Analysing the Relationship between Wastewater Utility and Civil Society Stakeholders: First Evidence from Two Cases

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ABSTRACT

Wastewater utilities are pivotal players in the path toward sustainability. In order to understand why they may prioritize the adoption of a given innovative solution, the paper focuses on two factors, i.e. regulatory obligations and pressures for change coming from civil society. Two cases are studied to compare the community's concerns about the effects of wastewater management and the standards that objectivize the same effects. After coding it, collected information is analyzed to find out possible rank reversals between community and regulator's priorities. The preliminary results show incongruences between the contingent pressures received from the community and the impact that is substantiated by regulations, and identify factors that could explain the tendency of utilities to overperform along selected dimensions, i.e. to reduce negative effects beyond standards.

KEYWORDS

Wastewater utility, Civil society stakeholders, Regulation, Rank reversal, Investing-up, Over-performance, Effects, Cases.

INTRODUCTION

Wastewater utilities (WUs) are critical players for reducing pressures on natural resources and the environment [1]. Two major impacts are expected from the industry in the near future, i.e. a contribution to scaling-up water reuse initiatives [2,3], and a more intense deployment of sewage sludge recycling and recovery systems [4,5]. At the same time, wastewater collection and treatment plants are crucial for more traditional yet vital functions, i.e. quality of water bodies and public health protection [6,7]. Integrated management of water is very important both for households and businesses, and it is mainly managed by water and wastewater utilities [8]. On average, high-income countries treat about 70% of municipal and industrial wastewater, but the ratio for middle-income countries is in between 28 and 38%, and drops to 8% for low - income countries [9]. The diffusion of wastewater treatment is deemed to increase, as the target of the Sustainable Development Goal 6, "Clean water and sanitation" [10] is to halve the quantity of wastewater that remains untreated. The present paper argues that in order to understand the logic followed by WUs when they decide for new technologies, we need to investigate the influence of two groups of secondary stakeholders, that is, regulators and civil society stakeholders (CSS).

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The context in which WUs operate is highly regulated, owing to the natural monopoly nature of activities, and the role WUs play for the residents' health, conservation of natural environment and landscape, workers' safety [11]. It is common for regulators, i.e. water, health and safety authorities, and environmental policymakers, to prohibit given harmful behaviours or technologies, or to set thresholds for undesirable behaviours or technologies. Technology or performance standards or mandates abound in fields such as the technical quality of service and above all urban water quality, in the form of maximum thresholds for the concentration of noxious and polluting substances not to be passed by discharges in water bodies [12].
Regulatory obligations are the output of legislation and scientific assessments conducted by authorities. As such, they "objectivize" the importance of the effects of wastewater management in the eyes of WUs. Notably, for the aims of the paper, we assume WUs to align fully with standards, and regulators to pursue the public interest. In other words, do not address WUs or regulators' misbehaviour or opportunistic conducts. Nonetheless, we argue that further adoption of innovative technologies could be appropriate [13]. Indeed, when making technological choices, WUs do not limit themselves to comply with regulated standards. There are a few motives why environmental innovation and enhancement of service quality beyond the regulated targets, or toward unregulated objectives, could be necessary [14]. First, communities exhibit a great degree of environmental, social and economic heterogeneity, but regulators determine general mandates, because they can suffer from information and monitoring costs about the specific features of single contexts. Second, existing regulations only partially cover a few additional "*effects*", which are held not to be disruptive, yet can harm both society and the environment, such as odorous emissions, noise, biodiversity reduction, traffic etc. More generally, water regulation is traditionally quite innovation averse [15].
Conducting its activity, a WU may seek to be congruent with the concerns of local CSS (residents, politicians, media, or non-governmental organizations), and decide to over-perform relative to the mandates of regulators, through the adoption of technological or operational innovations. Each CSS group may have its own preferences for one or few performances among the multiple objectives of the WU and it can make pressures on the WU through formal and informal channels, and incite it to invest even beyond the regulated targets or toward unregulated aims ("investing-up" or over-performance), changing the WU priorities.
It becomes thus very interesting to understand the dynamic that lays behind the decision made by the WU with regard to single effects of wastewater management, i.e. to understand if WU actions are more coherent with the "perceived" importance of the effect rather than with its "objectivized" importance. In other words, WU may adopt as criteria for technology choice regulations produced on the basis of scientific knowledge and legislation, or own perception of the CSS judgement on the effect, based on local CSS concerns and pressures. It should be highlighted that, similarly to regulators, we assume that the CSS are pursuing the public interest. However, we refrain from suggesting that CSS are more welfare-enhancing than regulators, or the other way round. Indeed, CSS are likely to be better informed on a few context- and time-specific issues than national or even regional regulators, even though they may lack more general scientific knowledge.
Importantly, whether and how the concerns of CSS may diverge from regulated standards, and how CSS may stimulate over-performance in the WU sector are untapped areas of research. So far, the research on "investing up" behaviour has not highlighted the reasons why WUs or other monopolists could over-perform. Many CSS influence water infrastructure decisions [16], and the WU wants to obtain legitimacy from community components, in order to justify its right to operate [17]. More generally, we could expect that the attention and efforts WUs reserve to single effects in daily management respond more to regulation intensity, and less to local stakeholders' objectives, owing to the authority and coercive power held by regulators [6]. Second, when considering process innovations, corporate decision-makers are less prone to

