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# Unpacking the Drivers of Stakeholder Engagement in Sustainable Water Management: NGOs and the Use of Facebook

Juana Alonso-Cañadas , Federico Galán-Valdivieso , Laura Saraite-Sariene and María del Carmen Caba-Perez \*

Mediterranean Research Center of Economy and Sustainable Development (CIMEDES), Department of Economics and Business, University of Almería, Ctra. Sacramento s/n, La Cañada de San Urbano, 04120 Almería, Spain; jac630@ual.es (J.A.-C.); fgalan@ual.es (F.G.-V.); ls703@ual.es (L.S.-S.)

\* Correspondence: ccaba@ual.es; Tel.: +34-950-015-857

Received: 6 March 2019; Accepted: 10 April 2019; Published: 15 April 2019



**Abstract:** The number of people worldwide without access to safe drinking water or adequate sanitation is an unresolved and growing concern, with non-governmental organizations (NGOs) playing an important role in mitigating the effects of water shortage. These organizations utilize the communication mechanisms at their disposal, such as social media, to help spread their social message and to achieve the commitment of society to their cause. In this context and based on dialogic and the resource dependence theory framework, the main aim of this research is to analyze how organizational structure, resource allocation and communication policies of NGOs focused on water management influence the online commitment of their stakeholders. Exploratory results show that these NGOs are not taking enough advantage of social media to engage with their potential donors and volunteers because of the remarkable difference between the management of Facebook posts and users' behavior. Using multivariate lineal regression, our findings show that certain structural (namely, size, reputation and board size), economic (fundraising expenses) and social media (number of Facebook fans) characteristics positively influence stakeholder engagement, while administrative spending and a broad presence in many social networks straitens the ability of these type of NGOs to attract and retain stakeholders' commitment through social media.

**Keywords:** water; non-governmental organizations; management; social media; Facebook; engagement

## 1. Introduction

In the last decades the sharp increase in population has accelerated the growth of agriculture and industry, which in turn, has made a dent in natural resources, particularly freshwater reserves [1,2]. As a consequence, the sustainable utilization of water resources has become a key element of social responsibility policies [3], since four out of ten people are affected by a lack of water and it is expected that water resources will decrease by 40% by 2030 [4]. Both the European Union (through the Water Framework 2000/60/EC directive) and the United Nations have set out plans and objectives to deal with the problem of sustainable water management.

Within this context, non-governmental organizations (NGOs) are an integral part of an international network of public and private actors supporting better governance in water management [5]. NGOs play a key role as organizations that cover a wider spectrum of civic needs, building their reputations and solid relationships to guarantee success [6]. Optimal water governance and effective stakeholder engagement are inextricably linked [7], and NGOs have the necessary voice in society to involve a greater number of stakeholders and thus fulfill their objectives.

In line with Gent et al. [8], NGOs focus all their efforts on immediate results in the political context where achievable goals coincide with those of donors in order to attract their funds. In addition, donors prefer tangible programs over more long term goals because they are better able to evaluate the results [9]. By providing measurable data, NGOs can reduce the information asymmetry about their actions and improve their reputation, since donors prefer to invest their scarce resources in efficient projects and influential organizations [8].

The rapid growth in the use of social media by organizations [10–12] has allowed NGOs to adopt these tools as a mechanism to disseminate information [13], build communication networks with the public [14], and manage natural or social crises [15]. To this end, social media technologies provide NGOs with various functions for crisis management [16] as well as a bidirectional communication channel with the public [17], which in turn requires a different communication strategy to engage stakeholders from that carried out in traditional media [18].

The inclusion of social media as part of the communication strategy of NGOs has generated new concerns among researchers. Although recent studies have focused on online transparency through Web 1.0, this trend has evolved to include the study of social media that focuses on issues related to the adoption and uses by NGOs [11,19] and on topics related to the organization's online communication strategy [20] through content study [21,22], and to a lesser extent, analysis of explanatory factors underlying online communication in the sector [20,23].

Gálvez-Rodríguez et al. [24] note that using social media channels for communication can have a positive effect on stakeholders' satisfaction and engagement with the NGO sector. In this regard, there is growing concern about stakeholders' engagement in social media as they are key players for fully realizing the potential of this media, and specifically, to increase popularity, dialogue and virality of the information posted on these online platforms. Among all social media, previous studies have relied on Facebook data as this platform exhibits a significant number of active users and the highest growth rate of all social networks [25]. It also has the most widespread adoption rate among NGOs [26], being considered by these organizations as a communication channel for engaging stakeholders [27]. Facebook, as the leading social media offers multiple opportunities to engage with the public and permits interaction through three simple actions: "Like", "Comment" and "Share" [28]. Depending on which of these is used, engagement with the platform can be quantified and measured [27].

Undoubtedly, Water NGOs or WNGOs (those NGOs that try to mitigate the effects of the water crisis) face the challenge of developing effective communication that will help them mobilize their stakeholders to involve them in their social assistance projects. To do this, WNGOs search for strategies that allow them to denounce social injustices and raise awareness about unsatisfied humanitarian needs. In this regard, social media, including Facebook, allows them to communicate and disseminate the benefits of their projects and their actions. The literature has not reached its full potential in this field since there is a scarcity of works devoted to analyzing which factors underlie the online communication of NGOs, and even fewer studies focusing on fields of action such as the case of water crisis management. Thus, it is necessary to investigate which factors can contribute to generate the online commitment of stakeholders to NGOs. This study is centered on WNGOs, a specific type of non-profit organizations that develop their activities to alleviate the effects of the crisis caused by the scarcity of water, which lasts over time and seems to have a difficult solution. In this context, the main objective of this research is to analyze, with regard to the specific issue of water management, which factors related to the structural characteristics of WNGOs and how their communication policy via social media affect the online commitment of stakeholders.

