

# Stakeholder interactions as sources for organisational learning: insights from the water sector

Stakeholder  
interactions

Davide Giacomini and Diego Paredi

*Department of Economics and Management, University of Brescia,  
Brescia, Italy, and*

Alessandro Sancino

*Department for Public Leadership and Social Enterprise,  
The Open University Business School, Milton Keynes, UK and  
Department of Business and Law, University of Milan-Bicocca, Milan, Italy*

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## Abstract

**Purpose** – This paper aims to understand stakeholders' sentiments with respect to company policies in the water utilities (WU) sector and to explore if and how these sentiments could be a source for organisational learning.

**Design/methodology/approach** – This study investigates the use of social media in WUs' and stakeholders' reactions as a source of data for organisational learning. This paper relies on a mixed-methods approach based on sentiment analysis of Facebook (FB) pages and semi-structured interviews with sustainability managers from a sample of Italian WUs.

**Findings** – Findings show that WUs increasingly use FB mainly to promote and disclose environmental issues and as a source of information for organisational learning. A longitudinal analysis of environmental disclosure via FB reveals a growing trend of both companies' posts and stakeholder interactions and significant differences among organisations in their ways of using information and knowledge obtained from social media.

**Originality/value** – Theoretically, this paper builds an original link between disclosure via social media and organisational learning processes. Empirically, to the best of the authors' knowledge, this is one of the first studies to identify the quantity and quality of environmental disclosure via FB and the related stakeholders' reactions.

**Keywords** Organisational learning, Organisational legitimacy, Environmental disclosure, Sustainability, Corporate social responsibility, Social media

**Paper type** Research paper

## 1. Introduction

According to the [Organisation for Economic Co-operation and Development \(2021\)](#), the world is facing critical water challenges that stem from the failure to adapt to climate change, world population growth and intensified competition among cities, farmers, industries, energy suppliers and ecosystems, among other factors. In this study, attention is focused on water utilities, a branch of public utility (PU) companies. These companies are

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part of urban water systems and play a crucial role in developing sustainable societies (Proskuryakova *et al.*, 2018; Palme and Tillman, 2008).

Water utilities (WUs) provide an essential public service and represent a relevant empirical field for studying environmental disclosures (Escamilla García *et al.*, 2016). The need for all PUs to be accountable regarding environmental objectives is a highly debated issue among researchers (Greiling *et al.*, 2015; Larrinaga-González and Pérez-Chamorro, 2008; Cormier and Gordon, 2001). PUs, as providers of essential public services, such as waste collection systems, water supply and energy, represent the core of a nation's infrastructure.

Within this backdrop, a pivotal question for researchers (Giacomini *et al.*, 2020; Bellucci and Manetti, 2017; Bebbington *et al.*, 2007) is how and how much disclosure and stakeholder interaction via social media and other reporting technologies are mobilised to promote organisational legitimacy and to provide useful information to understand the opinions of stakeholders. This study is focused on the use of social media by WUs to communicate on environmental issues. Specifically, it aims to understand whether social media reinforce the relation with stakeholders and if the stakeholders' interactions are taken into consideration and can be useful from a strategic point of view. This is a relevant issue, as this online engagement can potentially be translated into offline participation in corporate affairs (Hoffmann and Lutz, 2014) and provide useful information in terms of organisational knowledge. Focus is placed on environmental issues because they call for interaction between actors to combine different perspectives and make environmentally responsible choices (Chevalier and Cartwright, 1966). Indeed, enterprises should take into account the opinion of their stakeholders in defining their strategies and also disclose relevant information on their ability to contribute to sustainability while delivering value for all of their stakeholders (Bellucci and Manetti, 2018).

In this respect, social media usage has grown significantly in recent years, allowing instant access to information from any device (Warner-Söderholm *et al.*, 2018), changing relationships among people and between people and organisations (Barbeito-Caamaño and Chalmeta, 2020; Lyon and Montgomery, 2013) and providing use in terms of organisational legitimacy (Giacomini *et al.*, 2021). With the advancement of social media, every citizen can attend and participate in a sort of virtual public arena where organisational choices are continuously discussed (Bloom and Sancino, 2019; Whelan *et al.*, 2013) and can be involved in new forms of collective decision-making (Sæbø, Federici and Braccini, 2020). Hence, social media are considered one of the fastest-growing, timely and dialogic communication platforms (Manetti and Bellucci, 2016). Despite this, their use in sustainability reporting is under-researched (Lodhia *et al.*, 2020). Moreover, considering organisational learning processes, social media can also provide a large amount of information that is useful for defining corporate strategy and understanding stakeholder expectations. Indeed, the organisational learning is the set of processes through which companies increase their behavioural capacities because of information processing (Huber, 1991; Kim, 1993).

This paper aims to extend the existing literature by examining the nature and extent of the use of social media for environmental disclosure and as a source for organisational knowledge about stakeholders. The theoretical framework is grounded in the literature on legitimacy theory and stakeholder theory, and it is extended by drawing on the literature about organisational learning. Examining the ways and to what extent WUs use social media to disclose environmental issues is a viable way to assess whether and how they try to meet environmental stakeholder expectations (Giacomini *et al.*, 2020; Bellucci *et al.*, 2019) and whether the valuable data deriving from social media analysis are useful for organisational learning processes.

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In this study, attention is drawn to the dialogue between WUs and Facebook (FB) users, with a focus on the following key research questions:

- RQ1.* How is the WUs' environmental disclosure on social media?
- RQ2.* What are the stakeholders' reactions to the WUs' environmental disclosure via FB?
- RQ3.* What is the overall sentiment about environmental issues in the water sector? Is it changing over time?
- RQ4.* Is the information derived from stakeholders' interactions via FB useful for organisational learning processes?

The choice of FB as the empirical context was made for two main reasons:

- (1) It is one of the most widespread social media platforms in Italy (research context), Europe and the USA (Cosenza, 2019; Agostino and Arnaboldi, 2015).
- (2) As recently stated by Martin *et al.* (2018), a growing number of Austrian, German and Italian WUs and PUs started to use FB accounts to dialogue with their stakeholders.

