of six years. Their role is to assume their members EPR principle and to achieve the targets negotiated with the State. Besides recycling targets, the State defines the rules that will guide PROs' action after a participative decision-making process involving different stakeholders (NGO's, consumer associations, producer and recycling organizations, public authorities). Indeed, specifications are negotiated and discussed every six years in an accreditation commission before the State's final decision. The mission statement establishes and defines the relations that PROs have to engage during their six years of authorization with collectivities, operators of the waste sector (collection points, transportation, treatment), actors from the social economy, the e-waste EPR coordinator, public authorities and with their members. These relations are subjected to contracts relying on public and/or private terms of Contract Law. This legal complexity tends to favor multiple litigations. One major originality is that co-contractors cannot negotiate the terms of contracts. For example, members of PROs cannot negotiate their member fees, as the law imposes that fees must be proportionately equal to all members of a same PRO. Also, fees are conceptually explicitly different than taxes. Indeed, fees are public money paid by the consumer at the purchase of a new product, but contrary to taxes, private companies (PROs) are free to decide how to redistribute the fees provided that it serves the mission statement. This hybrid status is highly original and difficult to conceive for lawyers and judges and can lead to various litigations (Gossement, 2014). One common issue is to identify which judge,

¹ Eco-Emballages, the PRO dedicated to package management, has only a financial function.

the civil or administrative court, is in capacity to rule on a conflict involving PROs that are private actors with a public utility mission (Gossement, 2016a).

In this perspective, regulation is clearly hybrid, associating public and private actors through tailor-made governance and organizational mechanisms and reciprocal commitments. Figure 1 shows the contract outline in the e-waste sector. All the stakeholders are represented in the agreement commission and discuss PROs' specifications.