This article helps to fill the existing gap in the literature on social media and NGOs by empirically identifying the organizational factors and communication policies that contribute to the online commitment of stakeholders in NGOs devoted to water management. As these NGOs are characterized by a dependence on social support, the aim of this study is to make practical contributions and serve as a guide for WNGO managers to make appropriate decisions and achieve social engagement, both in the organizational and economic sphere.

## 2. Literature Review and Hypotheses Development

NGOs are committed to the environment and the beneficiaries of their programs, even though at times this can be incompatible with long-term survival and donor priorities [29]. These organizations resort to different mechanisms to involve different stakeholders in their activities, organizing talks to raise awareness about the limitations of natural resources [8], forming networks with other NGOs in order to attract greater resources and recognition [30], or using media to seek commitment from a large number of stakeholders [31].

Conventional media have traditionally been the most effective platforms for NGOs to disseminate their messages [32], but social media have largely replaced these traditional means of communication [33,34], improving the information exchange process between the organization and its stakeholders [35]. A broad body of research has tried to model how NGOs have adopted social media [11,36–38], and how they use social media to achieve their goals, such as raising awareness [39], developing their organizational identity [40], interacting with stakeholders [21,22,28] and encouraging the action and participation of stakeholders both online and offline [41].

Social media information is gathered from social platforms such as Facebook [19,28,42,43], Twitter [10,21,26,44] and YouTube [40]. Specifically, Facebook has been identified as being innately focused on relationship-building [45] and helps to boost engagement and enhance the dialogue between users [22]. Regarding possible explanatory factors underlying online communication in the NGO sector [20], the focus was initially placed on identifying which variables influenced the level of information disclosed by NGOs through Web 1.0 [46,47]. Subsequent studies of Web 2.0 data centered on the adoption of social media by NGOs [11], unraveling which factors affect the use of content available on social media such as Twitter [20]. Most of these studies frame their research from the perspective of two theories: the dialogic communication theory [48], which explains how these organizations use social media as a channel to achieve user commitment [49] and the resource dependence theory, which helps to understand why NGOs carry out strategies to improve their relationships with stakeholders, thus reducing uncertainty and resource dependence [50,51].

In light of the previous literature, it is important for NGOs to maintain a committed dialogue with their stakeholders in search of support and long-term funding [30]. Social media is considered as an excellent tool for enhancing this communication with stakeholders in the NGO sector [24], so it is important to continue studying which factors could either smooth the way or hinder the beneficial effects of using social networks to strengthen the link between the organization and social media users [52,53], especially when it comes to NGOs working in the critical area of water management. Based on this, a number of factors could explain the level of stakeholder engagement: reputation, organizational size, expense structure, board size, dependence on volunteers, number of social networks implemented, and size of the online community. This research builds on a longstanding tradition and explores whether social media Facebook, and social media in particular, has changed the impact of these factors on the success of the NGOs.

### 2.1. Reputation

Organizations well positioned in society usually have a good track record and a valuable reputation [20], which comes as NGOs demonstrate their accountability over the years by carrying out sustainability programs and activities. Preserving this status depends mainly on the trust that society places in them, and they must thus exploit those mechanisms that allow them to maintain or improve their image among stakeholders [54]. In this sense, social networks can promote NGOs services or events, as well as engage with the community and demonstrate their accountability [55].

Thus, the age of an organization is an approximate measure of the reputation achieved [56]. In this sense, Saxton and Guo [57] propose the age of the organization as a factor to be taken into account when analyzing the use of web technologies for the dissemination of information and the improvement of interactive communication with stakeholders. Gálvez-Rodríguez et al. [24] analyzed whether the age of an NGO was positively associated with the use of Facebook as a communication strategy, and in

a later study with the use of Twitter [20], without finding conclusive results. Despite these conclusions, and based on Saxton and Guo proposals, the following hypothesis is proposed:

**Hypothesis 1 (H1).** *The reputation of the organization has a positive impact on the level of stakeholders' online commitment with NGOs via social media.*

## 2.2. Size of the Organization

Large organizations from both the private [58] and the public sector [59] exhibit greater ability to survive and grow, since they have greater access to the necessary resources. For Saxton and Guo [58], larger NGOs also have the greatest ability to strategically use technology in order to build close relationships with their main stakeholders. However, Nah and Saxton [11] argue the opposite, highlighting the negative effect between the size of the organization and the adoption of Twitter. Similarly, Gálvez-Rodríguez et al. [20] found a significant negative effect on the use of Twitter as a communication strategy. Thus, the second hypothesis is as follows:

**Hypothesis 2 (H2).** *The size of the organization has a negative impact on the level of stakeholders' online commitment with NGOs via social media.*

## 2.3. Expense Structure

The cost structure in NGOs includes expenditures destined for fundraising activities, execution of programs and administrative or general expenses. The credibility and trustworthiness of this sector is mainly due to these organizations being clear with regard to the information shared about the expenses management, having transparency as a strategic value. Thus, NGOs can meet these demands and reach a large audience without being forced to allocate too many resources in advertising or public relations, through an appropriate use of web technologies [60,61]. In fact, according to Seo et al. [17], even organizations with tighter budgets can efficiently promote their image using social media.

### 2.3.1. Administrative Expenses

An NGO's organizational efficiency is evidenced by the amount of funding allocated to the beneficiaries instead of it being spent on administrative expenses or collecting funds [17]. Stakeholders, especially donors, usually prefer that NGOs assume lower administration costs, as this ensures that more funds are allocated to their beneficiaries through the execution of programs [62].