pressures exerted by informal institutions, relatively to regulatory pressures of formal institutions [12]. Third, one main reason why environmental practices beyond regulatory compliance are implemented is competitive pressure and the incentives coming from customer's choice [18,19], but WUs are generally a monopoly.

The specific aim of our study is to understand whether a rank reversal subsists i.e. to understand possible differences between the objectivized importance of an effect and the importance attributed by the WU that also subsume the judgement of CSS on the same effect. Second, the study investigates whether the rank reversal influences the decisions made, focusing on the investing up attitude and the possibility of over-perform.

In order to do so we conducted two case studies of WUs so to understand, for each effect, if the rank reversal is able to change the order of the WU's priorities, and, in case of investing up, whether and to which extent it is due to the rank reversal. To this aim, it would be necessary to develop a model for the identification of all the possible effects related to the wastewater treatment. The results obtained are able to give us some preliminary hints both regarding rank reversals, that seem to be influenced by regional regulations and location of the plants, and regarding over-performance, that seem to be influenced both by location of the plants and certifications held.

MATERIALS AND METHODS

Our research is based on two research questions.

- Research question 1: Rank reversal. *Is the "perceived" importance of wastewater treatment effects, i.e. WU priorities based on CSS pressures, different from "objectivized" importance, i.e. WU priorities based on regulatory mandates?*

  In order to investigate the previous question, we list the effects of wastewater treatment; "quantify" the objectivized importance of an effect (i.e. we qualify it through a categorical yet ordered scale) and the importance attributed by the WU to the CSS pressures, after identifying CSS groups.
- Research question 2: Investing up. *In which situations is the WU over-performing, i.e. voluntarily undertaking actions that are not required by regulators but are congruent with CSS pressures?*

  In order to investigate the previous, we need to identify all the possible over-performing actions that could be undertaken.

Identification of different elements

Identification of the effects. In order to identify the possible effects, we derived them from literature and validate them with the help of a WU.

In the first step we used two main sources, i.e. [20] and sustainability reports of different utilities available on the internet. This approach leads to the identification of 14 macro areas of effects, each of them comprehending more than one effect. Effects have been re-categorized and selected, since some effects were redundant or not relevant to wastewater activities, while others were missing in one or the other source. We hence modified the list of effects obtained through literature basing our choices on reasoning mainly, and ask two experts to validate our list of effects, in particular the changes we made: the first expert is a practitioner with knowledge of water and wastewater regulatory standards and WUs stakeholders' management; the second expert is an academic with knowledge in WU technologies and environmental management, and related effects and impacts.

Objectivized importance. The objectivized importance of each effect is set by WU mainly based on regulations, and thus on underlying scientific knowledge and legislation. It has been evaluated as in (1), where Magnitude is given by (2):

$$Objectivized\ Importance = Magnitude * Probability \quad (1)$$

$$Magnitude = Seriousness * Breadth * Time \quad (2)$$

For each effect, we thus evaluated four elements and we assigned to each of them a value using a three points Likert-like scale from 1 (Low) to 3 (High), according to the words and the descriptions used by the respondents to classify the outcomes of the effects during the interviews:

- *Seriousness*: seriousness of the possible consequences on health and safety, and environment;
- *Breadth*: breadth of the consequences in terms of number of people affected, size of the area affected, ...;
- *Time*: time of the occurrence during the whole plant lifecycle;
- *Probability*: probability of the occurrence.