To fully investigate the dimensions mentioned above, this study was developed by combining three different methods: longitudinal sentiment analysis (SA), manual FB post analysis and semi-structured interviews with sustainability and social media managers of some WUs. The use of this mixed methodology allows a detailed understanding of the phenomenon under study (Webb *et al.*, 1966).

In the following sections, the theoretical framework is presented in Section 2, whereas the Section 3 illustrates the Italian water sector. The research design and method are then highlighted in Section 4, and the results are shown in Section 5. Finally, in Sections 6 and 7, the main conclusions, limitations and future research avenues are summarised.

## 2. Theoretical framework

A growing concern about the effects of businesses on the environment has increased the demand for accountability with respect to not only economic results but also to socially and environmentally responsible practices (García-Sánchez *et al.*, 2013). Many scholars analysing the information dynamics between corporate environmental disclosure, financial markets and public pressures have found a meaningful relationship between environmental disclosure and market valuation (Aerts *et al.*, 2008; Baboukardos and Rimmel, 2016; Baboukardos, 2017; Cormier and Magnan, 2013; Gomez-Carrasco and Michelin, 2017; Michelin *et al.*, 2013; Rupley *et al.*, 2021). Their findings are consistent with the idea that traditional financial information has limited usefulness to investors, as it shows only historically oriented information on a mere financial base that is insufficient to evaluate a company's ability to generate future profits (Lev and Zarowin, 1999).

Over the past ten years, these requirements have also reached entities included in the public sector, becoming one of their essential duties (Farneti and Siboni, 2011), consequently resulting in a continuous increase in public companies' social and environmental disclosure (Andrades Peña and Larrán Jorge, 2019). Two of the most relevant theories to explain the interest in social and environmental disclosures are legitimacy theory and stakeholder theory (Manes-Rossi *et al.*, 2020; Garde-Sanchez *et al.*, 2018; Tagesson *et al.*, 2011; Deegan *et al.*, 2002; Gray *et al.*, 1995). These theoretical approaches – legitimacy and stakeholder theory – are the most used among scholars to justify social responsibility, even if several

studies are still not based on a single theoretical approach explaining corporate social responsibility (CSR) actions (Garde-Sanchez *et al.*, 2018). Legitimacy theory refers to the social contract between organisations and society (Deegan *et al.*, 2002). In the water sector, companies' actions directly impact the environment and society (Greiling *et al.*, 2015; Dumay and Hossain, 2018). Hence, legitimacy is particularly important. Moreover, in the broader context of state-owned enterprises, such as many WUs, legitimacy has crucial importance because these entities should deliver and create public value for citizens and stakeholders, and the expectations of accountability towards them are high (Greiling *et al.*, 2015). In this context, different forms of accounting and reporting are valuable tools for interacting with stakeholders and obtaining legitimacy (Andrades Peña and Larrán Jorge, 2019; Cormier and Gordon, 2001; Ahmed Haji and Anifowose, 2017). In the water sector, citizens are undoubtedly one of the most salient stakeholders considering power, legitimacy and urgency (Heino and Anttiroiko, 2015; Katko and Juuti, 2016; Mitchell *et al.*, 1997).

The literature recognises organisational legitimacy as the key element in explaining public organisations' choice to disclose sustainability issues (Dowling and Pfeffer, 1975; Navarro Galera *et al.*, 2014), where "organisational legitimacy is generally defined as the social acceptance of organisations and their actions" (Etter *et al.*, 2018, p. 61). In recent years, researchers have begun to analyse organisational legitimacy and social media usage. For example, Castelló *et al.* (2016), Colleoni (2013) and Patuelli *et al.* (2021) have analysed stakeholder tweets about organisations to evaluate the results of several communication campaigns. However, according to many authors, the issue of stakeholders' power is not fully explained by legitimacy theory (Manes-Rossi *et al.*, 2020). This is why, we include in our theoretical framework another theory: stakeholder theory.

Stakeholder theory is based on the importance of creating long-term value through the relationships between stakeholders and companies (Freeman *et al.*, 2010). It aims to deepen how organisations recognise and try to address the interests and expectations of their constituencies (Donaldson and Preston, 1995; Freeman, 1984). According to this theory, a stakeholder is "any group or individual who can affect or is affected by the achievement of the organisation's objectives" (Freeman, 1984, p. 46). According to Cooper and Owen (2007), the main question from a stakeholder accountability point of view is whether the engagement and the dialogue processes with stakeholders do effectively influence some aspects of organisational decision-making.

According to Morsing and Schultz (2006), there are three levels of stakeholder engagement: informing, responding and involving. In the first approach, organisations communicate unilaterally without seeking feedback from stakeholders. In the second, there is a search for two-way communication, but it remains unbalanced in favour of the organisation. The involving approach considers the stakeholders' perspective as a precious resource and therefore aims to stimulate a two-way dialogue. Web 2.0 has greatly expanded useful means for developing strategies for stakeholder engagement. Nonetheless, the most popular practices still seem far from what Mouffe (2000) defined as agonistic pluralism where a "pluralistic arena is created where the stakeholder engagement is the collection of various standpoints that public sector organisations have to take into account in their plans in an agonism - not antagonism- perspective" (Rocca *et al.*, 2020).

In defining stakeholder engagement, Bellucci *et al.* (2019) recall the extent to which organisations involve and empower stakeholders in decision-making processes, dialoguing and creating models of shared responsibility (Andriof and Waddock, 2002; Prado-Lorenzo *et al.*, 2009). In this view, relations between stakeholders and organisations, based on reciprocity, interdependence and power (Andriof and Waddock, 2002), must lead to dialogic forms of communication (Rowley, 1997; Bellucci and Manetti, 2017, 2018). In other words,

stakeholder engagement is not limited to the mere involvement of stakeholders in mitigating or managing expectations but rather requires the creation of a network of mutual responsibility (Andriof and Waddock, 2002; Belal, 2002; Steurer *et al.*, 2005; Manetti *et al.*, 2016). Finally, there is a further level of stakeholder dialogue, which takes the form of interaction between different stakeholder classes (Dillard and Roslender, 2011; Brown and Dillard, 2013; Bellucci *et al.*, 2019). This configures a multi-directional dialogue, which is often achieved through activities like multi-stakeholder forums, examples of which can also be found in the water sector (Esposito *et al.*, 2021). This dialogue is particularly crucial in the field of water management (Heino and Anttiroiko, 2015; Sallaku *et al.*, 2018; Warner, 2007) and more generally in corporate environmental management (Roome and Wijen, 2005).

