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# “Squaring the Circle”—The Disregarded Institutional Theory and the Distorted Practice of Packaging Waste Recycling in Romania

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**Abstract:** The European Union (EU) remains one of the leading-edge jurisdictions on the planet in legislating and enforcing the circular economy, a token of its forthright environmental awareness. Still, given that the level of economic development across the EU member states is heterogenous, this concern, however generous it may be, looks too beyond “their” means and too ahead of “its” times. What the European policymakers seem to disregard is that top-down institutional constructions, as is the case with the EU’s overambitious environmental legislation, can end up in severe distortions. Imposing/importing an institutionalized arrangement without due preparation may fuel resistance to (even positive) change, as the biases it engenders translate into considerable costs and selective benefits. The present article attempts a novel approach within the literature, where the failure to achieve recycling targets is usually considered the fault of private businesses. Instead, our study explains suboptimal environmental results by the institutionalization of spiraling governmental interventions in markets, meant to make the arbitrarily set recycling/reuse targets artificially viable. Subject to EU rules, Romania’s packaging waste recycling market is a textbook case in revealing this outcome predicted by economic theory, as our statistical data suggest. The conclusion is that it is equally perilous to neglect the calibration of legislative targets according to institutional and economic development as it is to reject environmental claims based on their costs.

**Keywords:** circular economy; neo-institutional economics; environmental legislation; top-down institutions; recycling and reuse targets; market distortions; EU packaging waste directive; Romanian recycling industry

## 1. Introduction

The theoretical and applied dimensions pertaining to sustainable development, as in fact to the whole sustainability science, are relatively delicate, given the fact that one can count a few hundred definitions that are attached to the core concept [1], with all this variety not necessarily contributing to clarity [2]. The notion of “sustainability” is for environmental management at least as flexible/versatile as “competitiveness” is for modern economics. Still, for the economist, the main concern is to find an efficient means to reach the desired ends: this is the very “Secret of Polichinelle” and “Occam’s razor” in the economic profession. Despite its widespread use, sustainable development still needs to organically integrate itself into the general economic framework in order for it to deliver on people’s

expectations. Trying to “create” a novel brand of “ecological macroeconomics” [3] risks ignoring the last few centuries of discussions on how economic incentives and economic calculation actually work. As F.A. Hayek warned: “the curious task of economics is to demonstrate to men how little they really know about what they imagine they can design” [4].

Even if one concedes that “environmental problems” are ultimately “market failures” (with all the liabilities of this popular concept [5]), the question regarding which means are best suited to correct them persists. There is no clear-cut consensus on this, but only majoritarian, vocal allegations, having as commonality the specter of wide-ranging governmental regulations or even nationalization of natural resources. For instance, as early as the 1960s, some suggested population control in the name of sustainability [6], while more traditional toolkits for environmental management such as Pigouvian taxes, cap-and-trade, or subsidies for green businesses might lead to a surreptitious substitution of governmental failures for market ones. Yet, as pointed out in several bodies of the economic literature, there is no irreconcilable conflict between “free-market economics” and “environmental/sustainability economics” [7,8], but, on the contrary, as we try to re-emphasize in this paper: it is the missing role of social institutions (and of legislation/policies thereof) in economic processes that is conducive to a gap between environmental ends and means. Such situation may be called “institutional mismatch” [9].

“Circular economy” represents an extremely interesting theoretical case study to be scrutinized with (neo)institutional economics lenses. As a concept belonging to the broader family of “sustainability” and defined as “a regenerative system in which resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing material and energy loops” [10], circular economy may be seen, paraphrasing a Marxian syntagma, as the “higher stage of sustainability”. Named as such by D.W. Pearce and R.K. Turner [11], elaborating on a scaffolding laid out by W.W. Leontief [12] and refined, among others, by K. Boulding [13] and D.H. Meadows et al. [14], “circularity” challenges the obsolete “linear” logic [15]. It embodies a regenerative system [16,17], capable of running on a limited stock of primary resources, with “dis-assimilation products” and “energy losses” down to zero. That is what mankind craves for, as there are regions on the planet where the “ecological footprint” looks alarming: the rate of consumption and waste generation exceeds the metabolic rate of nature [18]. Still, the adoption of proactive circularity legislation cannot escape the core economic laws.

The European Union (EU) is one of the most “progressive” supranational bodies in attempting to implement circular economy among its member states [19,20]. However, given that the development level of countries throughout the EU is extremely non-homogenous, this endeavor might prove more ambitious than anticipated, or in other words, too ahead of its times (without considering the circularity as fundamentally flawed, but only hastily enforced). While a country such as Germany, who has pioneered the circular orientation since 1996, will probably meet the high recycling targets imposed by the EU circular economy legislation, other member states could find these goals hard to achieve given that their institutional setup has not matured enough, needing more preparation. There are a couple of manifest negative outcomes regarding this top-down EU approach: economically, the expenditure burden will disproportionately fall on the private sector, with industry incurring higher costs, which will necessarily be transferred (at least in part) to the final consumer; politically, if some governments try to “make the high targets work”, this may spillover distortive interventionism.

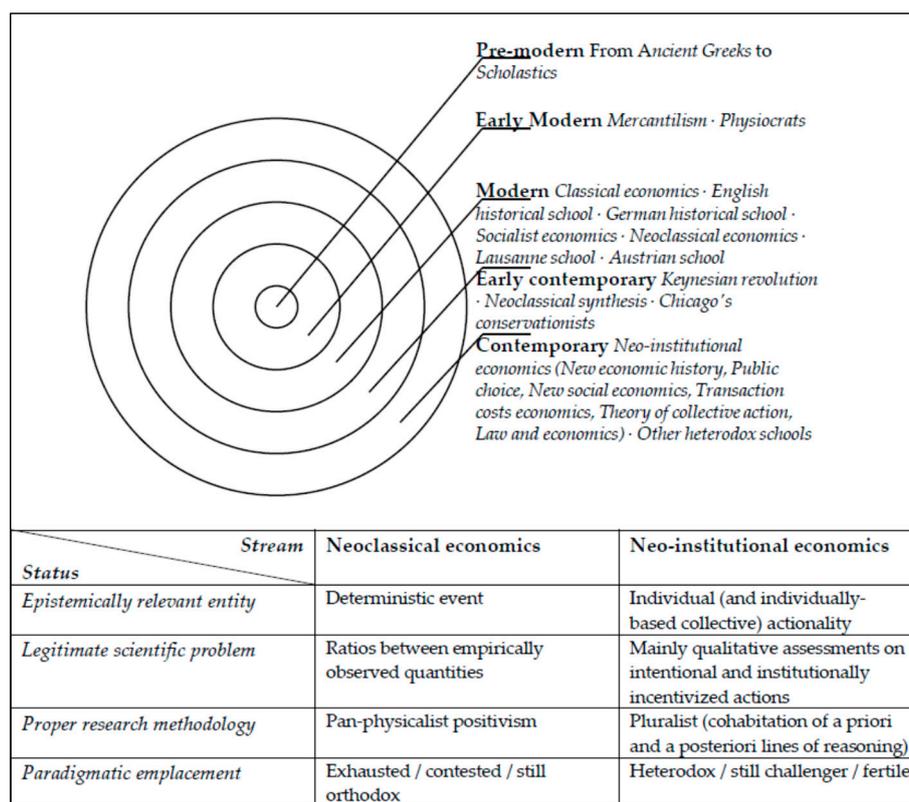
The present research is original in at least three ways: (a) it acknowledges the solid links between institutions (“rules of the social game”) and circularity, noting that poor institutional design cannot be compensated by mere political (and bureaucratic) will; (b) it reviews the legal framework devoted to circular economy by the European Union, drawing attention that in an integrated, yet heterogenous economic space, uniform regulatory targets create distortion and divergence (the EU’s *Circular Economy Package* being illustrative in this regard); (c) it illustrates the argument with the case of Romania, where institutional maturity (both formally and informally) is not supportive for the degree of economic circularity that the EU aims to achieve, as a whole, in the specific field of packaging waste recycling. Thus, the present study (i) starts with a dual-track literature review (both theoretical and empirical), emphasizing the steps forward as well as the blank spots in the scientific works devoted to this subject,

then (ii) it follows with a brief survey of the relevant EU legislation and degree of implementation, (iii) concluding with the quite illustrative/instructive case of Romania.