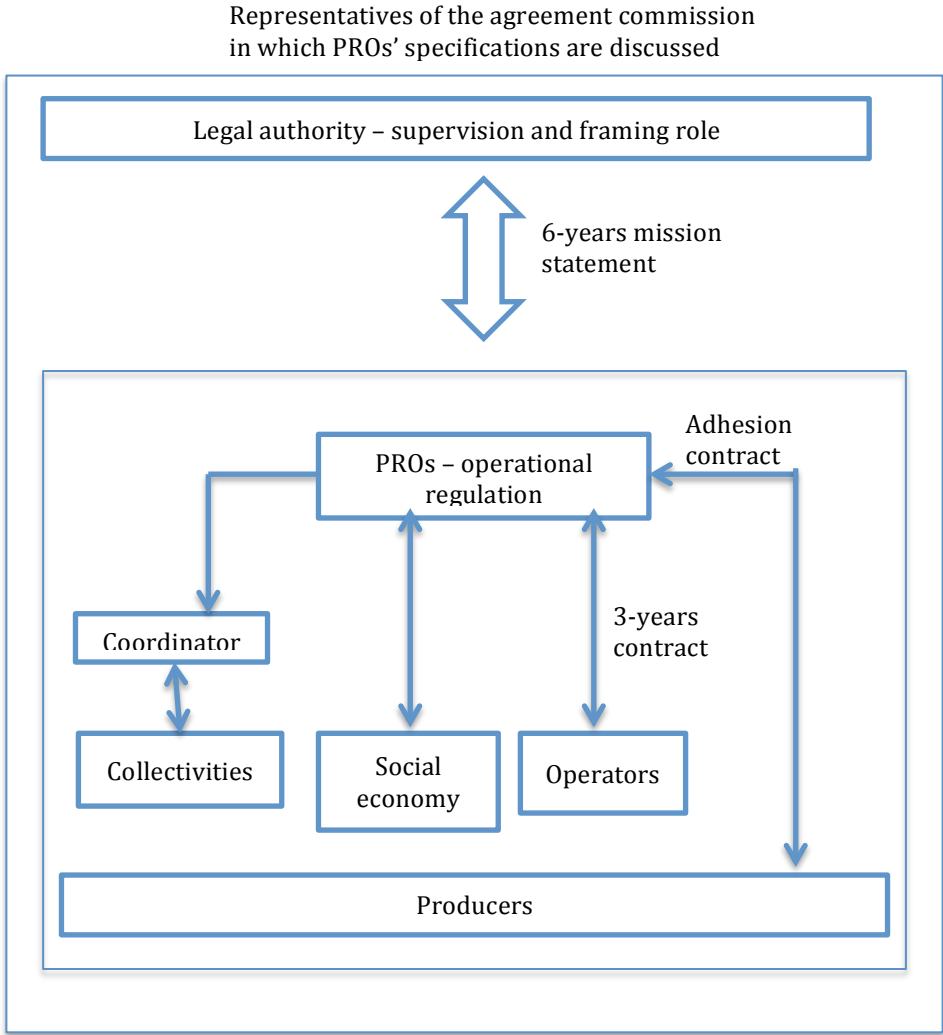


Figure 1: Contracts outline in the e-waste sector

Operational regulation is led to private actors, particularly PRO's who has a crucial role of coordination. Public authorities have a supervision and framing role and can activate different levers. PRO's activity is officially approved for a period of time of six years and is scrutinized by public bodies. They also have a strong consultative power that can influence the mission statement's conditions. As to date, three agreements period took place: 2005, 2009 and 2014.

The approval can be removed at the end of the authorization or during the mandate if the dynamic and results are not satisfactory, as it was the case for one of the e-waste PRO that have not been renewed. Public authorities can also introduce additional targets and specifications and introduce different incentives or regulations if specific problems are encountered, which we will develop more, later in the paper. Therefore, the EPR model is highly dynamic as the system is periodically revised according to its performances (Figure 2).

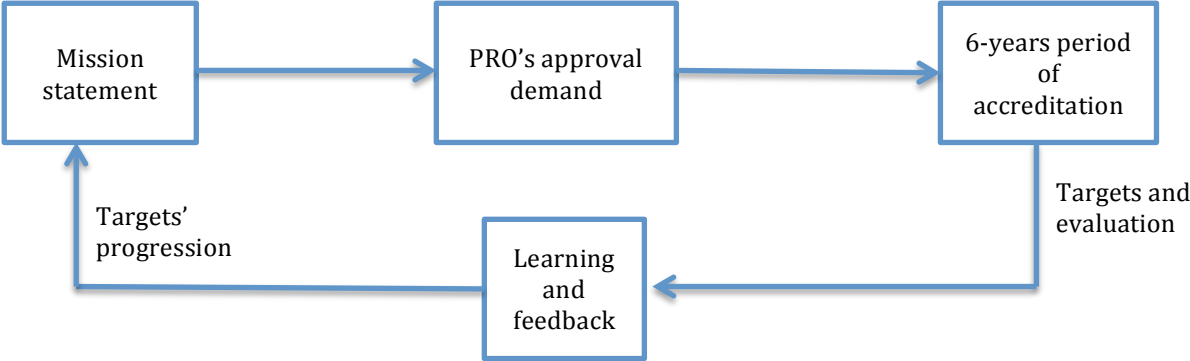


Figure 2: The EPR model, a dynamic model enabling revisions

Proposals of revisions can emanate from any stakeholders, even from producers themselves. Thus, the responsibility principle gives relative autonomy to PROs that can conduct on-going experimentations in order to comply with their specifications.

Findings: on-going experimentations and pitfalls of the hybrid regulation process

i. On-going experimentations

As a collective organization crystallizing the shared responsibility principle, PROs are key actors. During their six-years mandate they are enticed to experiment innovative solutions. For example, since the second agreement in 2009, PROs are asked to modulate producers’ financial contribution according to specific criterions. The criterions are established through a participative decision-making process involving all the stakeholders. First criterions that were established concerned pollutants. For example, if a producer would use more than 25 grams of brominated flame retardant, he would pay 20% more than if he did not. The aim is to entice producers to use fewer pollutants in their products. For that purpose, PROs had to inform their members and develop teaching skills in order to make them understand each criterion. As

these criteria became systematic, in the last agreement in 2014, more criteria were added that had been also discussed between all the stakeholders. Most of these new criteria concern prevention and product usage extension. For example, producers of washing machines, dishwashers, coffee machines, etc. can benefit from a 20% discount if they are able to provide for spare parts for at least 11 years. Other criteria are: provision of technical documentations concerning the product to be given to repairers, the use of secondary plastic in the product, etc. These criteria are more complex than the first ones that concerned only pollutants. In this second phase of the modulation experimentation, PROs have to develop even greater instruction skills. In order to help producers to embark on ecodesign and comply with these criteria, one of the PROs has conceived for its members an online calculator that evaluates the re-usability, recyclability and recoverability of e-products and gives advice to improve eco-design.