An often-underestimated issue with respect to the role of stakeholders is power (Dahl, 1957; Roome and Wijen, 2005). Stakeholder influence occurs when a stakeholder can influence the behaviour of an organisation, where influence is a materialisation of power (Mintzberg, 1983). One of the influences exerted by stakeholders concerns organisational learning processes, which is learning that occurs when organisations increase their behavioural capacities as a consequence of information analysis (Huber, 1991). This is particularly relevant in the environmental field (Hörisch *et al.*, 2014; Roome and Wijen, 2005; Thomson and Bebbington, 2005).

In this respect, social media can help companies to improve stakeholder engagement because they enable a two-way dialogue between stakeholders and companies (Bellucci *et al.*, 2019; Bellucci and Manetti, 2017; Cade, 2018), enriching opportunities for organisational learning processes. Organisational learning via social media is the third conceptual perspective, alongside legitimacy theory and stakeholder theory, that we consider in our multi-theoretical framework. The importance of using multi-theoretical framework to understand how companies behave is an acknowledged issue in social and environmental reporting research (Cormier *et al.*, 2005; Garde-Sanchez *et al.*, 2018; Gray *et al.*, 1995; Owen, 2008; Tagesson *et al.*, 2011). This is even more important when social media are considered because little is known about the mechanisms underlying data and knowledge generation in social media interactions and their use and implications on sustainability management and strategies.

With regard to environmental disclosure in particular, in recent years there has been a significant increase in the use of social networks (Cortado and Chalmeta, 2016), and the growth of social media has transformed the processes of online disclosure in the public sphere. Social media has allowed greater ease of access to dialogue and communication about CSR among users (Barbeito-Caamaño and Chalmeta, 2020; Castelló *et al.*, 2013), yet its use in sustainability management is under-researched. In the field of environmental management practices, social media may be a powerful tool for interacting with stakeholders (Lodhia and Stone, 2017) even though most of the research in this field has highlighted interactivity levels as typically low (Giacomini *et al.*, 2020; Gómez-Carrasco *et al.*, 2020; Suárez-Rico *et al.*, 2019). Moreover, as already found in the literature (Zhang *et al.*, 2020), social media can be an effective tool for organisational learning processes thanks to information obtained from the interactions with stakeholders. If the stakeholders can potentially influence the corporate strategy, in particular as regards sustainability, the dialogue with the stakeholders in the social networks makes it possible to obtain a wealth of data available to the entire organisation. In short, the data coming from interactions on social media become a source of company knowledge useful in terms of organisational learning. The literatures on the relationship between stakeholder engagement and organisational learning devote little consideration to the influence of stakeholders on the process or content of organisational learning (Roome and Wijen, 2005). Many scholars

assumed that interested stakeholders voluntarily cooperate in advancing the state of organisational knowledge (Perrow, 1986; Phillips *et al.*, 2000; Romme, 1999), and organisations just need to have the right mechanisms in place to optimise learning. Today, with Web 2.0 and the co-creation of content on social media, interaction with stakeholders can provide valuable information for learning within organisations, even when such stakeholders are unaware of their contributions.

In fact, organisations also learn “vicariously” by picking up information from external sources (Huber, 1991; Miner and Mezas, 1996). Hence, the systematic analysis of social media interactions can be a source of learning, particularly in the field of sustainability and environmental management. The articulation and coding of the knowledge obtained from the external environment, in particular from stakeholders’ (especially citizens) opinions, is the so-called “environmental scanning” (Mendelow, 1981) that constitutes an important antecedent to reorganisation processes and to the growth of organisational knowledge (Zollo and Winter, 2002).

### 3. Water sector

In the case of WUs, it is important that they are accountable not only to society’s expectations but also to governmental authorities. WUs operate according to a comprehensive institutional and regulatory framework, and many of their operations are controlled by a local, regional or national public authority (Mio, 2010). Starting from these premises, the level and quality of WUs’ environmental disclosure are crucial because WUs, as with other PUs, must obtain legitimacy from public and political authorities (Larrinaga-González and Pérez-Chamorro, 2008) because of the fact that they manage a vital resource for the community (Guerrini, 2013). Furthermore, as stated by the United Nations (2015), “water is at the core of sustainable development and is critical for socio-economic development, healthy ecosystems and for human survival itself.” WUs have an ethical obligation to promote sustainable development (Larrinaga-González and Pérez-Chamorro, 2008) and to involve civil society in resource management decisions (Warner, 2007).

In light of the above, it is essential to understand if and how environmental disclosure via social media in WUs is evolving in terms of communication by companies, reactions by stakeholders and use of the information deriving from online interactions for the purpose of organisational learning.

Water management has been privatised and outsourced in many countries. There is constant debate between public and private ownership, and regulators have often seen privatisation as a viable solution to promote efficiency despite controversial empirical evidence (Bel, 2020; Homsy and Warner, 2020; Warner, 2021; González-Gómez *et al.*, 2013; Romano *et al.*, 2013). Since the 1990s, the Italian water sector has been subject to political reforms, and in June 2011, the outcome of a referendum confirmed a preference for public ownership of the water service.