Higher administrative costs could keep NGOs from organizational efficiency, allowing stakeholders to perceive the NGO as an entity operating only for its own benefit and perhaps having an oversized structure that is closer to that of the private sector [63]. In this regard, it is interesting to consider this factor in the analysis of stakeholders' online commitment, through the following hypothesis:

**Hypothesis 3.1 (H3.1).** *A high level of administrative expenses has a negative impact on the level of stakeholders' online commitment with NGOs via social media.*

### 2.3.2. Fundraising Expenses

This functional expense classification is used for the costs of activities that involve soliciting for contributions. Nah and Saxton [11] show that this is a relevant predictor of the adoption of social networks and, in particular, exhibits a significant negative relationship between fundraising expenses and the frequency of Twitter updates. However, Gálvez-Rodríguez et al. [20], after analyzing the negative effect of fundraising expenses on development of NPOs' Twitter content, they do not find any relationship among them. However, it is reasonable to think that those NGOs that reduce their fundraising expenses are also those that use social networks more efficiently, as a more effective alternative to reach and engage the public. Therefore, the following hypothesis is posed:

**Hypothesis 3.2 (H3.2).** *A high level of fundraising expenses has a negative impact on the level of stakeholders' online commitment with NGOs via social media.*

### 2.3.3. Program Expenses

Program execution expenses are those the organization incurs to execute the specific programs established in accordance with its mission. Therefore, program expenses are directly related to carrying out missions and are different from the other categories mentioned. It is conceivable that donors would want to see a high proportion of this type of expenditure because this could indicate a high level of efficiency of the mission. Thus, stakeholders will be willing to acquire higher levels of commitment to those NGOs that are more efficient in meeting their goals.

According to Parsons [64], efficiency is the degree to which an NGO devotes resources to its mission. Although it is difficult to measure efficiency in this sector, several indicators can be used as a proxy [65], for instance the "program spending ratio". Through the indicator of financial stewardship, program expenses have been considered as a statistically significant factor to explain both the presence and the volume of NGOs on Facebook [11]. Thus, the following hypothesis is posited:

**Hypothesis 3.3 (H3.3).** *A high level of program expenses has a positive impact on the level of stakeholders' online commitment with NGOs via social media.*

### 2.4. Board Size

Board members are responsible for making the organization's strategic decisions, including cultivating relations with the outside world [66], an issue which social networks can support [60]. According to Gruber et al. [67], board members should consider the potential of web technologies to build dialogues and disseminate information, thus improving the perception that stakeholders have about their organization.

Among board characteristics, size has been considered as a determining factor in the decision to use web technologies as a communication strategy, since the NGOs (particularly those of Taiwanese origin) that have a greater number of members in their Social Council are more prone to disclose their information online [20]. In this regard, Nah and Saxton [11] show the importance of analyzing this factor when NGOs adopt the use of social networks due to its positive effect in improving the web-related dialogical ability of a set of American NGOs. However, in spite of analyzing this positive relationship in the same way, works such as that of Gálvez-Rodríguez et al. [20] do not show any correlation between the communication strategy carried out on social networks and the number of board members. Hence, this factor could also be relevant when exploring the online commitment of stakeholders, and thus the hypothesis put forward is the following:

**Hypothesis 4 (H4).** *Board size has a positive impact on the level of stakeholders' online commitment with NGOs through social media.*

### 2.5. Volunteers

Volunteer staff are a key element in NGOs. Many of these organizations could not carry out their activities but for the existence of people who voluntarily collaborate with them. An increase in voluntary work should generate greater commitment to the organization, since volunteers participate in the day to day running of the organization [68] and show a higher level of commitment to the social aim of the NGO [69].

According to Gálvez-Rodríguez et al. [20], NGOs must implement mechanisms to ensure the recruitment and loyalty of its volunteers, since most of the work in NGOs is accomplished thanks to their altruistic help [70,71]. Among these mechanisms, social networks contribute by generating commitment and improving the dialogue between the NGO and the stakeholders, including volunteers [22]. Therefore, the following hypothesis is put forward:



**Hypothesis 5 (H5).** *A high dependence on voluntary work has a positive impact on the level of stakeholders' online commitment with NGOs via social media.*

### 2.6. Social Network Presence

The social media market is extensive and offers several digital tools [44,72]. Likewise, social networks have meant a reduction in costs in managing the NGOs' communication since those organizations that invest less in image (having a limited budget) can now optimize their relationship with stakeholders through the use of social networks [73].

Therefore, NGOs have numerous opportunities to join different virtual grassroots groups and online social movements by joining networks and/or platforms that promote or support their causes [74], thus reaching a broader audience. However, the presence of NGOs on multiple platforms could increase administrative costs, taking away resources from other areas of the organization (such as program execution).

Therefore, the following hypothesis is proposed:

**Hypothesis 6 (H6).** *The presence on multiple social networks has a negative impact on the level of stakeholders' online commitment with NGOs via social media.*

### 2.7. Size of Online Community

According to resource dependency theory [75], organizations seek to establish collaborative relationships or alliances with their main stakeholders through the online communities on social networks. Organizations that wish to have a large online community should develop content and dialogues that encourage interaction [76], without which said online community could be weakened [77].

Organizations that actively participate in their online community are more likely to develop a large volume of content on their profile [78]. In addition, the size of the online community encourages content development on the social network [19,79], and is related to the number of followers of the Facebook profile [80] and the number of people involved in the social network [81]. Bearing the above-mentioned in mind, the following hypothesis is proposed:

**Hypothesis 7 (H7).** *The online community size has a positive impact on the level of stakeholders' online commitment with NGOs via social media.*

## 3. Materials and Methods

### 3.1. Sample

The sample selection process was initiated by considering those NGOs whose main objective is to fight against the effects of the water crisis (WNGOs), and further based on three criteria: first, being attached to prestigious entities that ensure good practices in non-for-profit organizations; second, with public and accessible economic and financial information; and third, being present on Facebook.