Our observations highlight that PROs main activity is to conduct on-going experiments and collective learning processes (Muniesa & Callon, 2007) by means of different regulation mechanisms and through incremental approaches and iterative learning. Charles Lindblom introduced the former in 1959 as “the science of muddling through”. He believed that “it is not possible to come to a comprehensive analysis of governance or government systems because complex societal problems can never be grasped entirely” (Bachus & Spillemaeckers, 2012). Therefore, it is of no use to apply strict long-term planning in politics as “one has to adapt constantly to reality”. Change can only be “step by step”. Along an incremental approach, iterative learning can lead to innovative solutions. “Iterative processes are about learning from experience and making adjustments on the way – a process also described as the observe-plan-do-check-adjust circle” (Layman, 2014). Indeed, iterative learning processes have the particularity to be somewhat open-ended as both goals and approaches may change on the way. In fact, not only is the objective pursued to rationalize the treatment of waste considered as a “bad”, but it is also to exploit the waste value potential as a good by developing new markets and technologies. Recently, a new focus was made on the recycling of strategic metals (precious metals, rare earth elements, critical metals, etc.) of which their value is being more and more recognized and stimulates new experimentations. In this innovation perspective, technologies and organizations do not preexist: they have to be discovered and constantly revised. As a matter of fact, technological changes in the e-sector and changes in commodity prices can have a great impact on the EPR organization. For example, an international successful French Rare Earth Elements (REE) recycler decided to

shut down two REE recycling sites at the end of 2016 because of a substitution of technology (from fluorescent lamps to light-emitting diode bulb) and because of China's competing industry (Leoty, 2016). Generally, because of the current drop in the price of raw materials the recycling sector is being tremendously challenged. In truth, the price of secondary materials are indexed with commodity prices, and, at the same time, their production generates fixed cost. Therefore, recyclers have great difficulty to align secondary materials prices with the low price of raw materials. These challenges lead to reorganization and new experimentations. For instance, recyclers tend to overcome the commodity price competition by specializing their activity and investing niche markets. Some recyclers have invested in high innovative start-ups enabling them to develop new recycling solutions (Theunissen, 2016). Moreover, in order to support the plastic recycling industry, one of the e-waste PROs launched end of 2015 with public organizations and a consulting firm a feasibility study for incentives mechanisms to secure the business model of the sector in France (2ACR, 2015).

Therefore, different regulation mechanisms are required that go far beyond financial support or setting specifications. In recent years, the variety of regulation mechanisms put in place by these private actors has considerably spread (contracts, specifications, guidelines, R&D supports, individual responsabilization for ecodesign, financial participation) and used to support or expand pioneering experiments or avoid certain practices. This on-going experimentation process can be affected by various events or lead to contentious drifts. That is why a continuous regulation production process supports and guides the collective action.

ii. On-going production of public regulations

This on-going experimentation process is affected by various events such as the impact of new political priorities (promoting ecodesign). Also, the shared responsibility principle led to a few drifts that public authorities tackled by reinforcing public control and supervision. These events influence constantly the outcome of EPR organizations.

For example, following a financial scandal concerning the transfer by a PRO's of funds in a fiscal paradise, public authorities decided to impose a State censor that would verify PROs' financial movements (CGEFI, download 2016; Article 46, Law n° 2009-967, 08/03/2009). This measure was implemented to all PROs in every EPR waste schemes, not only in the e-waste sector. Also, since 2014, PROs are systematically subjected to periodic inspections by

independent authorities (Article L541-10 modified by the Law n°2014-856, 07/31/2014) in order to verify if they respect the clauses of their mission statement. Recently, a non-renewal agreement of an e-waste PRO has generated many debates (ERP, 2015). This event has led to a decree proposal last April (Gossement, 2016b). This decree specifies the rules for a PRO's accreditation in an EPR system, rules which have never been really clarified before. Besides, the proposal specifies the condition of a non-renewal or rejection of a PRO accreditation demand.

The production of new regulations can also come from the initiative of producers themselves. For example, in order to fight against illegal waste traffic, French PROs advocated a ban on cash transactions in the scrap metal trade. This measure has had a great impact on the illegal struggle. In fact, the two-years European project (the Countering WEEE Illegal Trade (CWIT)) gave its final restitution in July 2015 and strongly recommended an EU-wide ban cash (UNU, 2015). Also, the French decree proposal of last April contains an obligation to all e-waste operators to contract with either a PRO or an individual EPR system (Gossement, 2016b). The aim of this measure is to oblige all waste operators to hand their wastes over to the EPR scheme and limit illegal trades.