Nowadays, about 2,552 operators exist in the Italian WUs sector; of which, more than two-thirds refer to municipal management (ISTAT, 2020). Municipal-owned companies have an independent company statute and are managed by appointed boards of directors, and local government organisations retain ultimate control through ownership (Bel and Pageda, 2006; Coccia *et al.*, 2021). This fragmentation seems to be a factor of weakness because, with reference to the Italian industry, studies show a positive impact on the efficiency of the operating scale (Guerrini *et al.*, 2013). Stakeholder engagement in this highly decentralised and fragmented sector has specific importance because it involves public, private or not-for-profit actors from local to regional and national levels and because water management is particularly critical from a political and social point of view. Thus, WUs are

expected to promote, even more than other utilities, transparency and engagement on sustainability matters (Haider *et al.*, 2016; Greiling *et al.*, 2015; Cormier and Gordon, 2001). As stated by Guerrini *et al.* (2013), in the water sector, there is an information asymmetry between the regulatory authority and regulated utilities that calls for the development of a transparent reporting system to disclose company performance. Accordingly, the need to communicate sustainable behaviours concerning resource management is stronger than in other sectors (D'Andrea, 2017; Larrinaga-González and Pérez-Chamorro, 2008). Nevertheless, in the literature we also find cases in which sustainability reporting in the water sector has decreased over the years (Vinnari and Laine, 2013).

Finally, considering disclosure via social media, it should be highlighted that in Italy, around 50 million people are internet users. Among these, more than 39 million are active social media users (Agenzia per l'Italia Digitale, 2020).

## 4. Methods

### 4.1 Data

This study focuses on a sample of the first 33 WUs (in terms of revenues) owned by Italian local governments. The sample was then reduced to 15 WUs that had official public FB pages with more than 100 posts (Appendix 1).

### 4.2 Research design

Following Giacomini *et al.* (2020), environmental disclosure was analysed based on six classes: air, energy, sustainability reporting, territory, waste and water. To identify the contents belonging to the six classes, we adopt the set of keywords available in Appendix 2. This longitudinal analysis from 2015 to 2018 can be divided into two stages:

- (1) an analysis of WUs' posts; and
- (2) interaction between WUs and stakeholders via sentiment analysis and manual FB post analysis.

Finally, we carried out semi-structured interviews to gather evidence on the process of analysing the information coming from the interactions with users of the WUs' FB pages. The interviews made it possible to gather some information, especially relating to the state of the art and the potential of data emerging from social media, as a source of organisational learning. To make the best use of the interview time (about an hour each), interview guides included questions related to the core issue (the use of information regarding sustainability disclosure via FB and the stakeholders' interactions) and other questions related to the central question such as the relationship between sustainability disclosure and incentives for managers.

### 4.3 Analysis of water utilities' posts

Once the information about WUs' FB activities was collected, analysis on the posts' content began. Firstly, the usefulness of introducing the six different environmental classes to explain different phenomena was checked by applying the Kruskal–Wallis non-parametric test (McKnight and Najab, 2010). To extract the more common words and thus the most popular topics, the study investigated the distribution of words among the six environmental classes. Starting from the raw FB posts, text messages comprised of numbers, stop words, punctuation and URL references were cleaned up. Text pre-processing was performed using the nltk module in Python (Bird and Loper, 2004). Then, word frequency was analysed to obtain an overview of the posts' contents. The term frequency for

each word in a document was calculated as follows:

$$tf_{i,j} = n_{i,j}/|d_j|$$

where  $n_{i,j}$  is the number of occurrences of a word  $i$  in document  $j$ , and  $d_j$  is the size of document  $j$  expressed as the total number of words in the document.

#### 4.4 Interactions between water utilities and stakeholders

To investigate stakeholder reactions to WU environmental posts, a second analysis step applying SA tools to stakeholder comments was performed. Then, in a third step, SA was reinforced with manual content analysis to WU posts. As argued by Liu (2012, pg. 7), SA can be described as “[...] the field of study that analyses people’s opinions, sentiments, evaluations, appraisals, attitudes and emotions towards entities such as products, services, organisations, individuals, issues, events, topics and their attributes. It represents a large problem space.” Sentiment analysis has been widely applied to different kinds of problems, including product reviews (Bollegala *et al.*, 2011), stock dynamics (Oliveira *et al.*, 2016) and political elections (Ceron *et al.*, 2014).

Before implementing any SA, the FB comments were first cleaned up to remove stop words and URLs, as was previously done for the WU posts. Then, stakeholder comments and WU replies to stakeholders were distinguished, as SA was performed only on stakeholder comments. There are several alternatives and approaches to performing SA, including methods based on machine learning models or methods based on specific dictionaries (Zola *et al.*, 2019). In this work, a lexicon database approach to SA computation was applied. A lexicon database is a special dictionary in which words are assigned to sentiment scores (Ghosh and Kar, 2013; Ravi and Ravi, 2015). The main benefit is that a fast, unsupervised classification of sentiments can be accomplished by summing up the overall word scores once a lexicon is built. In this work, the NRC lexicon database was used because it supports the Italian language (Mohammad and Turney, 2010). This lexicon was based on the emotions of joy, sadness, anger, fear, trust, disgust, surprise and anticipation. However, the Python library we used to implement sentiment analysis also generated a binary sentiment classification in positive and negative feelings. For each sentence belonging to the words included, a score was assigned to each of the eight feelings, and the overall sentiment was calculated.

Given the shortcomings of wordlist/lexicon approaches to sentiment measurement (Loughran and McDonald, 2016), an analysis of the posts carried out directly by the authors was added to the sentiment analysis.

#### 4.5 Management of the information from the Facebook pages and organisational learning processes

Furthermore, to better understand the strategies and organisational dynamics of the WUs engaged in environmental disclosure via social media (SM), three sustainability managers were interviewed because this method is well suited to the exploration of attitudes and motives (Louise Barriball and While, 1994; Smith, 1975). Our research goals were explained to the interviewees in detail before the interview began.

The semi-structured interviews were recorded to capture the interview data more effectively, and they lasted about an hour on average. The recording of the interview makes it simpler for the researcher to focus on the interview content and the verbal prompts (Jamshed, 2014). These face-to-face interviews helped to understand more carefully what key issues for practitioners with regard to the environmental communication strategies are.

The semi-structured interviews were conducted with three managers responsible for environmental, sustainability and CSR strategies of three different WUs located in three different regions of different sizes (Table 1) and with different types of ownership. All the three managers interviewed were heads of communication and CSR strategies within the company with many years of experience. Our primary questions focused on the presence of a strategy behind the posts' publications regarding sustainability and environmental issues, user responses, the use of SA and the impact that this type of analysis could have on the WUs' organisational strategies. Furthermore, we asked if there was a shared strategy regarding environmental and sustainability communications on FB pages and if SM are considered a valid tool to increase the WU legitimacy within the community.