Different social media platforms exist such as Twitter, Instagram, YouTube, or LinkedIn and they offer different possibilities to NGOs. The emergence of these social networks has meant greater competition for Facebook, which together with a kind of social fatigue may lead to the perception that Facebook is being gradually abandoned, or rather ignored by many users who used to be very active in this social network. However, this research chose Facebook from among the social networks in which organizations were present since it is still the most popular (98.8% of the organizations in the initial sample had a fan page). Facebook is the most suitable social platform to reach a wide audience, and it continues to be one of the most popular social networks worldwide, with 2.23 billion monthly active users as of the second quarter of 2018 according to Statista. Furthermore, it represents the ideal social platform for those organizations that want to build a relationship with their followers and boost engagement [82], as well as develop two-way communication [83,84].

A total of 88 WNGOs were initially selected from public information provided by agencies such as Charity Navigator or the Lealtad Foundation. After analyzing them and their corresponding fan pages, 37 were removed for not disclosing the necessary economic data (even after contacting them via email) and one was removed because it was impossible to access its Facebook fan page data. Thus, the final sample consists of 50 WNGOs (see Table 1) whose data were obtained for the period between the 1st of January 2017 to the 30th of September 2018, an acceptable period of time to analyze the information present on the social network according to previous literature [85]. Specifically, the data was gathered in September 2018, and 23,905 posts published by WNGOs were quantified and analyzed.

**Table 1.** Sample selection.

Sample Selection from Charity Assessment Organization and Lealtad Foundation	Data
Firms initially selected	88
Less firms without public economic data	−37
Less firms without public data available through API Facebook	−1
Final sample	50

The WNGOs included in this study are headquartered in the United States and Spain but develop their projects worldwide. According to the World Health Organization (WHO), the geographical area with the greatest number of people without access to water is sub-Saharan Africa, followed by different areas of Asia, coinciding with the main areas where WNGOs develop their projects. Specifically, 80% operate in sub-Saharan Africa and 44% in South Asia. It should be highlighted that among the geographical areas that WHO classifies as "rest of the regions", WNGOs are carrying out their projects mainly in South America (see Table 2).

**Table 2.** Geographical scope of action of selected WNGOs.

Geographic area	Number	%
Sub-Saharan Africa	40	80
South Asia	22	44
Eastern Asia	6	12
Southeast Asia	17	34
Rest of the regions (mainly South America)	36	72

### 3.2. Data Collection Tool

Following Mariani et al. [85] and Stier et al. [86], Facebook data was obtained using software developed ad hoc for this type of study (Facebook model). This software is prepared for the massive extraction of data and the treatment of Big Data, and has the necessary permission from Facebook to access its databases. The design and development of this tool was carried out by one of the co-authors.

The software consists of three modules. The extraction module is responsible for retrieving public data available from Facebook pages using queries based on the M language of Power Query to the Graph API (Application Programming Interface) of Facebook. The analysis module, based on the expressions of data analysis (DAX language) is responsible for developing a star analytical model for the multidimensional exploitation of the information extracted. The third module allows the visualization of the data based on the Microsoft Power Business Intelligence and allows the graphic representation of the results for a dynamic analysis of the information, in addition to allowing its export to Excel.

Although generic tools exist to analyze social networks, the software developed and used in this work is superior to those available in the market. Specifically, it offers two fundamental advantages for this type of research: on the one hand, it allows working with Big Data, by extracting and structuring information for a large sample of subjects and a broad time horizon; and, on the other hand, it calculates and returns the measure of online engagement according to different metrics previously parameterized

and that can be adjusted according to the type of study. Likewise, the software has been developed so that as new analytical needs arise, it is not necessary to modify the central programming because new modules can be added according to the desired goal.

Financial data was collected manually using two sources of information: the WNGOs official website from the available annual accounts in the transparency and/or accountability sections and information from WNGOs Form-990 reports.

### 3.3. Model and Statistical Analysis

This work assumes that the determinants of the level of online commitment reached by NGOs through their fan pages have a linear relationship, following previous studies by Haro-de-Rosario et al. [83], Mariani et al. [85] and Gálvez-Rodríguez et al. [87]. After testing the initial hypotheses for linearity, homoscedasticity, normality, independence and non-collinearity, an ordinary least squares (OLS) estimation process was applied. All statistical analyses were conducted in SPSS software (version 22).

Firstly, and in line with previous research [83,88,89], the online index of engagement (E) is estimated from a set of metrics (see Table 3) in order to identify the degree of users' engagement with WNGOs' fan pages. This index is composed of three dimensions of engagement: popularity (P), commitment (C) and virality (V), determined by the numbers of likes, comments and shares for each Facebook post. Popularity, in this context is defined as the users' acceptance of an WNGO's messages posted on its fan page, and by measuring the number of "likes" generated by each post. The "Commitment" dimension refers to the degree of involvement and interaction with the WNGOs' messages and is measured by the number of comments made to each post. The "Virality" dimension is defined as the diffusion and extension achieved by the WNGOs' messages posted on their Facebook pages, and is measured by the number of "shares" [87]. The independent variables are defined according to the posited hypotheses (Table 4).

**Table 3.** Metrics used to measure user online engagement.

Name	Sign	Formula	Measures
Popularity	P	Total likes/total posts	Average number of likes per post
Commitment	C	Total comments/ total posts	Average number of comments per post
Virality	V	Total shares/ total posts	Average number of shares per post
Engagement	E	$P + C + V$	Online engagement index

Source: own elaboration.

