The «Wisdom of The Crowds» and Their Knowledge of Puerto Rico's Challenges Six Months After *Hurricane María:* Thoughts on David Begnaud's Experiment on Journalism Crowdsourcing

«Jendetzaren jakinduria» eta Puerto Ricoko erronkei buruzko ezagutza Maria urakanetik sei hilabetera: David Begnauden kazetaritzako crowdsourcing *esperimentuari buruzko gogoetak*

La «sabiduría de las multitudes» y su conocimiento de los desafíos de Puerto Rico a seis meses del huracán María: reflexiones sobre el experimento de David Begnaud sobre *crowdsourcing* periodístico

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ABSTRACT: This article analyzes *CBS News* Correspondent David Begnaud's experiment with journalism crowdsourcing for his reporting on Puerto Rico's challenges six months after Hurricane María. It answers two interrelated research questions. First, it examines why journalists and media organizations have experimented with crowdsourcing strategies, using Begnaud's experiment as a case study. Second, using text-as-data methodologies, the article tests the collective intelligence of the people who responded to Begnaud's request for information. Based on this investigation's findings, the article shows that followers' collective knowledge properly estimated Puerto Rico's many challenges and some of the municipalities most affected by the storm. Even though crowdsourcing journalism is challenging, this article demonstrates that when done right it can enhance the journalistic process.

KEYWORDS: crowdsourcing; journalism; collective intelligence; Hurricane María; text as data; Puerto Rico.

RESUMEN: *Este artículo analiza el experimento del corresponsal de* CBS News, *David Begnaud, con el «crowdsourcing» periodístico para su reportaje sobre los desafíos de Puerto Rico seis meses después del huracán María. Esta investigación contesta dos preguntas. Primero, examina por qué los periodistas y las organizaciones de medios han experimentado con estrategias de «crowdsourcing», utilizando el experimento de Begnaud como estudio de caso. En segundo lugar, utilizando metodologías de texto como datos (i.e. «text as data»), el artículo cuestiona la inteligencia colectiva de las personas que respondieron a la solicitud de información de Begnaud. A base de los hallazgos, el artículo muestra que el conocimiento colectivo de los seguidores evaluó adecuadamente los muchos desafíos de Puerto Rico y algunos de los municipios más afectados por el huracán. Aunque el periodismo de «crowdsourcing» no es siempre fácil, este artículo demuestra que, cuando se hace bien, puede mejorar el proceso periodístico.*

PALABRAS CLAVE: crowdsourcing; *periodismo; inteligencia colectiva; huracán María; texto como datos; Puerto Rico.*

Introduction

On March 16, 2018, David Begnaud, a *CBS News* Correspondent, posted videos on his social media accounts informing his followers that he was returning to Puerto Rico to report on the sixth month anniversary of Hurricane María's landfall. In the video, Begnaud (2018a) asked his followers for some assistance:

> I have 35 hours to get what I need to do. That means I need to see as much as I can, interview as many people as I can, report, capture... We want to get a sense of what life is like in the island... I need to know from you where you think we must go and must see. Where are things getting better? Where they are still deplorable?

Begnaud's «open call for input» (Onuhoa, Pinder & Schaffer, 2015: 17) was viewed by more than 260,000 Facebook users and over 3,500 followers posted comments (2018a). Similarly, more than 350 Twitter users (2018b) and more than 250 Instagram users (2018c) responded to his video's request.

After his assignment, *CBS News* asked him to put together a «Reporter's Notebook,» which provides news correspondents and their production teams an opportunity to reflect on their experiences. During the segment, Begnaud (2018d) thanked his social media followers, noting that their answers to his questions helped his team decide which towns in the island to visit, who to interview, and which issues to cover. Although Begnaud did not use the term, his request is an example of crowdsourcing and the success of this first experiment led him to use this technique at least two more times in his coverage of Puerto Rico's post-hurricane recovery.[1]

This article examines two interrelated questions. In part one of this in-vestigation, I explore why journalists and media organizations have experimented with crowdsourcing strategies. Using Begnaud's experiment and his style of jour-nalism as a case study, I demonstrate that crowdsourcing journalism, though challenging, can enhance the overall journalistic process. This investigation's part two reviews the literature on the «wisdom of the crowds» (Surowiecki, 2005). Individuals and organizations employ crowdsourcing strategies to tap the crowd's «collective intelligence» (Brabham 2013), which research suggests is superior to an individual's judgement and «closer to the ground truth» (Yi *et al.,* 2012). Employing «text-as-data» methodologies (Grimmer & Stewart, 2013), I analyze Facebook users' responses to Begnaud's «open call» to test whether their collective opinion correctly

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[1] Begnaud (2018e) asked his Facebook followers to share with him information about people who died because of Hurricane María. He also put an «open call» for his story on Vieques (*CBS News* 2018).

described Puerto Rico's challenges and mentioned the most affected municipalities six months after Hurricane María made landfall.