Identification of CSS. In the present work, we focused exclusivity on those stakeholders that are influenced and/or influence the WU, but that do not have an economic transaction with the WU i.e., we are not considering shareholders, employees and suppliers and consumers are investigated outside service provision and use [21,22]. These stakeholders have been addressed in literature as secondary stakeholders [23]. The identification of the salient stakeholders is not easy [24], but they can be determined according to three attributes, i.e. power, legitimacy and urgency [23]. In the wastewater sector, we can add another attribute of importance, related to the actions of the stakeholder with reference to wastewater treatment effects [16]. With reference to a specific effect, stakeholders may experience a direct change in their well-being or profit when the effect materialized or they can be undirected impacted by those directly affected. In this way, we divided CSS in three categories, without suggesting a hierarchical distinction:

- *Directly-impacted stakeholders*, or “first-level” stakeholders: i.e. Residents, Tourists, Residents of downstream localities, Water polluting and water using industries, Landowners and farmers, etc.;
- *Second-level stakeholders,* activated by the “directly-impacted” stakeholders or self-activated, i.e. Associations of residents or tourists, Environmental associations, Other non-profit organizations, NGOs (most of them are organizations with sustainability or citizens’ rights-oriented mission);
- *Third-level stakeholders*, activated by the “second-level” stakeholders, by “directly impacted” stakeholders, by regulators or self-activated, i.e. Municipalities and other local governments and not, Media, Courts, etc. (organizations or institutions with a more general purpose than “second-level” stakeholders).

Among the three categories, communication channels may exist.

Perceived importance. Perceived importance is the WU perception of the CSS judgement on the effect, based on local CSS concerns and pressures. It has been evaluated as in (3).

$$Perceived\ importance = Observability * Escalation * Action \quad (3)$$

For each effect, we evaluated three elements and we assigned to each of them a value using a three points Likert-like scale from 1 (Low) to 3 (High), according to the words and the descriptions used by the respondents to classify the outcomes of the effects during the interviews:

- *Observability*: awareness of the impacted CSS about the effect;

- *Escalation*: scaling up process activated by a group of CSS that then involves another portion of CSS;
- *Action*: possibility for the CSS to undertake one or more of the followings actions in term of, for example, complaints, campaigns or other: legal actions; actions that could jeopardize the WU's right to serve; actions that could disrupt the reputation of the WU.

Rank reversal. The rank reversal is obtained comparing the objectivized importance of the effect with its perceived importance, as reported in (4).

$$Rank\ Reversal = Objectivized\ Importance - Perceived\ Importance \qquad (4)$$

Rank reversal can assume four different values:

- *High negative*: perceived importance is higher than objective one of, at least, two points;
- *Negative*: perceived importance is higher than objective one of one point;
- *Positive*: perceived importance is lower than objective one of one point;
- *High positive*: perceived importance is lower than objective one of, at least, two points.

The rank reversal could be a source of bias for investment decision, i.e. for innovation investment decision, since the WU can then act in order to contrast the effect that has the highest objective impact or the one that trigger the most significant feedback.

Over-performance. Over-performance (or investing-up) is the WU tendency to implement voluntary actions that curb harmful or undesirable effects beyond the requirements of regulation or takes place even in the absence of regulations. In particular, we can define over-performance any action preventing, mitigating or offsetting the impact of the effect on health of residents, safety of workers, local environment and landscape (i.e. health and safety or environment) beyond the minimum compliance with regulations. Actions, from more radical to gradual ones, can be then classified, based on and adapting [18,19]:

- *Blocking actions*: blocking or preventing the effect more than what required by standards;
- *Monitoring actions*: monitoring the effect; the level of performed monitoring is not required by regulation and, since monitoring may induce to reduce or prevent the effect in the future, these actions are reported as over-performance;
- *Mitigating actions*: mitigation of the effect by the reducing of the impact on health and safety and/or environment, after the effect has been already induced.

All the previous elements have been reported in Table 1 and organized visually to highlight the possible relationships among them.