**Table 4.** Stakeholders' engagement through Facebook: independent variables.

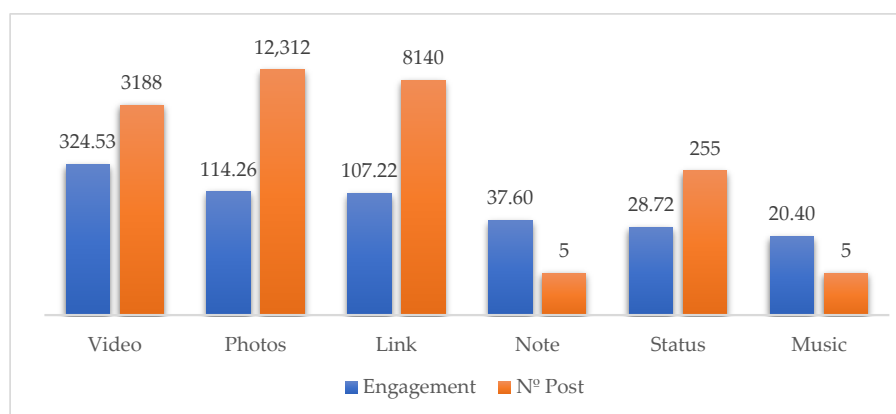
Hypothesis	Independent and Control Variables	Measurement	Expected Relationship
H1	Reputation	Number of years since the NGO was founded	Positive
H2	Size	Total assets reported in the last available 990 IRS (Internal Revenue Service) Form and financial statements	Negative
Expense Structure			
H3	Administrative Expenses	Total administrative expenses reported in the last available 990 IRS Form and financial statement	Negative
	Fundraising Expenses	Total Fundraising expenses/Total Expenses	Negative
	Program Service Expenses	Total Program Service expenses/Total Expenses	Positive
H4	Board Size	Total number of voting board members	Positive
H5	Volunteer Dependence	Total number of volunteers/(Total employees + Total number of volunteers)	Positive
H6	Social Networks Presence	Number of social networks where the WNGO has a presence	Negative
H7	Online Community Size	Natural logarithm of the number of Facebook fans	Positive



## 4. Results

### 4.1. Level of Stakeholder Engagement via Facebook

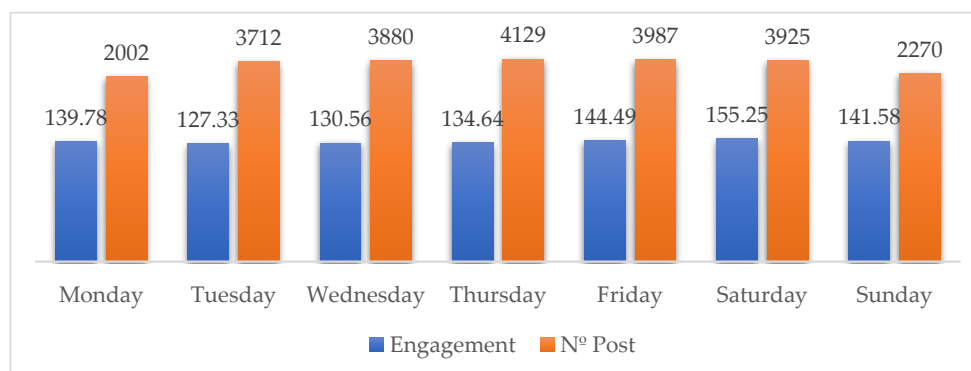
Prior to the main analysis, it is interesting to highlight some features of the posts published in the fan pages of Facebook. Regarding the format type of the information published, and among the formats allowed in Facebook (images, video, status, link, etc.), WNGOs mainly use images, with 51.50% of the 23,905 postings using this format. It is followed by 34.05% of posts with links. Only 13.07% of the posts analyzed used videos (Figure 1).



**Figure 1.** Number of posts and level of engagement by format type.

These results are in line with those found by Cvijikj and Michahelles [90], who show that images are the most appealing format for achieving online engagement, and more specifically, for attaining a greater number of likes and shares. Using this format, WNGOs obtain on average, a level of engagement of 114.26 (see Figure 1). However, this value is relatively low compared to that obtained by the posts published in video format, almost tripling the level of engagement achieved (324.53). This is relevant and should be taken into account by WNGOs, since the video format also increases the level of information richness in social media organizations, which also leads to better outcomes of engagement [79]. Thus, the WNGOs should consider increasing the number of posts with video format since in the analyzed period, they published only 13.33% of their posts in this format.

It is also relevant to note that Thursday exhibits the highest number of posts, followed very closely by Friday. In contrast, Monday and Sunday are the two days of the week in which the WNGOs publish the least number of posts (see Figure 2). In line with Mariani et al. [85] the publication activities of WNGOs are concentrated prior to the weekend, although stakeholders interact more with the publications made on Saturday. Given this, WNGOs should consider issuing a greater number of messages during the weekend.



**Figure 2.** Number of posts and level of engagement published per day.

Likewise, most of the posts (42.41%) are published between 12:00 p.m. and 19:59 p.m., and after that time the number of posts plummets until 6:00 a.m. (see Figure 3). The behavior of the WNGOs observed in this study is, to a some extent, different from the recommendations from Cvijikj and Michahelles [90] that it is better to publish during low peak hours (evening and night) to increase the number of comments received on their Facebooks pages. Mariani et al. [85] support this assertion, concluding that posts published in the evening gain greater visibility and a higher likelihood of obtaining greater levels of engagement. In fact, WNGOs get the highest level of engagement through the post published at night while the largest number of publications are made during the afternoon. In this sense, WNGOs are not following the right path because stakeholders react mainly to the most recent publications, thus content published during the night would be favored. The results of the level of engagement based on the time slot are in line with the statistics on the use of the Facebook platform, which show that most users access Facebook during the early or late evening [83].