Semi-structured interviews could be used together with quantitative techniques to produce a mixed-methods approach (Bellucci *et al.*, 2019; Bryman and Bell, 2015). The qualitative approach allowed for the collection of a vast amount of material that complemented the raw data gathered and coded during the sentiment analysis stage.

## 5. Results and discussion

### 5.1 Descriptive analysis

**5.1.1 Analysis of water utilities' posts.** In the time span considered for the analysis, a total of 12,574 FB posts were published; of which, 3.4% related to environmental and sustainable topics. Table 2 shows the distribution of the posts (#posts), as well as stakeholders' reactions in terms of likes (#likes), shares (#shares) and comments (#comments), expressed as a monthly average. The column "Inter/posts" in Table 2 expresses the ratio of the number of interactions (sum of likes, shares and comments) and the total number of posts. The average number of monthly posts about environmental topics follows a growing tendency from 2011 to 2017, while there was a reduction in 2018, demonstrated by the first seven months' data (RQ1). However, environmental and sustainability disclosure only covers a tiny fraction of the companies' FB activity. In terms of the impact of interest per post ("Inter/posts" column in Table 2), environmental posts have an overall higher ratio of 7.93, compared to 7.26 for generic content. Since 2015, there has been a growing trend in the level of stakeholders' interactions (Giacomini *et al.*, 2020).

Considering the data reported in Table 2, the information available about environmental activities before 2015 is very limited. Thus, in a further step of the analysis, the focus is on

Company	Owner	Head office	2019 annual turnover (€/000)	Population served	Managers interviewed	Experience
CAP Holding Spa	Local councils	Northern Italy	252,986	2,500,000	Head of external relations and CSR	More than six years
Acquedotto del Fiora Spa	Local councils and private shareholders	Central Italy	113,997	400,000	Network manager - Head of institutional relations and external communication	More than 10 years
Acquedotto Lucano Spa	Local councils and region	Southern Italy	62,603	289,000	Head of corporate secretariat; Corporate secretariat staff responsible for communication strategies	More than 10 years

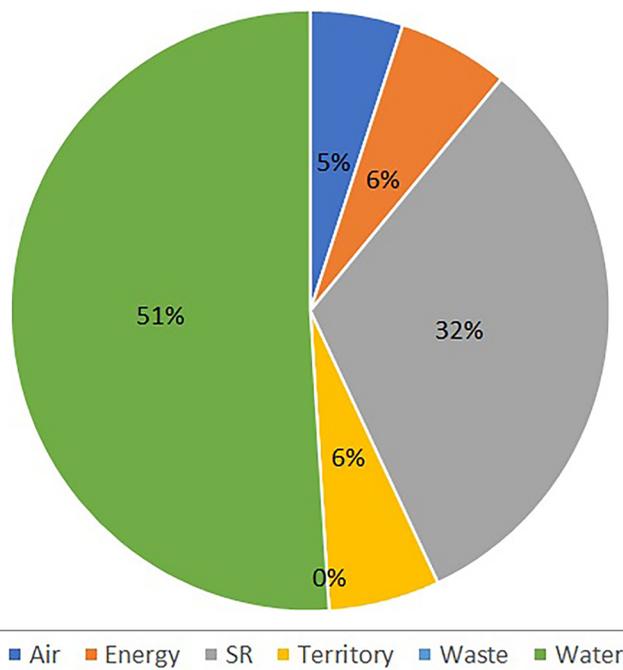
**Table 1.**  
WUs interviewed

**Table 2.**  
Environmental  
disclosure via FB and  
stakeholders'  
interaction

Year	Environmental FB posts					Generic FB posts				
	#posts	#likes	#shares	#comments	Inter/ posts	#posts	#likes	#shares	#comments	Inter/ posts
2009	0.25	0	0	0	–	2.25	0	0	0.08	0.04
2010	0	0	0	0	–	12	0	0	2.33	0.19
2011	0.33	0	0.08	0	0.25	18.33	0	1	1	0.11
2012	0.5	0	0.17	0	0.33	34.08	0.67	17.33	2.32	0.6
2013	1.08	0.25	0.33	0.08	0.62	35.58	7.25	9.42	3.42	0.56
2014	2.58	1	0	0	0.39	55.92	25.25	6.08	0.92	0.58
2015	3	1.17	0.17	0.33	0.56	82.58	34.33	23.75	16.58	0.9
2016	10.25	27.5	3.58	1.17	3.15	256.67	1,399.5	178.67	163.5	6.79
2017	12.08	137.17	5.5	7.42	12.42	312.33	1,930.33	360.25	432.33	8.71
2018 (July)	9.29	146.57	5.29	12.14	17.66	347.29	4,073.71	215.71	389.43	13.47
Average	3.7	26.36	1.35	1.68	7.93	105.63	602.47	75.37	88.56	7.26

data referring to the period 2015–2018 consisting of a total number of 10,250 FB posts; of which, 369 (3.6%) are linked to environmental sustainability.

Figure 1 displays the overall incidence of each of the six sustainable classes in the total number of FB sustainable posts. Because the companies in this study are WUs, the water class is, as expected, the topic with the highest impact, followed by the sustainability reporting (SR) class. The waste topic is almost untouched by the WUs in the analysis, with only one post found in 2018.



**Figure 1.**  
Published posts for  
each environmental  
class

More interesting is the dynamic of sustainable classes' disclosure over time. Figure 2 shows the temporal dynamics of FB posts between the different classes. WU, after having started environmental disclosure about their core business (water sector), tended to increase the level of sustainable communication on other environmental issues. This is evident in Figure 2, which shows that after initial growth, the water sector's sustainable social media disclosure tended to diminish, giving more attention to other environmental classes such as territory, social reporting, air and waste. This result was confirmed in several posts. For example, in the first half of 2018, Acqualatina Spa published three posts to raise awareness of waste, in particular, plastic waste. One of these posts said, "[. . .] as recently revealed by a Legambiente [1] survey, 80% of the waste found on Italian beaches is plastic such as caps and cotton buds. A figure that contains a clear message: safeguarding the environment today means changing our behaviour. Less disposable plastic, more reusable material." In this post, the WUs also said that "this is a significant issue, because environmental protection is synonymous with water protection, on which we play our role through purification." During the semi-structured interviews with sustainability managers, one confirmed that it was increasingly important for them to communicate that their commitment concerns not only water but all factors that may influence sustainability.