## 2. Literature Review

### 2.1. From the Role of Institutions in Environmental Development . . .

Before presenting what the European Union’s *Circular Economy Package* includes and discussing in detail how these regulations affect the member states (with a focus on Romania), as well as before commenting on how scholars evaluated the impact of circular economy (with a focus on recycling targets), a point is worth making. This main discussion concerns the way public regulations emerge and what has been proven so far regarding their impact on the welfare and development of a society—the undeniable goal of each and every public action. In this endeavor, we shall begin from the very basic idea that life in society (be it economic, political, etc.) is nevertheless governed by a *set of rules*—consecrated as “institutions”, using a more academic parlance. D.C. North, a paramount scholar in the field of institutional economics, defines institutions as “the rules of the game in a society, or more formally, are the humanly devised constraints that shape human interaction” [21]. Institutional economics, with its “law and economics” movement, gained influence in the second half of the 20th century, restructuring an unconsolidated stream of thought dating back from the late 19th century, replying also to the mechanical fictionalism that was imputed to mainstream “Keynesian-neoclassical synthesis” (for a diagrammatic glimpse, see Figure 1).



**Figure 1.** Neo-institutional economics’ lineage: temporal and topical aspects. Source: own conception.

Among various taxonomies, what is important for our argument is that institutions have been classified in two categories, depending on how they emerge [22]:

- Endogenous, or bottom-up institutions, which are spontaneously created by members of society in order to solve a problem that they face (examples include property rights, contracts, money, marriages, etc.);

- Exogenous, or top-down institutions, which appear as a result of a leading authority's decision to impose a set of rules so as to solve a (perceived) problem that society faces (examples include taxation, subsidies, etc.).

The field of environmental legislation falls into the latter category, as these regulations are created by local or supranational authorities (such as the European Union) in order to mitigate, or even eliminate, societal actors' injurious actions onto the environment.

R. H. Coase's seminal paper entitled *The Problem of Social Cost* [23] is among the first to discuss the problem of pollution and environmental legislation from an institutional perspective. He argues that, when dealing with actions that have a harmful effect (on others), the decision should not be focused on simply restraining those actions, but on inquiring whether the gain from preventing those actions is greater than the loss incurred by stopping them. When there are no transaction costs and property rights are assigned, then the party who produces the harmful effect and the one that is affected by it will negotiate an optimal solution for both, without needing intervention from a superior authority. However, if transaction costs exist and are high enough (e.g., too many people involved, too hard to identify who is involved, too hard to determine the cost of the externality, etc.), intervention coming from a higher centralized level is required. However, in Coase's perspective, a top-down, "one size fits all" approach may not be always a successful one. On the contrary, it may be counterproductive in contexts in which parties involved in and affected by a damaging action are still able to negotiate a more efficient outcome—such a possibility was studied theoretically [24] and historically [25]. Or, even worse, imposing/institutionalizing a top-down "corrective" regulation may become a burden on the economic actors, affecting economic behaviors and the future development.

In fact, there is an ample ongoing debate regarding the direction of causality between institutions and economic development (a sort of "egg-chicken" dilemma—in theoretical/explanatory terms—corresponding to a "putting the cart before the horse" peril—in practical/policy terms). While some may wonder if good institutions are the product of a developed society and/or can be properly enforced only in such a context, others ponder whether precisely the good institutions are the ones that influence development [26,27].

The same debate can be narrowed down to the relationship between environmental laws and development, for instance in the European Union. Are all member states equally able to create or, in the case of EU regulation, enforce and respect, the environmental directives imposed? We argue that the degree of compliance with EU environmental regulation is strongly influenced by the development level of a country, and the lack of compliance that we currently witness is attributed to a mismatch between the levels of economic development of the member states (which is strongly non-homogenous, despite all of the pro-convergence policies and funds) and the EU's bureaucratically set targets.

There are research papers to support our hypothesis. For instance, one [28] explains that developing countries oppose carbon taxes as it is considered that such taxes are harmful for economic growth, since they raise business costs, decrease the competitiveness of exports, and diminish firms' profits. In the same vein, there are investigations [29] finding out that there exists a powerful connection between economic development and environmental awareness, showing that government expenditure on environmental protection is correlated with environmental taxes only in the case of countries with mature industrial and service sectors, and not for countries that are still developing, or for former transition countries. Other studies [30] stress the fact that developing countries are still rather skeptical when it comes to global environment governance, although they have made significant progress since several decades ago when they were strong contestants of the environmental discourse. A more recent paper, and one of the very few on the topic written by Romanian authors, finds that "[...] designing and advocating environmentally friendly policies should be customized to the specificity of each country regarding its level of development, political polarization regarding environmental issues and the association of these policies with people's ideological preferences" [31]. Such a conclusion is reinforced by another research study [32] which raises awareness in relation to "circular economy's vicious circles".

On the other hand, research has shown that environmental regulation influences economic development through its impact on businesses and households. For instance, in the case of Denmark, the majority of green taxes appear to be regressive, placing a higher burden on low-income households, thus having redistribution effects [33]. When investigating the impact of environmental policy on trade flows, other researchers [34] infer that such policy tools act as a trade barrier, being used to protect domestic industries and having a strong impact on net imports. Another study emphasizes, while looking at the efficiency of environmental taxation across European countries, that this policy tool “is often found to be responsible for distortions in production and consumption processes, undermining economic performance” [35]. The same study discusses the disservice of this policy by highlighting its negative effects in terms of fiscal pressure, encouragement for rent-seeking behavior, and a lowering of competitiveness and consumption. Similar conclusions are reached by other researchers who show that there exists a relation between strict environmental policy regimes and diminished enterprise profits [36] or who find a strong negative direct effect of environmental policy on business performance, greater than the positive indirect effect mediated through R&D investments [37]. Additionally, there are studies underscoring the case of the relative superiority of market-relying eco-solutions over public eco-policies [38], as decentralization and deconcentration stimulate voluntary conformation [39].

Of course, there also exist individual “success stories” of environmental policymaking, as explained by surveys arguing that for European “eco-leaders” such as Denmark, the Netherlands, Norway, and Sweden, taxation as a means of environmental protection not only led to less pollution, but also to gains in terms of overall economic performance [40].

However, we consider that such findings should be rather seen as strengthening the observation that policy measures do not have a uniform effect, but they depend on the degree of ecological acculturation and economic development of societies. This in fact acts as a case against “one size fits all” directives and argues for “tailor-made” policy resolutions.