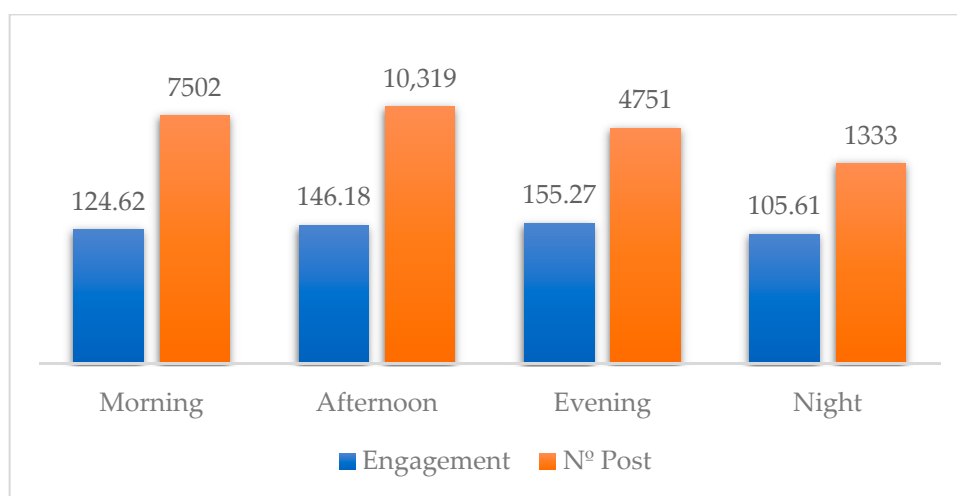


Figure 3. Number of posts published and level of engagement per time slot.

Table 5 shows that the 23,905 posts published during the period analyzed received 2331.730 “likes”, 96,670 “comments” and 893,396 “shares”. The average of “likes” per post is 77.27, while the average number of “comments” per post is 2.88 and 26.37 for “shares”. Given these initial results, there is a predominance of “like” and “share” actions. In line with previous research [83,85,91], these results confirm that clicking a “like” is more common among users than commenting on a post. That is, the posts published by the organization receive a greater number of actions that involve a lower investment in time and effort for the user.

Table 5. Principal quantitative parameters used for Facebook pages.

	Total Posts	Total Likes	Total Comments	Total Shares
Total	23,905	2,331,730	96,670	893,396
Average	544	46.635	1.933	17.868

Finally, Table 6 summarizes the average values of the engagement index (E) together with its dimensions: popularity (P), commitment (C) and virality (V). The value shown by “E” indicates a high level of heterogeneity regarding stakeholder engagement with the WNGOs, presenting an average value of 106.52 and a standard deviation of 238.53. The average value of the popularity dimension (77.27) is significantly higher than that for commitment (2.88) and virality (26.37). Also, there is great diversity in the results of the three dimensions, especially in the case of popularity and virality.

**Table 6.** Stakeholder engagement main statistics (N = 50).

	Engagement (E)	Popularity (P)	Commitment (C)	Virality (V)
Mean	106.52	77.27	2.88	26.37
Median	24.67	20.17	0.72	5.30
Maximum	1448.93	1134.61	30.82	317.14
Minimum	2.00	1.00	0.00	0.33
SD	238.53	176.8413138	6.27	61.87

#### 4.2. Determinants of the Level of Stakeholders Engagement via Facebook

According to the results, the explanatory capacity of the model is confirmed (70.7%), and the linearity condition is corroborated by Fisher's F-test (Table 7). Seven out of nine variables are statistically significant: "Reputation", "Size", "Administrative Expenses", "Fundraising Expenses", "Board Size", "Social Networks Presence" and "Online Community Size" contribute significantly to explain the level of engagement achieved by the WNGOs. Pearson correlation matrix (see Table A1 of Appendix A) shows that there is a medium-strength correlation between some of the variables, being the correlations less than 0.8, and thus avoiding multicollinearity [92].

**Table 7.** Regression analysis results.

	Unstandard Coefficients	Std. Error	t	Sig.
Constant	−597.036	298.205	−2.002 *	0.052
Reputation	3.949	1.441	2.740 ***	0.009
Size	$1.694 \times 10^{-6}$	0.000	4.401 ***	0.000
Administrative Expenses	$-2.524 \times 10^{-5}$	0.000	−4.090 ***	0.000
Fundraising Expenses	759.788	447.825	1.697 *	0.098
Program Services Expenses	−16.703	317.514	−0.053	0.958
Board Size	7.525	3.155	2.385 **	0.022
Volunteer Dependence	55.448	55.071	1.007	0.320
Social Networks Presence	−361.37	20.190	−1.790 *	0.081
Online Community Size	60.462	13.539	4.466 ***	0.000
Significant at: *** p < 0.01; ** p < 0.05; * p < 0.1				
R-squared				0.707
Durbin-Watson				2.128

## 5. Discussion

NGOs are heavily dependent on tangible and intangible resources to carry out their core mission of improving society and the environment. More specifically, funding and social support are central and interrelated elements for NGOs to guarantee their survival, and that makes it mandatory for these organizations to constantly keep an eye on the entities and individuals providing these resources: their stakeholders. Traditional means of communication are becoming obsolete and have been surpassed by social media in that social networks allow organizations to turn unidirectional information flows into reciprocal, dialogic and feedback-providing trade-offs. Social media also allows them to reach a wider audience, which becomes essential given the high competitiveness between organizations in the race for the coveted fundraising. How NGOs should optimize these dialogues is an unexplored but interesting topic since it allows them to increase their influence on stakeholders, their ability to raise funds, and in the end, to expand their social and environmental impact.