The production of new regulations can also emanate from the political agenda. For instance, since the Grenelle Environment Round Table in 2007, a new political priority was made on ecodesign that had a significant impact on PROs' mission statement, since it was acknowledged that this environmental objective was left aside. Indeed, this political shift was operationalized in the second PROs' agreement in 2009 with the expansion of the mission statement in which criteria for financial modulations were introduced. Other specifications were also added concerning the need for more research on recycling treatments, for developing new collection channels, for engaging more with the social economy, etc. Since the first mission statement, the amount of specifications for PROs' activity has tremendously increased. In truth, the first mission statement document published in 2005 contained three pages against 47 in the last one in 2014. This significant amplification highlights the complexity of EPR schemes and the constant need for more clarifications in order to reflect to the exactness of the collective action changes and progress.

Not only do the production of regulations concern the e-waste sector but it also impacts every EPR schemes (used packages, used cars, paper waste, etc.). In fact, the various mission

statements of the different EPR schemes influence one another. For example, the creation of a PRO coordinator, as we can see in the e-waste sector, has been put forward in the decree proposal to become systematic in all EPR schemes when the situation of multiple PROs in a unique waste sector occurs (Gossement, 2016b). More generally, after having created more than twenty EPR schemes over the last decade, public authorities decided to focus on an overall harmonization and rationalization phase. As a matter of fact, last December a horizontal commission has been created in order to harmonize the various waste schemes and the numerous accreditation commissions (Decree 2015-1826, 12/30/2015). The aim is to favor mission statements standardization and mutual progress between waste sectors.

Thus, in this process, regulation is a dynamic and hybrid activity that is aimed at reducing uncertainties, reducing treatment costs and promoting innovation. In this perspective of possible unpredictable and unsettling internal changes or externalities, a crucial issue for PROs is to maintain their members commitment to the *common purpose* that materializes the shared responsibility principle.

iii. Maintaining and revising the common purpose

Shared responsibility is a fragile principle that can be threatened by free-riding strategies and conflicts. Indeed, in a collective scheme it is common to observe passive actors that do not contribute to the collective effort but still benefit from it. Making sure that a collective strategy is acceptable for the main stakeholders and suitable with policy targets is a constant purpose for PROs because it is their license to operate that is at stake. In theory, their accreditation to operate can be revoked at any time (even if it has never happened before, except for a non-renewal). Also, producers can change their membership to another PRO if they are not satisfied with the service provided. For example, a producer could choose to change PRO because of an increase of the financial contribution.

As a matter of fact, one of the e-waste PROs is at the point of increasing its membership fees because of the recycling sector struggle. For that purpose, the PRO launched a quantitative and qualitative study in order to evaluate how much should be the increase and to find the best way to communicate and justify it to its members. Also, it has developed guiding and support tools for better eco-design performances exclusive to its members in order to compensate a possible fee increase and to foster individual responsibility. Indeed, it is

acknowledged that the collective EPR system enables tremendous reduction in logistics and treatment costs because of significant scale effects. However, a collective organization has a reverse side that is responsibility dilution and limit individual action (Olson, 1965). That is why public authorities and PROs struggle to encourage producers to promote eco-design, as eco-design can only emanate from an individual action (Mayers et al., 2013). Indeed, the producer is the only one able to influence its production design in order to decrease the environmental footprint. Encouraging members to go beyond the mere obligation of contributing financially to the e-waste scheme and to fully engage in the common purpose is a great challenge for PROs.

More generally, this same PRO had always been very cautious about how to define and communicate its strategy to its members. At each approval periods the PRO has carefully defined the common purpose that would appeal its main stakeholders and suit policy targets. At the creation of the e-waste scheme, between 2005 and 2010, the focus was on the reduction of collection and treatment costs. Their strategy was to “comply with the collect and treatments obligations at the **lowest cost**, while developing a high-quality sector and while integrating the social economy”. After the Grenelle Environment Round Table in 2007, the PRO focused more on eco-design and its strategy between 2010 and 2013 was to “contribute to the optimization of the **environmental footprint** of e-products in the respect of the members interests”. Today, with the economic struggle, the aim is to create more value out of waste. Thus, the current strategy of this PRO is to “foster the emergence of **operational recycling solutions** at high environmental, social, and economic performance for the benefit of the general interest” (translated from French from confidential documents).