5.1.2 Analysis of stakeholders' interactions. The second step of the analysis introduced stakeholder interaction with WU posts. Table 2 reports preliminary information about citizens' reactions to generic and environmental WU posts. Table 3 expresses the monthly average of these interactions calculated as the sum of comments, likes and shares. Considering all six sustainable classes (all the columns in Table 3), stakeholder interactions show a growing trend, especially for the air, green, territory, waste and water classes (RQ2).

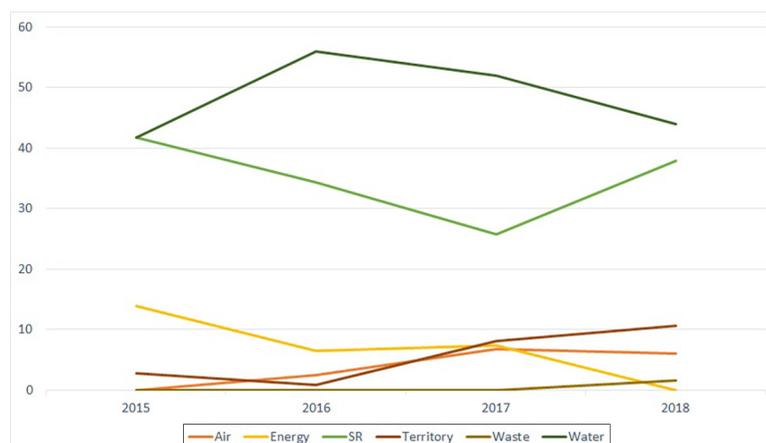


Figure 2. WUs' environmental disclosure over time

Year	Air	Green	SR	Territory	Waste	Water	Environmental total
2015	0.00	0.17	0.33	0.00	0.00	1.17	1.67
2016	0.42	2.25	17.92	0.17	0.00	12.50	33.25
2017	7.08	11.75	110.17	8.08	0.00	16.25	153.33
2018	34.14	0.00	69.71	38.00	7.00	22.14	171.00

Table 3. Published posts and stakeholders' interest for each environmental class

The last step of interactions analysis is SA (RQ3). As described in the method section, SA has been performed via the lexicon database approach using the NRC database. The overall sentiment divided per year is reported in Figure 3 and is positive for all three years. In 2017, when the number of interactions exponentially increased with respect to the previous years, positive feeling reached 69% of the comments. Positive feeling may increase over time because, as confirmed by the managers in the interviews, WUs are learning from SM and changing their communication strategies. For example, in 2017 Acque Spa engaged citizens in co-creating content to publish on SM for World Water Day with a photo challenge. In April 2017, the WU published a post with all of the challenge's photos. Using this strategy, the post received more likes than prior posts and generated very positive comments. Finally, by replying to posts, the company started a sort of dialogue with the citizens.

Figure 4 analyses sentiment distribution separately for the six classes. For each area, even if a common positive tendency emerged, there were several forms of stakeholder interaction. A thoughtful use of SA could stimulate an interactive dialogue as advocated by

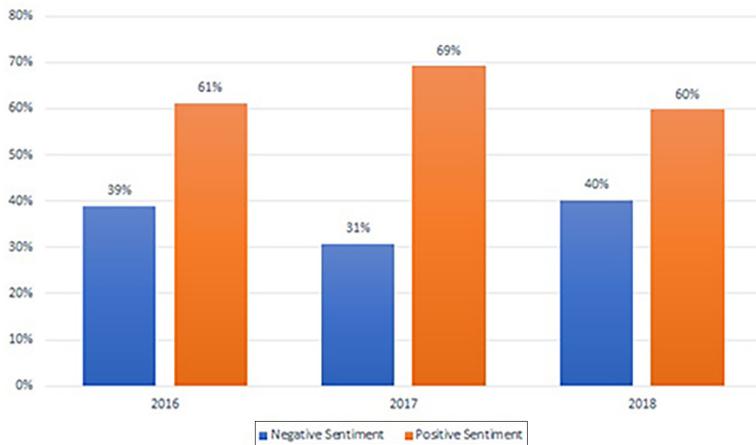


Figure 3.  
Sentiment  
distribution for  
stakeholders'  
comments

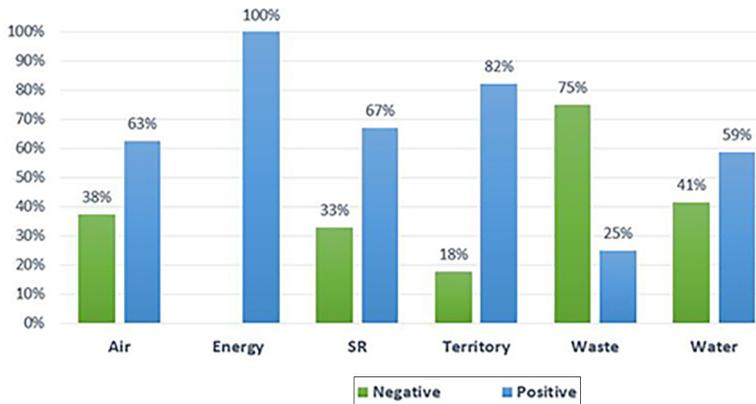


Figure 4.  
Sentiment for the  
different  
environmental  
classes

the stakeholder theory. Moreover, in [Figure 4](#), positive sentiment is the prevailing one, but two classes show completely different behaviours. Positive sentiment reached 100% for the energy class, whereas the waste class had only 25% positive interactions. The manual analysis of the posts made it possible to understand how the powerful result of the posts relating to energy was linked to the high recognition of citizens for projects that aimed to use renewable sources to support energy consumption in the water sector.