## 2.2. *To the Amiss Institutionalization of Circular Economy*

The defenders of circular economy consider that it goes a step further than sustainable development, denouncing the latter as still biased by “linear” efficiency criterion. Yet, circular economy seems to largely follow the coordinates of the sustainable economy, as exposed in the Brundtland Report [41], with sustainability still being a rather sluggish concept as compared to circularity. There are studies [42] denouncing that eco-efficient means used for sustainability ends still preserve the linear mindset, only elongating the “line”. For example, recycling, in the present mindset, rather leads to the phenomenon of “downcycling”—the recovery of less and less quality materials and of increasingly poor quality, rather than recovering/restoring the materials in question. Putting it otherwise, circular economy distinguishes itself by claiming the resolution of normative issues first (“doing what is right”) and only then solving the economic problems (“means to ends adequacy”).

Generously and heuristically, circular economy is abundant in imagining mechanisms for implementing such ethical and efficient outcomes. For instance, some [43] plead for the so-called “cradle-to-cradle” arrangements in order to create eco-efficient (and in a sense, eco-sufficient) systems to responsibly self-sustain human cradle ecosystems—by designing endless cycles of biological and physical–chemical metabolisms. Within this representation, “waste management” (i.e., from packaging) is placed on the outer circle. Or, in another portrayal [44], the “waste hierarchy” contains layers of operations such as: prevention, reuse, recycling, energy recovery, and, only at last, disposal. The literature of circularity accommodates a progression of scientific contributions ranging from practical pragmatism to philosophical principled reflections, both of these roving from single-agent-focused to whole system-oriented ones (for a diagrammatic glimpse, see Figure 2).

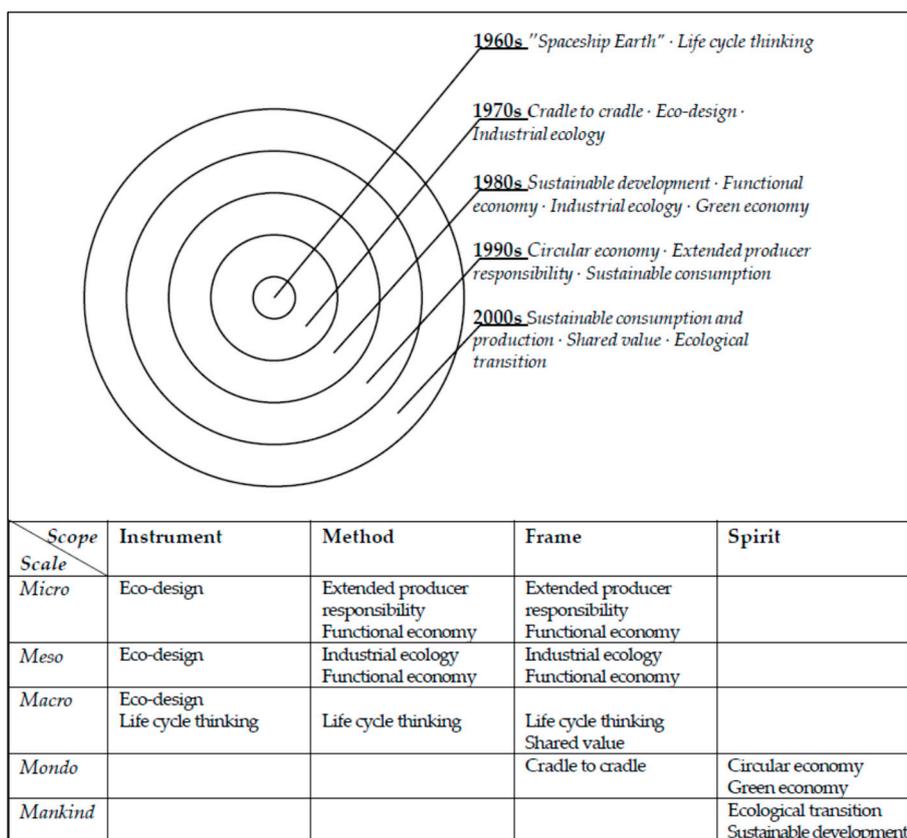


Figure 2. Circular economy’s conceptual family: temporal and topical aspects. Source: own conception.

Although it is recognized that it takes time for all these revolutionary ideas to mature and society to benefit from them, most problems arise precisely here, as we will observe in the case of Romania: there is a mismatch between the (“armchair/bureaucratic”) targets and the levels/rates of evolution of the “real economy”.

Narrowing our perspective to the literature in the field of circular economy and, particularly, to packaging waste recycling in the European Union (the space that is of immediate interest for the present research, focused on Romania, as a member state of the EU), we observe that there are only a few authors concerned with the investigation of the stakeholders who bear the costs involved by implementing the common directives (which are going to be reviewed in the next section devoted to legislation review)—i.e., producers via lower profits, consumers via higher prices, taxpayers via higher local taxes—or demonstrating, on the contrary, that such schemes are rather self-sustainable.

For instance, one study [45] documents that supporting recycling initiatives by switching to biomaterial packaging would be reflected by companies (especially by the small and medium enterprises) into higher prices, thus the final cost would be supported by the consumer. Another one [46] analyzes recycling schemes for packaging waste in several countries, identifying how different responses can be offered to the same problem, i.e., complying with recycling targets imposed by the EU, and how these responses reflect the costs vs. benefits tradeoff. In countries such as Germany or the UK, the industry pays all the costs involved in packaging waste recycling, yet it also collects all the benefits from selling of the sorted packaging waste materials. As the paper also includes a case study on Romania, it highlights that in this country, the costs of packaging recycling are higher than the benefits, requiring the intervention of local governments via taxes supported by the population. One possible reason for this state of facts is that Romania is a newcomer in this field and it has not yet made its recycling processes efficient enough. One paper [47] investigates the case of Portugal, where packaging recycling is a shared responsibility between the industry and local authorities. The authors

raise an interesting question in their research with respect to whether it is possible that local authorities are actually inflating their recycling costs because they expect the industry to foot the bill.

Externalities and non-excludability are the reasons for which any discussion in the field of environmental economics is extremely complicated. In this line of thought, one researcher [48] explains that the efficiency of waste recycling can be achieved only if it stops being a “collective action problem” [49] and it becomes an individual one. He argues that such a shift would be possible if the right economics incentives are used, such as reward schemes, in order to make people consider it profitable to take part in the recycling activity. Long run tax concessions [50] could be a good economic incentive in order to convince consumers to act environmentally responsible and avoid free-riding.

There are also voices [51] who assert that no policy on its own can lead to more efficient recycling, and a mix of multiple measures should be used in order to incentivize people in this direction. Moreover, the measures have to be focused not only on waste recycling, but also on waste prevention. The proposed measures can mainly be divided into two groups: “sticks” (i.e., changes in the costs faced by waste generators and restrictions in their legally available choices) and “carrots” (i.e., financial encouragement to recycle more or to produce less waste). One example of such a “stick” can be found in the European Commission’s assessments [52]. The European authorities have long since advocated a mandatory deposit refund system on one-way beverage packaging in order to achieve harmonization of the national policies at the level of the entire European Economic Area and avoid the fragmentation of the common market. Recent research [53] discusses the applicability of this deposit refund scheme in the case of Spain, by comparing it with an Extended Producer Responsibility System (EPRS) that is now in place in this country. They conclude that the EPRS obtains better environmental outcomes. This result is remarkable in its own right and can help lead to the conclusion that, at least in some cases, “less intervention is better than more”.