By maintaining and revising a common purpose suitable at the same time to stakeholders and policy targets, PROs embody the armed wing of public authorities. Indeed, by integrating new regulations in their strategies and by informing producers of these complex regulation changes, PROs enable waste Law interpretation. In that sense, the EPR principle is an original political tool that appears to be relevant and useful to give meaning to waste regulation and to federate producers to act in favor of the common purpose.

In this perspective, a dynamic and vivid governance is all the most important since intense collective learning takes place and leads to different strategic options (resumed in Table 1). If the e-waste regulation setting in France has promising characteristics, we also argue that

certain issues has still received little attention (such as prevention, reuse or the lengthening of the product life) to the extent that they may contradict the producers' traditional business models. As these issues may prove to have great value, we plead for a stronger public regulation at the European level since certain activities (eco-design and product strategies for instance) should be dealt at a transnational level to have stronger effects on worldwide producers.

Problematization	Eco-Systèmes (PRO) strategy	Results	External jolts	New items
Explosion of waste	Comply with the collect and treatments obligations at the lowest cost , while developing a high-quality sector and while integrating the social economy	Collection and treatment rates increased, high quality network structuring	Financial scandals, illegal waste traffic	State censor, periodic inspections of PROs
Raw materials pressure, lack of eco-design	Contribute to the optimization of the environmental footprint of e-products in the respect of the members interests	Online calculator to evaluate product recyclability, eco-design guidelines	Grenelle Environment Round Table (promoting eco-design), illegal waste traffic	Fee modulation 1 st phase, development of research on strategic metals recycling technologies, ban cash
Development of new business models, create multiple value	Foster the emergence of operational recycling solutions at high environmental, social, and economic performance for the benefit of the general interest	Launch of a feasibility study for incentives mechanism to secure BM, recyclers specialize in new activities in order to survive the economic crisis	Commodity prices crisis, illegal waste traffic	2 nd phase Fee modulation (prevention and product usage extension criterions), obligation to all e-waste operators to contract with PROs or individual systems, research for new collection channels, engaging more with social economy

Table 1: On-going experimentations of the hybrid regulation process

Discussion and contributions: towards a dynamic model of hybrid co-regulation

In this communication, we have proposed to consider hybrid regulation as a performative practice rather than from a traditional ostensive viewpoint (Latour, 1986). In other words, the value of hybrid regulation shall not be considered in principle but in practice, through the careful examination of its dynamic effects. For standard economists or lawyers, hybrid regulation is difficult to explain and justify in theory.

As we have shown in earlier sections, considering the practices of hybrid regulation in the e-waste sector in France provides a very different picture of the underlying dynamics. In particular, it appears as an adaptive and revisable model well suited to complex and uncertain issues for which direct public intervention is difficult to design, implement, control and provide sanction.

However, as we shall argue, the performativity of this model depends on the capacity of private regulatees to build, beyond individual responsibility mechanisms, a collective waste management framework, based on a common purpose, aimed at reducing “bads” and valuing “goods”. This empowerment of private actors can be achieved through hybrid regulation. The practical case gave insight of how hybrid regulation can be performed in practice. Based on this pragmatic approach we aim at proposing a model of hybrid co-regulation. As said, Ostrom has proposed principles for the governance of natural resources. However, at the light of the e-sector major differences can be identified between natural resources governance and e-waste hybrid regulation. First, the “common purpose” in the waste sector is created by the State as the common interest is not directly identifiable. Secondly, waste and the issues surrounding their management are continuously evolving and changes are highly unpredictable. Thus, the “common purpose” must be maintained and revised. These assumptions enable us to propose a more dynamic model of hybrid co-regulation that can be discussed. We propose that such a model shall have six main characteristics:

- Based on a specific scope and purpose, different actors are designated *collectively* as responsible of a public issue;
- A shared responsibility principle is defined, materialized in a *mission statement* which define targets and reciprocal commitments;

- The pursuit of this mission can be delegated for a period of time to a **collective organization** who acts on behalf of its members and is dedicated to the pursuit and actualization of the common purpose;
- The mission-driven organization has a **governance structure**, composed of different stakeholders, who have the power to revise the mission of the organization;
- Targets and mission given to this organization are **revisable**, depending on results and problems observed in the field and new public objectives;
- Public intervention may be required to **correct** the failures of self-regulation: if the mission has not been achieved or needs to be revised, when free-riding behaviors threaten collective action.