### *5.2 Semi-structured interviews with sustainability managers*

In this section of our in-depth qualitative analysis, we involved three managers from some of the WUs in our sample that communicate via FB. All the managers confirmed the importance of environmental issues and sustainability in their WUs' dialogue with stakeholders via SM and that there was a strategy for the posts' publication. The managers also claimed that sustainability was one of the pillars of their business plan. Using the words of CAP Holding Spa manager, the role of sustainability is important because "the sustainability strategy is an industrial strategy. For CAP, sustainability is one of the pillars of the business plan. The weight of sustainability is relevant because even the aspects of information on business and commercial communication should take into account the sustainability dialogue with stakeholders and social media are helpful in doing this."

However, these interviews revealed that the posts creating the most vivid discussions were often those related to operations on the water network (maintenance or suspensions). This was also confirmed by the manual post analysis. Regarding the use of sentiment analysis by the WUs, two out of three of our interviewees stated that they use it, while the third one will use it shortly. A WU uses SA, then implements a qualitative analysis of the posts and finally interprets all the data on the basis of specific indicators to create a reputational model. The information obtained is therefore a relevant basis for organisational learning processes, given that the emerging data are used, obviously not as unique sources, to evaluate the effectiveness of environmental disclosure and to try to understand what the priorities of the stakeholders are. Interaction analysis shows which topics get the most attention and methodical analysis of comments and reactions to posts helps to understand stakeholder views. In particular, the sustainability unit examines the interactions and sentiment in environmental posts and uses this information to review the contents and the communication tools of the business strategy. Furthermore, given that a part of management by objectives should consider sustainability issues ([Cordeiro and Sarkis, 2008](#)), the analysis of data on social media in the next years could provide useful information for evaluating the ability to reach and involve stakeholders on sustainability issues and therefore better evaluate some corporate, team and individual objectives linked to stakeholder engagement. The network manager of Acquedotto del Fiora Spa stated that "sustainability is one of the pillars of our strategy and it is closely related to innovation." According to him, "the analysis of social media interactions allows us to understand how effective our strategies are in the eyes of stakeholders and to understand how much our sustainability vision for the water sector is appreciated by stakeholders. Indeed, from 2020 there is constant supervision of the Facebook page." The manager of Acquedotto Lucano Spa stated that the analysis of interactions via FB is fundamental because "it allows us to make corrections both to our strategy towards stakeholders, and to the methods of corporate communication."

All three interviewees agreed on the fact that, in recent years, they have been dedicating ever-increasing economic resources and time to communication via FB and other social media. There is a consensus that a presence on social media increases reputation and legitimacy in the community and helps to understand stakeholder priorities. Obtaining data

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that photograph the opinion of some stakeholders allows the sustainability units to use them also to make other units understand the relevance of stakeholder engagement and develop corporate knowledge. In this regard, the sustainability manager of Acquedotto del Fiora said, “we have been preparing the sustainability report for over ten years, but in recent years we have invested much more in communication via social media, both in terms of time and energy, and through sponsored content. Social networks allow us to communicate sustainability every day and to intensify the relationship with the younger sections of the population. Soon, after developing a specific vocabulary for sustainability, we will also use sentiment analysis.”

## 6. Conclusions and future development

Social media promotes the creation of computer-mediated social networking and internet users' collaboration (McCay-Peet and Quan-Haase, 2017; Sigala, 2009). For organisations and their stakeholders, they enable rapid and open dialogue on prominent issues, including sustainability (Lodhia *et al.*, 2020). As a result, companies and public sector organisations are embracing social media more to share their sustainability progress and achievements with stakeholders (Manetti and Bellucci, 2016; Reilly and Hynan, 2014).

Although they are not a conventional accountability tool, social media have characteristics suitable for sustaining dialogic accounting systems, allowing organisations to obtain and communicate information from and to stakeholders (Bellucci and Manetti, 2017) to facilitate interactions between different actors, as suggested in the best environmental management practices (Roome and Wijen, 2005) and to support organisational learning (Baxter, 2015; Zhang *et al.*, 2020).

This study has analysed stakeholder interaction towards environmental issues on social media to measure the use of social media as an environmental disclosure tool and to analyse the alignment between stakeholders' expectations and WUs. While most WUs' FB posts are not about environmental issues, the results show a growing trend in citizens' interactions with environmental disclosure via FB (RQ1). A more in-depth analysis showed that in the past few years, interest in these issues has surpassed the interest in generic posts, which is a remarkable finding. This result shows that WUs' communication strategies towards environmental and sustainable disclosure via social media is getting closer to meeting citizens' expectations (RQ2), thus encouraging two-way communication (Bellucci and Manetti, 2017). Furthermore, as shown by the sentiment analysis, the overall sentiment towards these interactions is positive (RQ3). This evidence seems to be in line with legitimacy theory. Through FB, WUs attempt to reduce their legitimacy gap with stakeholders by opening two-way dialogues on environmental issues, which are increasingly relevant (Argento *et al.*, 2019). Interviews conducted with sustainability managers confirmed increasing investment in analysing citizens reactions via FB.

In this respect, future research is needed on this topic. Data analysis showed that WUs' environmental disclosure via FB is still in its early stages. In particular, an understanding of how the analysis of stakeholders' reactions on social media can help organisational learning seems to require further and deeper explanation with qualitative studies (RQ4). As stated by Miner and Mezias (1996), organisations also learn by picking up information from external sources. As we said, stakeholder opinion is undoubtedly a valuable source, especially in the field of environmental management where multi-stakeholder cooperation and organisational learning are crucial (Roome and Wijen, 2005). The managers of the three companies interviewed stated that they use the information arising from the interactions via FB to review their sustainability policies, recognising social media as a vehicle for citizens' influence and a useful data source from an organisational learning perspective.