However, few studies point specifically towards the crux of the problem: that the EU’s 2015 *Circular Economy Package* (and its upgrades/updates thereof) become quasi-inapplicable for a country in which producers lack the necessary means in terms of waste management and where the population has no economic incentives to act environmentally responsible. General economic theory teaches us that overambitious policy measures can only create distortive public and private behaviors [54]. The present study aims at bypassing the mainstream mindset within the (i.e., Romanian) scientific literature: rather “descriptive” than analytical [55–57], rather “prescriptive” than reflective [58–60], drawing attention to the need to institutionally correlate the “circular” means with the “circular” ends in order to avoid overburdening and socially imbalanced costs.

### 3. Legislation Review

#### 3.1. *The Circular Economy Package and Implementation of the Directives*

The European environmental legislation is usually considered one of the most complex and progressive legal frameworks in the world, the *European Green Deal* commitments representing only the newest piece in the puzzle. The track record is vast. Just to take the example of waste generation, the EU directives cover almost every aspect (from used vehicles to packaging). There were some notable previous attempts by individual countries to implement a circular economy (Germany, China, Japan), but nothing on the same caliber as the EU’s efforts.

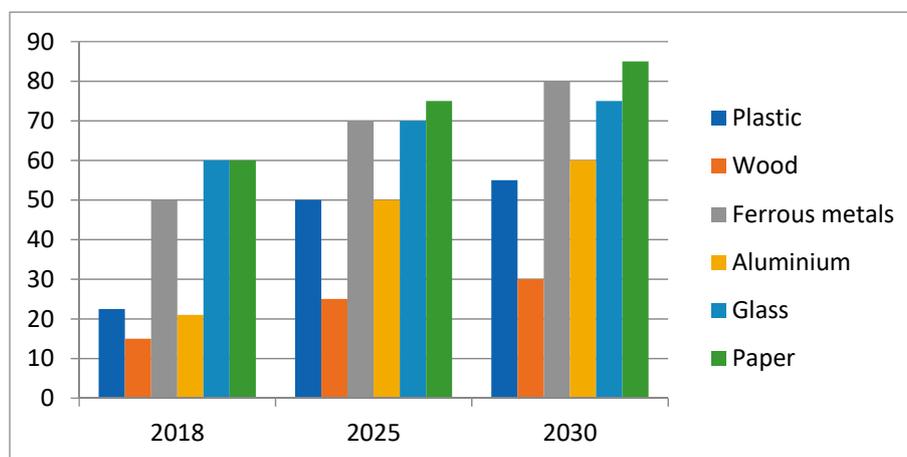
Deciphering the meaning of circular economy is a formidable task even for environmental and legal experts. Leaving aside the political talk, the “circular economy action plan” started by the European Commission in 2015 was, generally speaking, an endeavor to amend the old EU directives on waste. Among these, one of the most important is the new packaging *Directive (EU) 2018/852* amending *Directive 94/62/EC* [61] (analyzed by the present paper).

The EU managed to achieve the said revision of its waste legislation on 30 May 2018, amending its previous directives on end-of-life vehicles (2000/53/EC), batteries and accumulators (2006/66/EC),

electronical and electric equipment (2012/19/EC), landfilling of waste (1999/31/EC), the general waste directive (2008/98/EC), and the aforementioned packaging and packaging waste directive (94/62/EC) [62].

The reasons for which we claim that the legislation on packaging is one of the most important in the field are that, first of all, it has a direct impact on private European producers and, second, it has an extremely wide range of application—virtually any product sold on the common market requiring the use of a certain type of packaging. Moreover, the effects of the new packaging directive (2018/852) are even more important in the case of goods for which the cost of the packaging is relatively high compared to the total cost of the product, such as in the food and beverage industries.

In practice, the movement towards the circular economy meant an increase in mandatory recycling target rates. Under the general umbrella of Extended Producer Responsibility (EPR), producers who place goods on the common market are required by law to recycle, by themselves or through intermediaries, a certain percentage of the quantity of their packaging. The EPR principle is the twisted European version of the “polluter pays” concept. European authorities have interpreted that the producer is always responsible for the way in which the consumer uses their products. In a sense, it is totally counterintuitive: if a person throws a used PET bottle in a lake, is the company who manufactured the bottle the one who is responsible for this? Although the EPR system is, in practice, more complicated, the general outline resides in the fact that producers have to fulfil two types of targets: the general target—i.e., a percentage of the total weight of the packaging placed on the market; and the individual targets—i.e., a percentage of the weight of each type of packaging placed on the market. The two sets of targets have to be fulfilled simultaneously. The *Circular Economy Package*—see *Directive (EU) 2018/852* amending *Directive 94/62/EC* on packaging and packaging waste—imposes the increase in both types of targets by 2025 and 2030, respectively. The general target should increase from the current value of 60% to 65% in 2025 and to 70% in 2030, respectively. While this increase seems not that spectacular, if one carefully looks at the rise in individual targets for each type of packaging, the situation becomes far more interesting, as Figure 3 suggests.



**Figure 3.** Individual recycling targets for each type of packaging waste in the EU. Source: own conception.

Here, we can see all-around increases for each type of material, most spectacular being the case of plastic, for which the recycling rate should increase from the current 22.5% to 55%. Aluminum waste recycling should also increase from the current 21% to 60% by 2030. These two categories are particularly important because in most countries, they are the hardest to collect.

However, the most ambitious legal text on which the European Commission is currently working is the so-called *Single Use Plastics (SUP) Directive*. Among other things, the *SUP Directive* intends to introduce a 90% collection rate for PET bottles, a type of waste for which there was previously no legal target in the EU [63]. The reason for which this proposal is rather frightening is that the new rate is extremely high. Such a target has never been attempted before at the EU level and there is currently no

official statistic regarding PET collection in the Union. Moreover, there is no consensus on exactly how the relatively less developed member states will achieve this goal. It is worth mentioning Eurostat currently shows no official statistics on PET waste; it is included in the broader category of plastic waste. The only agency which claims to have accurate information on the issue is Petcore, the so-called “voice of the PET industry”, which states that the EU recycled an impressive 59.8% of its PET in 2016. However, not all the PET producers and recyclers in the EU are members of Petcore, a fact which is especially true for example in Eastern Europe. Their high recycling rate for PET is probably correct for the available data in Western Europe, but remains doubtful for the whole of the EU. The European Commission is placed in the somewhat dubious position of setting a legal requirement on an issue on which it has no reliable information.

European directives impose a certain result for EU member states to achieve, but the latter are free to choose whatever actions to take in order to reach this target. The preferred measures among member states at the moment are either separate collection with penalty fees for those who do not meet the recycling targets (e.g., Belgium, Netherlands, UK, France, Spain, Italy, Portugal, Hungary, Romania, etc.) or different versions of mandatory deposit systems (e.g., Germany, Finland, Sweden, Denmark, Estonia) [64].

Separate collection presupposes that consumers as well as businesses selectively sort their waste and give it over to specialized companies who can recycle it. These latter can be private, state-owned, or a mixture of the two. Individuals, but mostly companies, who fail to do this are required to pay some kind of penalty, either to the state or to waste management firms.

Deposit systems are usually imposed on top of separate collection schemes for different recipients such as glass bottles, PET, or aluminum cans. They require that the consumer should pay in advance a deposit fee that he can claim back if he brings the bottle/can to certain specially designated areas, such as a retail store.

These are of course not the only type of interventions that are available to member states for reaching their goals. They can (and generally do) use a whole panoply of measures, ranging from Pigouvian taxes and subsidies to general bans on certain materials or downright nationalization of recycling industries.