Methodology for the investigation

We conducted case studies in order to understand possible existing patterns among the different elements of the framework. This study fulfils the criteria for case study research [25]. We conducted case studies using semi-structured interviews, questionnaires, and secondary material. We investigated two different mono-utilities, both situated in the South of Europe (Utility 1: Italy; Utility 2: Spain), serving more than 1 million inhabitants and 100% public, so that the two utilities can be easily compared. To ensure the collection of appropriate data [26], we identified interviewees able to provide specific information regarding the effects that a WU has to face and the feedback from the stakeholders [27]. Therefore, we selected in each WU people knowledgeable and responsible for Operations and for Sustainability (Utility 1: director of operations, and CSR manager; Utility 2: director of operations, director of protection and environmental education, CSR manager). We developed a case study protocol for helping us standardize the sequence in which the questions were asked and minimize the impact of contextual effects [28]. We also asked several additional open-ended questions, supplemented by questions emerging during the interview, and free comments [29]. Each face-to-face interview lasted approximately 3-4 h. For each effect, respondents were asked to offer information in the following area (basing on the framework in Table 1): Description (detailed representation of the effect components); Objectivized impact (coded representation of the health and safety, environmental and other impacts of the effect); Role of regulator (standard and economic tools); Stakeholders impacted and their responses (feedbacks and other actions); Presence and types of over-performance. In order to be sure about the applicability of our framework, we asked to the investigated WUs to provide us also an evaluation of completeness and applicability of the framework, with a particular focus on the effects reported. All the interviewees gave us small hints that helped us in better developing the framework, confirming both its completeness and applicability.

RESULTS AND DISCUSSION

Presentation of the single case analysis

<u>*Utility 1.*</u> In Utility 1, several interesting rank reversals emerged. Among the negative rank reversals, we find the ones related to *Odorous emissions* and *Noise emissions*; among the positive rank reversals we have *Other emissions in the atmosphere*, for which, regardless the objectivized importance, CSS do not seem to perceive this effect. Considering the totality of the rank reversals, in general, for Utility 1, there are more negative rank reversals than positive ones. "Atmosphere" macro area presents several negative rank reversals, while "Resources consumption" and "Groundwater, soil and subsoil" are characterized by several positive ones. There are numerous high negative rank reversals, as for *Odorous emissions, Fire risk and Surface visible water pollution*, while there is only one high positive rank reversal related to *Spill on soils from leaking from tanks and connecting pips (internal sewerage)*.
Regarding over-performance, there are several macro areas and related effects for which there is not a standard, like for example for "Groundwater, soil and subsoil", "Flora and fauna", "Landscape and naturalistic aspects", "Road conditions" and "Economic activities". Utility 1 implements all the three types of possible actions, in particular: blocking actions are implemented with reference to "Noise", "Surface water" and "Waste"; monitoring actions are implemented with regard to "Atmosphere", in particular *Odorous emission*; mitigating actions are implemented focusing on *Other emissions in atmosphere*, *Spill on soils from tanks' flooding* and *Energy consumption*. The results from Utility 1 are reported in Table 2.

<u>*Utility 2.*</u> In Utility 2 several rank reversals emerged. Utility 2 presents more positive rank reversals than negative ones, and, while the negative ones are equally distributed between negative and high negative, almost the totality of the positive ones presents a difference of one point of the Likert-like scale between perceived and objectivized importance. The macro areas that present more negative rank reversals are "Atmosphere", "Noise" and "Surface water", while positive ones are reported in "Groundwater, soil and subsoil", "Resources consumption" and "Waste". High negative rank reversals are related, for example, to *Odorous emissions, Noise emissions* and *Surface visible water pollution.* The only high positive rank reversal is related to *Other emissions in atmosphere.*
Considering over-performance, Utility 2 implements very few of them, even if they are all blocking ones, so of high relevance. In particular, blocking actions are referred to *Odorous emission* effect, and "Groundwater, soil and subsoil" and "Waste" macro areas. For the remaining effects, actions are not implemented, even if legislative standards may be present. The results of Utility 2 are reported in Table 3.

Table 1. Case study protocol.

		Description of the effect																								***Regulation***					***Stakeholders***				***Over-performing***		
		Health & Safety								***Environment***								***Other***								***Standard***		***Economic tool***			***Stakeholder type***				***Type of action***		
		How much				When				How much				When				**How much**				**When**				**Technical**	**Performance**	**Sanction**	**Tax**	**Subsidy**	**Observability**	**Escalation**	**Action**	**Channel**	**Blocking**	**Monitoring**	**Mitigation**
Macro area	***Effect***	S	B	T	P	S	B	T	P	S	B	T	P	S	B	T	P	S	B	T	P	S	B	T	P												
Atmosphere	Powder emissions into the atm. derived from the transit of vehicles																																				
	Odorous emissions																																				
	Other emissions in the atmosphere																																				
	Fire risk																																				
Noise	Emissions from temporary working activities																																				
	Emissions from normal operation of the plant																																				
Surface water	Surface water pollution																																				
	Surface water pollution from metals																																				
	Surface visible water pollution																																				
Groundwater, soil and subsoil	Spills on soil of treatment's waste, waste and chemical products used in the process																																				
	Spills on soil during transportation, receiving and disposal of raw materials phases																																				
	Spills on soils from leaking from tanks and connecting pipes (internal sewerage)																																				
	Spills on soil from tanks' flooding																																				
Flora and fauna	Disruptions of the activity on flora and fauna																																				
Landscape and naturalistic aspects	Landscape and architectonic aspects																																				
Road conditions	Roadblocks																																				
Resources consumption	Energy consumption																																				
	Water consumption																																				
	Fuel consumption																																				
Waste	Waste production																																				
Economic activities	Employees per yea																																				