By focusing on the use of social media for communicating environmental issues, this study contributes to both literature and practice. From a theoretical perspective, the research demonstrates that WUs try to disclose environmental issues via social media to increase their legitimacy, as expected from a legitimacy theory perspective (Colleoni, 2013; Dutot *et al.*, 2016; Etter *et al.*, 2018; Lodhia *et al.*, 2020). The analysis of the comments reported on the FB pages also revealed that, with very rare exceptions, interactions on FB are with only one, albeit very relevant, category of stakeholders: citizens. The result is not surprising, as the centrality of the citizen as a stakeholder is already known in literature, as well as the need to put in place adequate communication processes and engagement towards this category of stakeholders (Heino and Anttiroiko, 2015; Katko and Juuti, 2016). However, from our findings, interactions with citizens via FB do not yet seem to lead to full stakeholder engagement that results in empowered role for stakeholders in decision-making processes (Bellucci *et al.*, 2019). Rather, the cases examined seem closer to what Morsing and Schultz (2006) define as the second level of stakeholder engagement: there is a two-way dialogue, but it remains unbalanced in favour of the organisation promoting sustainability communication. Hence, social media are therefore seen as a useful tool to reinforce organisational legitimacy and to provide data that can be used for organisational learning processes but not yet close to the arena where what Mouffe has defined as agonistic pluralism is fully exercised (Mouffe, 2000; Rocca *et al.*, 2020). There is therefore the risk that the warnings that could be grasped thanks to the reasoned use of social media as sources for organisational learning remain unheard.

This work has some limitations that need to be acknowledged. Firstly, the analysis is based on a limited sample of Italian WUs; future studies may analyse larger sample sizes across and within Italy. Secondly, we based our analysis only on one social medium (FB); in the future, it may be interesting to consider other social media such as LinkedIn, Instagram, etc.

Further research could also undertake in-depth analysis by using methods such as case studies to better understand how disclosure processes take place and how stakeholder SA can effectively influence the environmental management of WUs and all companies. Finally, it is crucial to understand how the large amount of valuable information provided by stakeholders on social media can be used effectively through adequate organisational learning processes. In the past years, social media have changed communication, making it cheaper and faster than ever before and opening a new channel for firms to directly communicate and interact with their stakeholders (Patuelli *et al.*, 2021). The results of this and other research show the need to ask not whether social media can be useful in linking sustainability practices and stakeholders, but how. It is necessary to understand how social media are useful in organisational learning processes and how they can, through information on stakeholders contained therein, influence corporate strategies. The importance of stakeholder involvement in the sustainability field requires the development of organisational routines as mechanisms for the creation and utilisation of knowledge about the stakeholders' views. In this regard, the development of recurring patterns where the inclusion of sentiment analysis as a measure of corporate and individual performance in the sustainability management field could be a valid example. Another example is that the detection of indifference or worse negative sentiments on a given WU campaign could lead to encoding these signals of deterioration of organisational legitimacy. At this point, processes that impose an in-depth analysis of their motivations should be activated together with the obligation to inform the CSR manager or the sustainability committee. Heeding warnings can be crucial in terms of organisational learning. Organisations can make inferences from the interpretations and encode them in routines to shape future behaviours (Marcus and Nichols, 1999). In other words, the ability to know how to read, contextualise

and enhance the opinions expressed by citizens (and other stakeholders) through social media, a particular niche of environmental scanning, should be part of what Zollo and Winter (2002) define dynamic capabilities – that is, “a learned and stable pattern of collective activity through which the organisation systematically generates and modifies its operating routines in pursuit of improved effectiveness.”

To remain effective, all organisations have to track the criteria and the values by which the stakeholders judge their effectiveness; they are called upon to recognise the role of stakeholders. Public sector organisations and companies that maintain the infrastructure for a public service, such as the WUs, must pay even closer attention to citizens (Wiewiora *et al.*, 2015). Social media are one of the most suitable tools for disclosure on the one hand and for the growth of organisational knowledge on citizens’ view on the other; on these topics, many research avenues still deserve in-depth analysis.

#### Note

1. Legambiente is an Italian environmentalist association developed in Italy and throughout the Western world in the second half of the 1970s.

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**Appendix 1**

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**Table A1.**  
WUs analysed

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Name	Older post date (dd/mm/YYYY)
Acqua Novara S.p.a	02/09/2015
Acqualatina S.p.a	11/02/2016
Acque S.p.a	29/06/2009
Acque Veronesi S.c.a.r.l.	05/01/2016
Acquedotto del Fiora S.p.a	01/07/2015
Acquedotto Lucano S.p.a	12/01/2017
AMAP S.p.a	27/09/2017
Ats Servizi	22/05/2012
CAP Holding S.p.a	03/02/2016
CIIP S.p.a	10/09/2012
G.A.I.A. S.p.a	10/11/2015
Irisacqua S.r.l.	29/11/2015
Padania Acque S.p.a	09/10/2015
S.A.S.I. S.p.a	18/10/2016
Uniacque S.p.a	15/10/2016

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Area	Items	Keywords
Water	Wastewater treatment	Pollutant loads, wastewater, sewage
	Water supply	Water cycle
	Recycled water	Recycled water, recovered water, reused water, water savings
Air	Emissions of CO <sub>2</sub> and other climate-altering gases	Emissions
Energy	Urban air quality	Control units, PM 10, nitrogen, air, breathe
	Reduction of energy consumption	Energy, energy consumption, energy savings, energy efficiency, efficiency, consumption
	Energy production from renewable sources	Renewable sources, savings, photovoltaic, panels, heat pump, white certificates
Territory	Environmental investments	Environmental investments, green investments, hydroelectric, photovoltaic, solar, wind, geothermal, energy, plantings
	Concern for the loss of biodiversity	Biodiversity
	Availability of parks	Square metres of urban green per inhabitant
	Limitation of environmental impact	Environmental impact, green procurement, environmental footprint, environmental sustainability
	Contaminated sites	Extension of sites of national interest in hectares
Waste	Areas with hydrogeological problems	Landslides, hydro-geological security, regional planning
	Protected areas	Natural areas, protected areas
	Conferment of urban waste to landfills	Percentage of municipal waste sent to landfills on total urban waste collected
	Separate collection of municipal waste	Waste, separate waste collection, door to door, cap, bins
Sustainability report	Sustainability report	Social report, sustainability report, environmental report

**Table A2.**  
Coding scheme

### Corresponding author

Davide Giacomini can be contacted at: [davide.giacomini@unibs.it](mailto:davide.giacomini@unibs.it)

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