### 3.2. Romanian Environmental Law Regarding Packaging Waste

In Romania, the old packaging and packaging waste directive was implemented through *Government Decision 621/2005* [65] and subsequent amendments. Another law, respectively, *Government Emergency Ordinance (GEO) 196/2005* [66], created an independent fiscal administration designed to levy everything that generally falls into the category of environmental taxes. This fiscal agency is called the Environmental Fund Administration (EFA). The money raised was meant to be used for the fulfilment of some previously unspecified environmental projects [67]. Producers who do not meet the mandatory targets are required by law to pay a penalty fee of RON 2 (approx. EUR 0.4) per kilogram to the EFA for the difference between the mandatory recycling rate and their actual recycling rate. It is worth nothing, however, that the EFA was in no way obliged to use these funds to increase the national recycling rates or to contribute in any way to fulfilling the European requirements.

Producers were naturally not capable of fulfilling the targets by themselves, so they had to use specialized companies in this sense. These are called PROs (Producers' Responsibility Organizations). They are intermediaries between the producers of packaged goods and the recycling industry. It is generally considered that they work as a “clearing house” mechanism. Their goal is to take the responsibility of the recycling rates away from producers (for a negotiated fee) and fulfil them in their names by working with numerous individual collectors and recyclers. In Romania, at the end of 2017, there were about 16 such companies which operated on the market. The producer was not obliged by law to use a PRO, being also able to fulfil his targets individually by working directly with one or more recycling companies.

The situation however drastically changed in 2019 because of the new amendments made to the packaging and packaging waste directive at the EU level (2018/852). The Romanian authorities used the circular economy as a pretext to introduce a new law which, among other things, negatively affects the competition on the PROs market, increases state intervention in the recycling system, and raises the costs of private producers which sell packaged goods.

*Order 149/2019* [68], which was published on 27 February 2019, explicitly states (art. 23 b) that producers of packaged goods can fulfil their recycling targets individually for primary packaging (such as PET, cans, and the like) only by using their own packaging. Until now, such packaging was treated as fungible goods. If you placed on the market a ton of PET, you had an obligation to recycle a certain proportion of that quantity of PET, say 550 kg, but the key difference was that you could recycle any PET bottle and not necessarily the same bottles that your company produced. In effect, this drastically reduces the capacity of producers to fulfil their targets individually, making them captives to a certain PRO.

Furthermore, other laws which appeared in the same period, such as *GEO 74/2018* [69] further amended by *Law 31/2019* [70], were aimed at significantly concentrating the PROs market. For example, explicit provisions in the abovementioned law state that a PRO will be authorized to operate in Romania only if it cumulatively contracts at least 10,000 tons from its clients and it can constitute a guarantee of RON 2 million at the EFA in the form of a deposit of bank guarantee letter—see art. 5 of *GEO 74/2018*, which amends art. 16 points 8 d and e.

The new legal Romanian environmental framework also introduces the term of “municipal waste” (*GEO 74/2018*). This refers to any waste collected from the population (be it selectively or not) or from any other sources if the waste is “similar in nature and composition to household waste”.

The aim of this modification in legislation was that now local authorities have a de facto monopoly on this type of waste. To give an example, if PET bottles are collected post consumption from the population, they go into the category of municipal waste and can only be collected by the local authorities through specialized companies contracted by them. Private collectors practically cannot collect these types of waste anymore, which, interestingly enough, were the most valuable. Private recyclers can gain access to these materials only if they have a contract with the local authorities. Although this is not exactly a nationalization of the recycling industry in the technical sense of the term, the government will have increased control over the companies who gain access to the materials on the market.

#### 4. Methodological Approach

The methodology used in this study combines a theoretical perspective with a practical endeavor.

First, we revisit the body of literature dedicated to neo-institutional economics and use it in a non-traditional field, i.e., environmental legislation. After we explain the link between institutions and circularity, we review the legal framework devoted to circular economy in the European Union. In evaluating the literature and legislation relevant to the topic, we take recourse to this branch of economics to develop assertions on the impact of circular economy legislation on economic actors (producers, consumers, taxpayers), emphasizing that both the academic literature and positive law-making lack an institutional grasp on how uniform regulations and targets distort economic activity, creating divergence in EU member states’ development routes.

The second part of our study shifts from the conceptual to the empirical illustration of our topic. In this respect, we present the case study of Romania, where institutional maturity is not supportive of the degree of economic circularity that the EU aims to achieve, as a whole, in the specific field of packaging waste recycling. Based on simple and robust statistical tools, we quantitatively assess the burdensome impact of the EU’s packaging waste recycling targets on Romania’s economy. In the end, we come back to qualitative appraisals based on institutional economic theory, explaining why the Romanian case is illustrative for “institutional mismatch” distortions, suggesting to include a realistic temporal factor within the “institutional design” of a circular economy.

The rationales for this methodological choice are manifold and can be summarized based on the following:

We resorted to a neo-institutional mindset (distinct from neoclassical mainstream economics) to decipher circular economy's implementation mismatches. This is not about quantitative policies only (applying "tools" to "targets", "systemic parameters" being given), but also about qualitative policies (to adjust a system's structure, the "equation" itself). The latter needs a theory of institutions and institutional change, able to take into account further on, sociocultural specificities, distribution of interests and power, conflict, and social coordination.

Further on, we found it necessary to undertake a legislation review, analyzing the EU directives in the area of packaging waste management, as well as the legal provisions used to translate them into national law. Only by doing this and with neo-institutional economics' lenses, we can fully grasp the economic consequences of the EU's *Circular Economy Package*. Given the technical complexity of the European environmental legislation and the significant effort that is necessary to understand it, few studies have seriously attempted an inquiry into this feature.

Only after clarifying the institutional setup does an empirical study in the field of packaging waste become meaningful. Still, it raises additional issues. Although Eurostat publishes raw data on the major recycling targets (which we have acknowledged), there are no official data on PET collection and recycling in particular. There are some estimative data from private sources, but they only depict the current situation in some of the states in Western Europe, but relatively nothing about the rest of the EU, especially about the EU's relatively less developed regions.

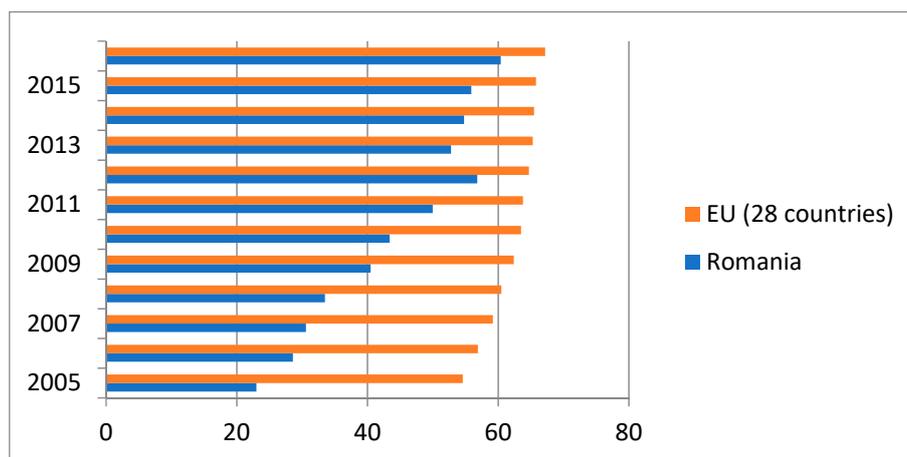
Therefore, in order to properly estimate the initial impact of the *Circular Economy Package* on the Romanian private sector, we collected and analyzed data regarding the prices charged on the Romanian market by the abovementioned PROs. We gathered all the prices charged by each company for individual packaging types and used them to compute industry average prices. This permitted us to calculate a percentage annual increase in costs (that we deem to be puzzling) for producers, which place packaged goods on the markets.