Table 2. Utility 1 results

Macro area	*Components*	*Objectivized importance*	*Perceived importance*	*Rank reversal*	*Over-performance*
Atmosphere	Powder emissions in the atmosphere derived from the transit of vehicles (construction phase)	M/L	M/L	-	*No standard*
	Powder emissions in the atmosphere derived from the transit of vehicles (operation phase)	L	M/L	Negative	*No standard*
	Odorous emissions (set up phase)	M/L	H	High negative	Monitoring action (artificial noses)
	Odorous emissions	M/L	H	High negative	Monitoring action (artificial noses)
	Other emissions in atmosphere	M/H	M/L	Positive	Mitigating action (growing algae and planting trees)
	Fire risk	M/L	H (assumed)	High negative	No
Noise	Emission from temporary work activities	L	M/H	High negative	Blocking action (rewarding silenced machines)
	Emission from normal operation activities	M/L	M/H	Negative	Blocking action (rewarding silenced machines)
Surface water	Surface water pollution	M/L	M/L	-	Blocking action (blocking industrial pollution activities)
	Surface water pollution from metals	M/L	M/L	-	Blocking action (blocking industrial pollution activities)
	Surface visible water pollution	M/L	H	High negative	Blocking action (blocking industrial pollution activities)
Groundwater, soil and subsoil	Spills on soil of treatment's waste, waste and chemical products used in the process	M/L	L	Negative	*No standard*
	Spills on soil during transportation, receiving and disposal of raw material phases	L	L	-	*No standard*
	Spills on soils from leaking from tanks and connecting pipes (internal sewerage)	M/H	L	High positive	*No standard*
	Spills on soils from tanks' flooding	M/L	L	Positive	Mitigating action
Flora and fauna	Disruption of the activity on flora and fauna	M/L	M/H	Negative	*No standard*
Landscape and naturalistic aspects	Landscape and architectonic aspects	L	M/L	Negative	*No standard*
Road conditions	Roadblocks	L	M/L	Negative	*No standard*
Resources consumption	Energy consumption	M/L	L	Positive	Mitigating action (100% renewable sources and auto-production)
	Water consumption	M/L	L	Positive	*No standard*
	Fuel consumption	M/L	L	Positive	*No standard*
Waste	Waste production	M/L	M/H	Negative	Blocking action (no waste production from 2017 - no dump-)
Economic activities	Employees/year	M/L	M/L	-	*No standard*

Table 3. Utility 2 results

Macro area	*Components*	*Objectivized importance*	*Perceived importance*	*Rank reversal*	*Over-performance*
Atmosphere	Powder emissions in the atmosphere derived from the transit of vehicles (construction phase)	L	M/L	Negative	*No standard*
	Powder emissions in the atmosphere derived from the transit of vehicles (operation phase)	L	M/L	Negative	*No standard*
	Odorous emissions (set up phase)	L	M/H	High negative	Blocking action (deodorization systems)
	Odorous emissions	L	M/H	High negative	Blocking action (deodorization systems)
	Other emissions in atmosphere	M/H	L	High positive	*No standard*
	Fire risk	M/L	L	Positive	No
Noise	Emission from temporary work activities	L	M/H	High negative	No
	Emission from normal operation activities	L	M/H	High negative	No
Surface water	Surface water pollution	M/L	M/L	-	No
	Surface water pollution from metals	M/L	M/L	-	No
	Surface visible water pollution	M/L	H	High negative	No
Groundwater, soil and subsoil	Spills on soil of treatment's waste, waste and chemical products used in the process	M/L	L	Positive	Blocking action (resistant tanks and absorbent materials)
	Spills on soil during transportation, receiving and disposal of raw material phases	M/L	L	Positive	Blocking action (resistant tanks and absorbent materials)
	Spills on soils from leaking from tanks and connecting pipes (internal sewerage)	M/L	L	Positive	Blocking action (resistant tanks and absorbent materials)
	Spills on soils from tanks' flooding	M/L	L	Positive	Blocking action (resistant tanks and absorbent materials)
Flora and fauna	Disruption of the activity on flora and fauna	M/L	L	Positive	*No standard*
Landscape and naturalistic aspects	Landscape and architectonic aspects	L	M/L	Negative	*No standard*
Road conditions	Roadblocks	L	M/L	Negative	*No standard*
Resources consumption	Energy consumption	M/L	L	Positive	*No standard*
	Water consumption	-	-	-	-
	Fuel consumption	M/L	L	Positive	*No standard*
Waste	Waste production	M/L	L	Positive	Blocking action (no usage of landfill)
Economic activities	Employees/year	-	-	-	-