Based on a sample of 50 WNGOs aimed at mitigating water-access inequalities, the results provided support the general approach that several factors exert an influence on a WNGO's stakeholder engagement. First, a solid reputation arises when these organizations are able to match words and deeds in the long term. Mere good intentions could provide social support and funding in the short term, but the longevity of non-profit organizations only comes if those intentions materialize in facts. If a WNGO is able to consistently prove its accountability, it will be more likely not only to survive, but also to grow in size. Furthermore, visibility increases as WNGOs grow and become large organizations, attracting stakeholders' attention [11], and thus, funding. This process becomes a virtuous circle as WNGOs (and NGOs in general) maintain their accountability in the eyes of stakeholders. Therefore, these factors (reputation and size) are thought to be interrelated and also have a strong relationship with stakeholder engagement. The results of this research confirm this point, since reputation and size exhibit a significant relationship between them and are also significant in explaining the level of online engagement. The positive sign of the coefficients underpins the argument that reputed and bigger WNGOs achieve higher levels of stakeholder engagement, and confirms the results of previous research [24,57].

From an economic point of view, accountability heavily depends on the efficient use of monetary resources. An efficient WNGO must be able to allocate more resources to its core activities, that is, the promotion and execution of water scarcity programs. As expected, our results showed a positive relationship between administrative and program services expenses, since the more initiatives are taken, the more expenses are needed to be appropriately managed. However, a negative relationship was found between administrative and fundraising expenses, meaning that a greater proportion of resources devoted to funding is needed when the level of administrative expenses is low. When it comes to a smaller WNGO, its size only requires a small administrative structure (a positive relationship, according to our results), and it devotes more resources to fundraising (funding expenses are also negatively related to size). Closing the circle, the funding expenses ratio and the program services expenses ratio are also negatively related, since devoting a higher proportion of resources to developing initiatives directly influences the proportion available to fundraising by diminishing it. The findings from the regression further confirmed that, as hypothesized, the WNGOs with fewer administrative costs attain higher levels of stakeholder engagement, confirming that stakeholders prefer to support those organizations which assume lower administration costs as a form of demonstrating their efficiency [63]. Interestingly, fundraising expenditure is positively related to stakeholder engagement, that is, stakeholders' online support increases as a higher proportion of resources are allocated to funding-related activities. While this sounds obvious (visibility increases with the efforts made to attract donors), it means that WNGOs are not sufficiently taking advantage of the cost-reducing feature of social media (thus decreasing efficiency), and this is evidence not found in previous studies [20]. Surprisingly, program services effort is not significantly related to online stakeholder engagement, meaning that the proportion of resources aimed at water-scarcity initiatives is not relevant for stakeholders, but fundraising spending is. This means that attention is drawn in the promoted results of the activities and not in the amount of money devoted to their execution, contradicting in some way the results of previous studies [11,64].

The implications of the organizational structural features of WNGOs also yield interesting results. A higher number of board members increases the likelihood that one of the members is more interested (and/or is directly involved) in promoting the WNGO's activities via social media [11,20], thus positively influencing the adoption of social media strategies. This enhances the participation of the organization in social networks and dialogue with stakeholders, which in turn boosts online engagement. Volunteer dependence was also expected to be positively related to online commitment, but our results prove that, although positive, this relationship is not significant. Recurrent volunteers continue helping the organization and promote their participation through social media where relatives and friends can become potential volunteers or donors. According to our results, the attraction ability of WNGOs using social media seems residual, although this contradicts previous findings [20,69].

Regression results regarding social media variables confirmed our hypotheses. Focusing on being present in a few social networks allows WNGOs to focus their efforts on achieving higher commitment instead of scattering resources to reach a wider audience. Our findings confirm that WNGOs reach higher levels of commitment by disseminating information using a smaller number of social networks, which is confirmed by the positive influence exerted by the number of Facebook fans, and in line with previous research results [19,76,78,79].

Some additional findings from our analysis arise when exploring temporary segmented data from WNGOs' Facebook posts. There are wide behavioral differences between when and how WNGOs stimulate social media participation and when and how Facebook users actually interact. Our results indicate that WNGOs prefer publishing on working days, while the highest levels of interaction are reached on weekends [85]. Similarly, WNGOs post more frequently in the afternoon, while Facebook fans interact especially in the evening when they can spend some free time and check their social media profiles [85]. In order to boost the impact of posts, WNGOs should turn the strategy around and adapt it to stakeholders' behavior. The type of post is also a relevant point, since the highest level of engagement is reached by using videos, and to a lesser extent, images. These types of post format increase attention and impact [79]. However, the relevant point is that WNGOs could engage more easily (three times more) by using less posts including videos, and engage a little less by almost quadrupling the use of images. WNGOs are missing out on the potential for interaction that the video format offers, and thus they should consider increasing the number of posts published in video format to take advantage of its potential to engage stakeholders [85].

## 6. Conclusions

Social media are an excellent tool through which WNGOs can bring the problem of water scarcity closer to the day-to-day reality, thus involving society in a seemingly distant problem. As a means to achieve this goal, WNGOs should think strategically about social media, and Facebook in particular, integrating a social media presence and participation with the rest of the organization's strategies. WNGOs should be aware of the level of followers and fans' engagement with the organization's projects in order to reach sufficient commitment to integrate them as volunteers, donors and partners, and therefore committing them to the cause.