## 5. The Circular Economy in Romania: A Case Study

### 5.1. Unrealistic Recycling Targets, Romania's Impediment

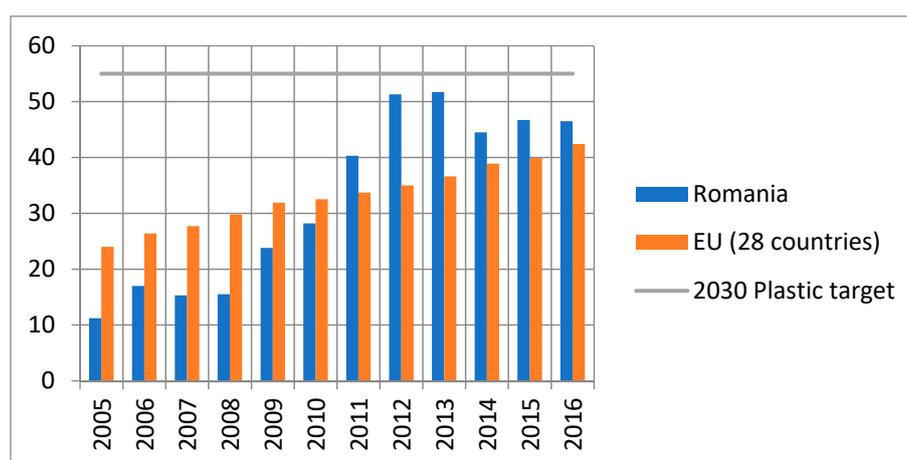
Since Romania entered the EU in 2007 (yet, it prepared the harmonization of its legislation before that), it has continually developed its waste management framework for packaging, a fact which can be supported with figures.

Figure 4 presents the total packaging recycling rate in Romania compared with EU-28. It can be seen that Romania increased its recycling rate from 22% in 2005 to 60.4% in 2016. This increase is spectacular. Will Romania be able to reach the new targets of 65% in 2025 and 70% in 2030, respectively? It seems that the answer will be affirmative. Given the fact that the average collection rate for EU-28 was already over 60% in 2016, it can generally be assumed that most of the EU member states will not have very serious problems with the new total packaging waste target.



**Figure 4.** Romania's total packaging recycling rate as compared to EU-28 (2005–2016). (Data source: Eurostat [71]).

However, the context totally changes when we look at individual targets, especially in the case of plastic. The new target in 2030 is 55% as compared with the actual 22.5%, as Figure 5 points out. The statistics for EU-28 are currently nowhere near that target, with only 42.4% plastic recycling in 2016. Romania has a slightly better figure of 46.4% in 2016, but the new targets will still prove a challenge.



**Figure 5.** Romania's total plastic packaging recycling rate as compared to EU-28 (2005–2016). (Data source: Eurostat [72]).

Moreover, there are also the problems of aggregate statistics that make us skeptical. Although the numbers at the EU level do not look so problematic, different countries have experienced serious difficulties with reaching their actual reduced targets, either globally or individually. In a report on the implementation of EU waste legislation, the Commission mentioned that in the sphere of packaging waste, a considerable number of states have missed their recycling targets, respectively: Hungary, Malta, Croatia, Cyprus, Finland, Greece, Romania, Poland, and Portugal [73]. In the case of Romania, 2013 and 2014 were years in which the global recycling and reuse objectives were not achieved, a fact which was officially recognized by the national authorities [74]. The same was true in the abovementioned years for the individual recycling target for glass packaging waste. These are only a few reasons for which we consider that the current system still has a considerable amount of questionable issues and that increasing the requirements through legislation will probably cause additional problems instead of fixing the current ones.

One of the most unrealistic pieces of legislation in the whole circular economy framework is currently the *Directive (EU) 2019/904* on single used plastics [75]. It aims at introducing a 90% collection rate for PET bottles in 2029, a target which will make all the other amendments more or less trivial. There is currently no official statistic on PET collection in the EU. A decent estimation would be to assume that PET recycling has the same rate as plastic waste recycling. In that case, given the abovementioned numbers at the EU level, it is clear that the target is unrealistic. We have already shown that in 2016, only about 42% of all the plastic packaging was collected.

There are also more optimistic voices on the European market. Petcore, Europe's leading association for PET producers, recycling, and individual companies, is one of them. In their 2017 Survey on European PET Recycle Industry, they claim that the recycling rate in the EU is around 58.2% [76]. However, they also admit that although Germany has an alleged recycling rate of 90–95%, Finland has a rate of 30–40%, while for many Mediterranean and Eastern countries “collection rates vary significantly” (a more accurate way of putting it would be that reliable data are lacking). In this case, it is only legitimate to ask ourselves whether a country which currently only recycles 20–30% PET will be able to reach 90% in only 10 years. The authors of the current paper are highly skeptical. Moreover, governments in these countries will be given a political incentive to blame private producers for their alleged failure and implement heavy interventionist measures in order to “solve” the environmental problems. We have already seen in the previous sections that local authorities have now gained a strong foothold in the recycling of municipal packaging, which was, until now, a relatively private sector. Further intervention is to be expected, especially in the form of a mandatory deposit scheme implemented on top of the current system.

### 5.2. “The” Benchmark: What about Germany's Success Story?

When arguing that the EU's recycling targets are unrealistic, the most common objection that one receives is related to Germany's success story. How can Germany recycle 90–95% of its PET bottles (as the previously mentioned sources claim)? Is it not possible for other countries to follow the same example and implement mandatory deposit schemes on top of current legislation? There are, however, some crucial institutional differences between Germany and other EU member states.

First of all, as we stated earlier, Germany was one of the countries to pioneer packaging waste legislation. The *Verordnung über die Verwertung und Vermeidung von Verpackungabfällen*, also known as the *German Packaging Ordinance*, included a mandatory deposit scheme as early as 1991 [77]. Although the deposit scheme entered into force only in 2003 [78], it is still clear that Germany had a considerable head start in the packaging collection and recycling industry as compared to other countries, which were latecomers in the EU.

However, the crucial difference between Germany and Romania (and consequently, the reason why in the current context, the mandatory deposit scheme would probably fail) is one of institutional design. As early as 1990, Germany was the promoter of *Der Grüne Punkt*, the license brand/symbol of an industry-funded waste collection and recycling scheme. PRO Europe, which is now the umbrella organization for *Der Grüne Punkt*, currently has active members in 31 countries [79]. Because the collection scheme in Germany was privately funded, the industry had property of the waste it collected. The member companies who paid the fees to participate in the scheme were in this way able to cover a part of their expenses with the proceeds obtained from the valuable packaging waste they collected. However, in Romania, anything that falls under the umbrella of municipal waste (including high value packaging materials) is the property of the local Romanian authorities (see *Law 101/2006* [80] and further amendments). This translates into the fact that Romanian producers must pay the expenses of the system, but the proceeds from the processing and selling of valuable waste are claimed by local authorities through their contracted collectors. The burden of the system is, in this case, skewed towards the packaged goods industries. This is, of course, just one example of different institutional designs between countries and it is possible to remedy the situation at the national legislative level. However, top-down approaches by a supranational body such as the EU on environmental issues will only

exacerbate negative national practices as they do not occur in the right sequence of events. This is even more so in the case of overly ambitious targets imposed on countries which are not yet ready for them and which lack a reasoned preparatory strategy.