Discussion of the results

The two investigated WUs present several differences, both in rank reversals and investing up actions. The two WUs are quite aligned as for the objectivized importance of the effects. This result was rather expected, as the two utilities had been selected so to be easily comparable in terms of the context of their operations. It is possible to observe, nevertheless, that Utility 2 shows an overall lower objectivized importance than Utility 2. We do think that these small differences can be related to the lower *Probability* of the effects recognized by Utility 2, given the different regulation in the two Countries and different percentage of adoption of ISO 14001 in the plants (100% for Utility 2 versus 30% for Utility 1).
Regarding the rank reversals, the location of plants can explain the presence of some differences. Utility 1's plant, indeed, are mainly located next to urban areas, thus stakeholders are often activated and, as a matter of fact, Utility 1 presents more negative and high negative rank reversals

than Utility 2. Indeed, on the contrary, Utility 2's plants are located in rural areas, so that many effects are not perceived by stakeholders.
Regarding over-performance, Utility 1 over-performs more than Utility 2 and, in general, implements all the different types of actions, while Utility 2 only implements blocking actions. This is reasonable, considering that the perceived importance in Utility 1 is higher than in Utility 2. Nevertheless, we do think this point should be further investigated. Certifications do not seem to influence the over-performing attitude. Utility 1, indeed, manages less certified plants than Utility 2, but seems to implement more investing up than Utility 1. On the other hand, it is also true that maybe Utility 2 over-performs less with reference to specific effects, given the overall high performance related to the ISO 14001 certification. Also, for this point, we do think further research is still needed.

CONCLUSION

Regardless the important role that innovative technologies may play in the wastewater treatment sector, we still face several open issues preventing the adoption of these technologies. Quality and environmental mandates set by regulators objectivize the importance of environmental, health and safety effects of WUs operations. Nevertheless, regulatory obligations do not cover all the cases where the adoption of innovative technologies could be appropriate, either because they miss to capture issues specific to the operations or context of single WU, or because they exclusively focus on most noxious effects. The WUs perception of CSS pressures are another main cause of innovation among utilities, since conformity with CSS expectations is a major legitimization instrument. In order to understand when, how, and to what extent rank reversal (i.e. the difference between objectivized and perceived importance of WU effects) can influence the investing up attitude of a WU, we conducted two case studies covering both an Italian and Spanish WUs, both 100% owned by local governments and with similar size and structural characteristics. After identifying and categorizing the effects of wastewater treatment, we categorized both the objectivized and perceived importance of each effect for each utility, taking into account the different CSS.
The results obtained give us some preliminary hints both regarding rank reversal and investing up attitude. Regarding the former, the geographical location of the plants is able to influence the activation of stakeholders, thus influencing Perceived importance, and, in turn, the value of rank reversals. Regarding over-performance, no linkage appears to exist between the presence of certifications and investing-up attitude, but further research needs to be conducted.
Our work proposes a first integrated analysis of effects, stakeholders and over-performance in the wastewater sector. The work could be useful for WUs, since they would be able to easily understand the importance of each effect with reference to their stakeholders, so to balance their investment based on regulatory obligations and the legitimacy goal. The work could also be of interest to regulators, in order to check factors that may determine the objectivized importance of effects, and to identify those effects that could be subjected to regulation refinement.
Nevertheless, our work presents some limitations, owing to the very small number of cases. The sample has to be enlarged in order to generalize the results obtained. Moreover, a further stream of research could be to qualify the CSS pressures through an investigation of stakeholders themselves. Another interest point would be to differentiate between the effects of which the utility is directly responsible and those which exceed its reach.

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