These characteristics can be summarized according to three main ideas (Table 2). The first one is the political impulse to create a collective action that will have to endorse a public issue. The second idea is the possibility for the collective to claim for representatives' organizations to embody the armed wing of public authorities. The last and main point is the right to revise and strengthen the whole system through a participative-decision making process.

Collective action created by public authorities	Actors are designated collectively
	Definition of a mission statement
Possibility of key actors as armed wing of public authorities	The mission can be delegated to a collective organization
	The governance structure gives power to the organization
Possibility to revise and strengthen the system	Targets and missions are revisable
	Public intervention accepted in case of failures

Table 2: Three main ideas of hybrid-regulation and six characteristics

We argue that such a model may avoid the pitfalls of neoliberal individual responsibility or command-and-control approaches in evolving contexts characterized by uncertainty, interdependence, ambiguity and innovation. Is it a transitory regime of regulation? As long as issues remain complex and progressive, it is highly consistent with setting a dynamic agenda. But if the context stabilizes, one can imagine a progressive privatization. On the contrary, if important drifts and insufficient results are observed, stronger public intervention might be legitimate.

In a next step, it should be highly enlightening to expose PROs and public actors to the proposed model. Moreover, an international comparison is planned in order to understand, in view of these novel principles, the various implementations of the EPR principle, their impacts and the value creation generated (economic, environmental and societal value). Indeed, we assume that EPR systems should be compared not only through direct quantitative indicators (e.g. collection rate, valorization rate), but also through more global indicators reflecting the multiple value creation such as e-waste employment rate, number of masters' degree dealing with circular economy, etc. Furthermore, qualitative indicators could be created to evaluate the link between a system performativity and its level of hybridization.

In this perspective, we aim to contribute to the present debates about regulation dynamics of capitalism in a transnational world (Djelic & Sahlin-Andersson, 2006) by providing a dynamic model of hybrid co-regulation and discussing its performativity, which remains under-theorized although practices and experiments are strong. We believe the value of such a model expands far beyond waste issues and is worth for issues with similar characteristics.

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Annex 1

List of the different interviews (anonymized) that have been conducted throughout the research.

Company	Role in the company	Role of the company
Orange	Responsible of the sustainable research unit	IT producer
Eco-Systèmes	<ul style="list-style-type: none"> - President - Engineering and development manager - Assistant technical management - Director technical management - Social economy relations manager - Local collection manager - Collection director and institutional relations - Legal expert 	French Producer Responsibility Organization
Bigarren Bizi	Director general	Innovative recycling industrial project
Terra Nova	Director general	Precious metals and critical metals recycling company

Morphosis	Director general	Precious metals and critical metals recycling company
Chimie Paristech	Researcher, professor and PhD supervisor	Research center on critical metals recycling
Grenoble University	PhD doctorate	Research on the e-waste sector governance
ADEME	<ul style="list-style-type: none"> - Engineers - PhD student 	Research center on environmental issues
CERNA	<ul style="list-style-type: none"> - Director - PhD doctorate in economy 	Research center on the economy of waste
Ginko 21	Founder	Consulting environmental company
SIRRMET	President	Union of electrical and electronic producers
Recupel	Treatment manager	Belgian Producer Responsibility Organization
Bio By Deloitte	Consultant	Consulting environmental company
Nexans	Sustainable Development Technical Manager	Cable industry
Ecovaluemetal	Co-founder	Innovative recycling industrial project
SEB	<ul style="list-style-type: none"> - Environmental Manager - International Product Manager 	Electrical and electronic producer

Close the Gap & Worldloop	Director of External & Partner Relations	International non-profit organization
R-Cube	Founder	Professional federation of the repair and re-use activities
Programme Clic Vert	Founder	International non-profit organization
Ecologic	<ul style="list-style-type: none"> - Director general - Collection points director and institutional relations 	French Producer Responsibility Organization
Environmental ministry	General delegate of the economic council for the sustainable development	Public authority
Déchets infos	Managing editor	Waste sector newspaper
GIFAM	Sustainable development manager	Umbrella organization of producers of electric domestic equipment
Federec	Communication manager	Recycling federation
Nanterre city hall	Waste manager	Public sector
MakerSpace Agboglobhie project	Co-founder	Innovative project for re-use
Direction de la propreté et de l'eau, Paris	Director general	Public sector
Mines de Douai	Researcher	Research center on plastic recycling