As a first but relevant step, it is essential to characterize the stakeholders' online commitment to WNGOs via Facebook by analyzing the individual components of the engagement index. Based on the results of this study, "popularity" is the dimension that yields the highest value, being a sign that stakeholders are willing to engage with WNGOs through actions that involve little effort, such as clicking on "like". Knowing this, these organizations can quickly involve users by getting their attention through such simple marketing actions as "one like = one drop". Nonetheless, it is not only necessary to encourage quick and easy participation, but also maintain the attention of the followers, which means it is important that WNGOs match their projected image with the actions taken. Only through a true dialogue with its stakeholders, will WNGOs get a real, long-lasting commitment.

Similarly, the publication of images is significant, but the opportunities offered by Facebook to encourage online interaction through the use of other formats, such as video, is squandered. WNGOs should take this point into account, since they may be missing out on the potential of the video-format posts to involve stakeholders. Likewise, "when" a post is published is an equally important aspect of the online communication strategy. According to the results, WNGOs publish mainly on weekdays (particularly on Thursday) and in the afternoon. However, it would be advisable that they do it on weekends (Saturday) and at night, given the levels of engagement for the posts they publish in these days and time zones.



Second, WNGOs should be aware of which factors could help them achieve success in obtaining online engagement through social media. Our findings show that the variables that have traditionally been considered determinants for the overall success of the NGOs (reputation, size, cost structure, board size and volunteer effort) remain valid for the specific case of WNGOs and their goal of getting stakeholders involved through Facebook. That is, the effort WNGOs make to achieve the overall organizational success will result in the particular success of the organization in achieving the commitment of stakeholders through social media. The results show that the most reputable WNGOs should continue to make use of technologies as a mechanism to increase interactive communication and thus achieve greater online commitment from stakeholders. Likewise, they must be efficient organizations with a cost structure where the highest specific weight is given to fundraising costs and minimizing administrative costs. Similarly, it would be advisable for WNGOs to enlarge board membership, as this favors stakeholders' online commitment.

The results also show that WNGOs should not disperse their efforts, but should reduce their presence in few social networks, develop content and foster dialogue that in turn, will encourage interaction. Smaller WNGOs are an example of how organizations with very little capacity have to implement and use new technologies, and how social media can be used strategically to involve and engage stakeholders with their goals.

This study broadens the existing literature on social media and non-profit organizations, with the added value of focusing the object of study to organizations that face the management of a specific and growing crisis, such as water. For those WNGOs, the benefits offered by social media to increase relationships with its stakeholders are highlighted, and specific actions at the organizational level and regarding their communication policy are recommended to improve their online commitment.

This study is limited to the specific case of WNGOs, being interesting to extrapolate the research to other non-profit organizations whose social goal is related to other specific issues, such as the environment, hunger, natural disasters, childhood, etc. In the same way, future research should examine other factors in addition to those considered in this study.

**Author Contributions:** Conceptualization, J.A.-C.; Data curation, J.A.-C.; Investigation, F.G.-V. and L.S.-S.; Methodology, J.A.-C.; Project administration, L.S.-S. and M.d.C.C.-P.; Supervision, M.d.C.C.-P.; Validation, M.d.C.C.-P. and F.G.-V.; Writing—original draft, J.A.-C., F.G.-V. and L.S.-S.

**Funding:** This research was funded by the PAIDI group "NEW APPROACHES IN FINANCE AND BUSINESS INFORMATION SYSTEMS (SEJ385) of the Andalusia government, Spain.

**Acknowledgments:** We are grateful to the anonymous reviewers whose comments and suggestions significantly improved the manuscript.

**Conflicts of Interest:** The authors declare no conflict of interest.

Appendix A

Table A1. Bivariate correlation matrix.

Variable	Mean (S.D.)	Engagement	Reputation	Size	Administrative Expenses	Fundraising Expenses	Program Services Expenses	Board Size	Volunteer Dependence	Social Networks Presence	Online Community Size
Engagement	106.516 (238.530)	1									
Reputation	27.08 (18.360)	0.534 (0.000)	1								
Size	53083958.448 (181650165.733)	0.441 (0.001)	0.511 (0.000)	1							
Administrative Expenses	3729807.130 (11775879.316)	0.337 (0.008)	0.538 (0.000)	0.953 (0.000)	1						
Fundraising Expenses	0.927 (0.060)	0.158 (0.136)	-0.053 (0.356)	-0.205 (0.077)	-0.223 (0.060)	1					
Program Services Expenses	0.8092 (0.0845)	0.067 (0.322)	0.190 (0.093)	0.271 (0.029)	0.257 (0.036)	-0.558 (0.000)	1				
Board Size	6.22 (6.819)	0.233 (0.052)	-0.020 (0.445)	0.074 (0.304)	0.073 (0.307)	-0.143 (0.161)	-0.059 (0.342)	1			
Volunteer Dependence	0.505 (1.235)	-0.087 (0.274)	-0.135 (0.174)	-0.153 (0.144)	-0.173 (0.115)	-0.152 (0.146)	0.026 (0.430)	-0.093 (0.261)	1		
Social Networks Presence	3.16 (1.235)	0.049 (0.369)	-0.119 (0.204)	-0.127 (0.190)	-0.202 (0.080)	0.278 (0.025)	-0.287 (0.022)	-0.058 (0.346)	-0.068 (0.320)	1	
Online Community Size	9.647 (2.029)	0.646 (0.000)	0.479 (0.000)	0.384 (0.003)	0.382 (0.003)	0.124 (0.196)	0.095 (0.255)	0.084 (0.280)	-0.229 (0.055)	0.288 (0.021)	1

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