### 5.3. On Competition and Costs in the Romanian PRO Market

One of our main concerns in the present paper is that new legislation issued at the EU level always creates incentives for a national government to implement interventionist measures. We have already mentioned in brief the modifications in national legislation which came, more or less, as a consequence of the *Circular Economy Package* put forward by the European Commission.

*GEO 74/2018*, for example, is a legal act which had a direct negative effect on competition in the Romanian PRO market [81]. In order for a company to be licensed as a PRO, according to the abovementioned legal text, it has to fulfil a number of criteria, among which:

- Being a joint stock company;
- Having contracted in the previous year from its clients (which should also be stockholders) at least 10,000 tons of packaging waste;
- Making a deposit of RON 2 million (approx. EUR 420,000) to the National Administration Fund in the form of cash or bank letter guarantee.

Such a legal requirement, although it was probably meant to bring more stability and credibility to the PRO market, drastically affects competition. The first consequence, which was easily predictable, was that from 18 PRO companies authorized in February 2018, only 12 remained in 2019. Out of the 12, one is in a state of insolvency and two can operate only at the local (as opposed to national) level [82]. This means that in less than two years, one-third of these companies went off the market.

General economic theory points out that normally, a decrease in the number of sellers should manifest itself in an increase in the price of said product. Fortunately, in Romania, PROs are required by law to make the prices public on their websites. The prices charged by the 12 companies in 2019 are presented in Table 1.

Based on the data, we were able to calculate the average prices of PROs for each category of waste (glass, plastic, paper, metal, and wood) and compare their average values between 2018 and 2019. This was somewhat difficult, given the fact that in 2018, the prices were not split between municipal and commercial waste, as shown in Table 2.

$$\text{Annual percentage price increase} = \left[ \frac{(MW_{2019} + CW_{2019})}{2W_{2018}} - 1 \right] \times 100$$

where:

$MW_{2019}$  = price of municipal waste per price category in 2019;

$CW_{2019}$  = price of commercial/industrial waste per price category in 2019;

$W_{2018}$  = price of waste per price category in 2018.

Table 3 synoptically presents the percentage increase for each type of waste. We used the average price on the market for each type of packaging for both years. The year 2019 proved somewhat more complicated since, as discussed earlier, the legislation included the concept of municipal waste, which encouraged PROs to use two separate prices for each material type—one for commercial waste and one for municipal waste. In order to easily compare them to the 2018 values, we used a mean value between the two prices. It can be observed that all of the prices increased, with the exception of wood and other plastics (i.e., plastics with the exception of PET). If we calculate the average price per ton, for any packaging material placed on the market, we would have an overall increase of approximately 3% in a period of six months.

**Table 1.** Prices \* charged by the 12 companies in 2019 \*\*.

Material Type	Glass		Plastic				Paper		Metal				Wood	
			PET		Other Plastics				Steel		Aluminum			
	M	C	M	C	M	C	M	C	M	C	M	C	M	C
PRO 1	112	99	159	135	88	71	87	79	84	75	175	159	78	78
PRO 2	147	111	167	153	115	109	93	84	113	97	189	168	88	84
PRO 3	147	136	178	157	126	115	105	94	115	105	178	168	105	94
PRO 4	126	115	168	157	126	115	94	84	115	105	178	168	105	94
PRO 5	107	101	145	138	80	67	88	82	90	84	143	136	78	73
PRO 6	109	109	147	140	105	101	87	83	91	88	155	147	82	82
PRO 7	115	111	169	162	88	71	102	96	144	99	173	162	77	73
PRO 8	117	117	168	168	115	115	84	84	99	99	182	182	88	88
PRO 9	208	109	193	147	147	94	94	84	128	88	197	151	115	84
PRO 10	120	105	179	143	118	111	97	92	97	92	173	147	101	92
PRO 11	115	111	170	162	101	90	100	82	99	90	172	164	82	69
PRO 12	107	103	146	139	114	110	86	83	96	92	162	142	88	79
Average market price 2019	127	111	166	150	110	97	93	85	106	93	173	158	91	82

\* Price (EUR/ton) of packaging waste per category. Source: own calculation based on data from Green Resources [83].

\*\* M stands for municipal waste while C refers to commercial/industrial waste.

**Table 2.** Prices \* charged by the 12 companies in 2018.

Material Type	Glass		Plastic				Paper		Metal				Wood	
			PET		Other Plastics				Steel		Aluminum			
	M	C	M	C	M	C	M	C	M	C	M	C	M	C
PRO 1	101		138		103		73		82		178		78	
PRO 2	157		147		136		126		115		178		136	
PRO 3	122		146		115		89		105		147		94	
PRO 4	105		136		105		73		94		147		84	
PRO 5	94		138		73		80		80		105		80	
PRO 6	115		166		115		88		98		157		94	
PRO 7	107		153		113		88		91		170		83	
PRO 8	110		149		115		84		94		153		84	
PRO 9	109		168		115		79		94		168		84	
PRO 10	115		138		107		88		84		157		84	
PRO 11	113		147		105		86		84		147		84	
PRO 12	109		147		115		94		96		136		96	
PRO 13	126		157		115		84		94		168		94	
Average market price 2018	114		148		110		87		93		155		90	

\* Price (EUR/ton) of packaging waste per category. Source: own calculation based on data from Green Resources [84].

**Table 3.** Percentage increase of prices \* for each type of waste.

Year	Glass		Plastic				Paper		Metal				Wood	Total
			PET		Other Plastics				Steel		Aluminum			
	M	C	M	C	M	C	M	C	M	C				
2019	119.02		157.88		103.82		89.29		99.37		165.42		86.50	117.33
2018	114.06		148.43		110.27		87.05		93.26		154.62		90.36	114.01
% price increase	4.34		6.37		-5.85		2.57		6.55		6.98		-4.27	2.91

\* Price (EUR/ton) of packaging waste per category. Source: own calculation.

This is admittedly not as remarkable as expected. Yet, again, aggregation does obscure certain aspects which are relevant for this situation. For example, we have already pointed out that GEO 74/2018 introduced the concept of municipal waste, which is defined more or less as any waste which is collected post consumption from the population. In that case, PET, glass bottles, and aluminum cans all fall *de facto* under the umbrella of municipal waste. If we make the same comparison as before between

2018 and 2019, but use the prices for municipal waste for the categories specified above, the picture is considerably different, as illustrated by Table 4.

**Table 4.** Percentage increase of prices \* for municipal waste for each type of waste.

Material Type	Glass	PET	Aluminum
2018	114.06	148.43	154.62
2019	127.46	165.60	173.11
% increase	11.75	11.57	11.96

\* Price (EUR/ton) of packaging waste per category. Source: own calculation.

The comparison shows that for these packaging materials, the rise in price has two digits, ranging between 11.5% and 12% over a period of approximately six months. This is a considerable increase and it will have a significant impact on the industries which predominantly use this type of packaging, particularly the food and beverage industries.

The companies which cannot fulfil their obligations individually or with the help of a PRO are left to pay the penalty fee towards the National Administration Fund, which is calculated according to the following cumbersome formula:

$$\text{Penalty fee} = \text{Max}(a; b; c) \times \text{RON } 2$$

where:

$$a = d + e + f + g + h;$$

$$b = (Q_t \times R_t - \sum q r_i);$$

$$c = (Q_t \times V - \sum q v_i);$$

$$d = \text{Max}[(Q_{\text{metal}} \times R_{\text{metal}} - q r_{\text{metal}}); (Q_{\text{aluminium}} \times R_{\text{aluminium}} - q r_{\text{aluminium}})];$$

$$e = \text{Max}[(Q_{\text{plastic}} \times R_{\text{plastic}} - q r_{\text{plastic}}); (Q_{\text{PET}} \times R_{\text{PET}} - q r_{\text{PET}})];$$

$$f = (Q_{\text{wood}} \times R_{\text{wood}} - q r_{\text{wood}});$$

$$g = (Q_{\text{paper}} \times R_{\text{paper}} - q r_{\text{paper}});$$

$$h = (Q_{\text{glass}} \times R_{\text{glass}} - q r_{\text{glass}});$$

$Q_i$  = quantity of  $i$  type of packaging placed on the market;

$q v_i$  = quantity of  $i$  type of packaging which was reused by other methods than recycling;

$Q_t$  = total quantity packaging placed on the market;

$q r_i$  = quantity of  $i$  type of packaging which was actually recycled;

$R_i$  = individual legal target for type  $i$  packaging;

$R_t$  = global legal recycling target;

$V$  = global legal reuse target, other than recycling.

In spite of the complicated aspect of the abovementioned formula, the logic behind it is relatively simple. The three terms of the equation,  $a$ ,  $b$ , and  $c$ , represent the difference between the quantities of packaging which were actually recycled/reused and the three types of legal targets, respectively: the individual target per type of waste, the total recycling target, and the total reuse target (by other methods except recycling). The formula calculates which of these three terms is the largest and imposes the obligation to pay the said sum on the company. For instance, if the company places on the market one ton of packaging and does not have a contract with a PRO (and it cannot fulfil the targets individually, which is usually the case), it will be liable to pay according to the global target  $(1000 \times 0.6 - 0) \times \text{RON } 2 = \text{RON } 1200$ , which represents approximately EUR 250 per ton. As we saw in Tables 1 and 2, this sum is considerably higher than the average fees charged by the Romanian PRO companies.

Understanding the way in which the penalty fee works is crucial in order to fully grasp the way in which the PRO market operates. Reducing the competition among PRO companies will normally

push the prices charged by these companies toward the upper limit, which is the penalty fee levied by the National Administration Fund.

## 6. Conclusions

Our analysis suggests that the new targets imposed by the *Circular Economy Package* will prove a challenge for many EU member states, casting serious doubts upon the alleged feasibility of the whole project. The core argument behind this result lays in the severe mismatch between the EU's bureaucratically set targets and the countries' heterogeneous levels of economic development and institutional readiness. As we have explained in the previous sections, poor institutional design cannot be compensated by mere political (and bureaucratic) will, and a top-down, "one size fits all" approach in establishing institutions (EU environmental legislation represents just another set of institutions) places, most of the time, a burden on economic actors, thus affecting their future behavior through bad incentives. Understanding the functioning of institutions, even of those which are undisputedly benign and forward-looking, is cornerstone for their success.

- The most effective institutions are those that emerge through a bottom-up approach, from the society, because (1) those are the product of the economic actors' endeavors to solve a problem they actually face, and (2) in their creation, economic actors are careful to minimize (or even eliminate) possible adverse consequences that hurt their activity. In top-down approaches, legislators may disregard (voluntarily or not) the negative unintended consequences, yet economic actors will seek to bypass these rules or to place the burden onto another category of societal players. As such, in the case of environmental legislation, the economic consequence is reflected by industry's higher costs, "split" (at least in part) with the final consumer, without compensating acknowledgeable benefits for any of them, while the political consequence is mirrored by governments' revolving attempts to "make high targets work" that may spillover distortive (chain-linked) interventions.
- In addition, what is noticeable is that top-down institutional designs, when created at supranational levels, do not take into account each country's readiness (in terms of economic and social development) for an efficient assimilation and proper functioning of these rules. Countries like Romania and other EU emerging economies still have an immature institutional layer, which will hinder an efficient application of such laws, setting in motion a wave of unintended consequences resulting in competition distortions and suboptimal overall results. Moreover, given the fact that member states will have to implement the EU directives into national legislation, government authorities will have a certain degree of flexibility regarding the means to achieve these targets. This will prove as a perfect pretext for increasing state intervention into the economy, but it is extremely questionable whether the (chain of) immixtures will create positive results.

The *Circular Economy Package* proved to have immediate effects upon the Romanian economy, and the new laws that were enacted directly targeted the recycling market. Among the most important new legal provisions, one can count the introduction of the concept of "municipal waste" and the obligation for Romanian PROs to cumulatively contract at least 10,000 tons annually from their clients and to constitute a guarantee of RON 2 million at the fiscal authorities.

- Consequently, the first legal innovation transformed municipal waste into some *de facto* monopoly of the local authorities, making it extremely complicated for producers to individually meet their targets. At the same time, the second one considerably concentrated the PRO market in Romania, with the number of firms in the market going down from 18, in 2018, to 12, in 2019.
- The same period manifested itself with average price increases of 11–12% for glass, aluminum, and PET placed on the market, as economic theory predicts in monopolization processes. The firms which are most vulnerable to these price increases are largely food and beverage industries because they are the heaviest users of the aforementioned packaging types.

The monopoly of local authorities, the concentration of the PRO market, and the price increases that placed additional burdens on core industries/markets exemplify only some of the unintended consequences of such top-down institutional designs we have already indicated.

In terms of policy recommendations, our study emphasizes the need for a thorough reconsideration of the very idea of an unhampered market process, as well as the economic development hereof, as a yardstick for tailoring responsible policies. Such environmental measures as the EU's *Circular Economy Package* must be correlated with each countries' own development level and institutional readiness, otherwise a forced implementation may backfire and produce costly unintended consequences.

More specific advice includes:

- The requirement for state authorities to focus on increasing competition in the recycling market, not on hampering it. As such, any company should be permitted access to the "municipal waste market" in order to collect, sort, and recycle these high value materials without discretionary restrictions.
- Regarding PROs, while it is true that certain financial measures should be implemented in order to make them more trustworthy, conditioning them to reach a minimum turnover limit and to make financial guarantees at the fiscal authorities appear to be suboptimal methods in this regard.
- Another specific policy measure focuses on encouraging European authorities to gather and publish official, reliable statistics regarding PET collection and recycling, as introducing a 90% PET collection rate without having solid data regarding the current state of affairs looks ill-advised.
- Given the fact that numerous countries experienced problems with the current targets, a longer period for the implementation of the *Circular Economy Package* also appears to suggest itself as a possible solution, negotiating terms that are to be kept away from both fleeting and lingering time frames.

The present study is innovative and contributes to the specialized body of scientific literature in a number of ways. First of all, it is the only systematic research which focused on the recently introduced national legislation in Romania in the field of packaging waste recycling. This new wave of legislation was presented as a direct consequence of the EU's *Circular Economy Package*. Surely, other similar laws will soon follow. Secondly, to the authors' knowledge, it is the only study which consistently analyzed the effects (in terms of costs and market structure) on the PRO market in Romania in recent years.

The paper also has a few limitations. The main one is that the statistical data were primarily focused on one country. However, it is the authors' belief that the results are extremely relevant for most Eastern European countries. Further research is needed in order to collect and analyze data regarding the packaging waste market in other countries in the EU. The present data supplied by Eurostat are not sufficient in this respect. A second limitation is that the study only took into consideration the costs incurred by the companies which used PROs to fulfill their legal obligations. Although the overwhelming majority of companies are in this particular situation, there are still others which attempt to achieve their targets individually or choose to pay directly the contribution towards the state authorities (i.e., the Environmental Fund Administration). Further research is needed in order to find an accurate way of accounting for these additional costs on the private sector.

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