1. **Crowdsourcing in Journalism**

Influenced by Surowiecki's *The Wisdom of the Crowds*, the term crowdsourcing was coined by Jeff Howe in an article for *Wire* in 2006. The term, as Darren Brabham (2013: xviii) noted, «was quickly adopted by the popular press and bloggers», but it lacked a precise definition (Brabham, 2013, p. xviii). This shortcoming also applied to the academic literature on crowdsourcing as Enrique Estellés-Arolas and Fernando González-Ladrón-de-Guevara's suggested (2012) in their work. For this article, I adopt Brabham's (2013: xix) definition of crowdsourcing: «an online, distributed problem-solving and production model that leverages the collective intelligence of online communities to serve specific organizational goals.»

This discussion is divided into two sections. The first one explores reasons media organizations and journalists have experimented with crowdsourcing practices. In doing, so it considers some of the benefits and challenges associated with journalism crowdsourcing. The second section reviews Begnaud's experiment with crowdsourcing and his reporting on Puerto Rico's recovery after Hurricane María.

1.1. Journalism Crowdsourcing

How does Brabham's conceptualization apply to journalism? His work only looked at Assignment Zero's experiment with journalism crowdsourcing (Brabham, 2013: 27-28), which only lasted six-weeks (Howe, 2007). Although it yielded mixed results, Assignment Zero started an important conversation regarding the future of journalism in the Internet age. Since then, many news organizations around the world have experimented with different crowdsourcing strategies to great effect (Gondwe, 2021; Antonopoulos *et al.,* 2020, Aitamurto, 2018; Aitamurto, 2016; Bradshaw & Brightwell, 2012; Van Der Haack, Parks & Castells, 2012; Muthukumaraswamy, 2010) and the rise and the growth in social media has directly informed the development of new journalism strategies based on crowdsourcing principles (Lamprou *et al.,* 2021; & Roothman, 2018).

In 2015, Columbia University's Tow Center for Digital Journalism published its *Guide to Crowdsourcing* (Onuhoa, Pinder & Schaffer, 2015), defining the concept and explaining why so many news organizations have adopted these techniques. The report's authors define journalism crowdsourcing as «the act of specifically inviting

a group of people to participate in a reporting task —such as news–gathering, data collection, or analysis— through a targeted, open call for input; personal experiences; documents; or other contributions» (Onuhoa, Pinder & Shaffer, 2015: 14). This definition is in line with Brabham's understanding of crowdsourcing. One of this report's main takeaways is that when done right crowdsourcing empowers «people to share what they know individually so that journalists can communicate the collective information» (Onuhoa, Pinder & Schaffer, 2015: 14). While crowdsourcing strategies can enhance journalism, it is important to recognize that not all journalists or news organizations are able to take advantage of this approach (Appelgren & Salaverría, 2018).

Johanna Vehkoo (2013), for example, documents some of the challenges journalist face when experimenting with crowdsourcing. The main problem is connected to both the quantity and quality of the crowdsourced information. Some projects fail to get off the ground because they fail to generate the targeted audience's enthusiasm (Appelgren & Salaverría, 2018: 652) leading to low response rates (Furuichi & Seidel, 2017). Other projects generate so much data that it is difficult for journalists to analyze, evaluate and verify the accuracy of the collected information in a timely manner (Aitamurto, 2016: 190). For instance, shortly after the Boston Marathon bombings in April 2013, law enforcement agencies asked the public to share any information that could help the officers identify the bombers. Social media users, using fora in Reddit and 4Chan, collected and shared images that falsely implicated an innocent high school student. Even though law enforcement officials had not named him as a person of interest, *The NY Post*, a New York City newspaper, posted a photo of the student in its cover, suggesting his possible connection to the plot (Wadha, 2013). The pressure to publish new, unverified information did not only tarnish *The NY Post's* reputation, but it also caused undo harm to an innocent person (Carver, 2013).

In addition, journalists interested in crowdsourcing should remember that individuals that react to an «open call» are a «self–selected group of people» (Aitamurto, 2016: 191). While their shared opinions may not constitute a representative sample of the public's views, self–selection can be a positive thing. Research shows that people that participate in crowdsourcing projects tend to be knowledgeable about the topics being discussed (Vehkoo, 2013: 6; Brabham, 2012). Thus, for some journalists, especially those that have little knowledge of the topic being researched, their main challenge is access to a well–informed audience (Lamprou *et al.,* 2021: 420; Springer, 2018: 5).

Journalists interested in crowdsourcing journalism, therefore, need to invest time and resources building a sense of community with their audience (Vehkoo, 2013: 30). This is an important piece of the puzzle. It is not enough for journalists to use their reporting to attract the crowd's attention. Journalists must also find ways to

connect with these people and to nurture this relationship. Therefore, social media platforms have become an integral part of both contemporary journalism (Humayun & Ferucci, 2022) and in other firms using crowdsourcing (Palacios-Marqués, Gallego-Nicholls & Guijarro-García, 2021). Journalists interested in crowdsourcing need to «[open] up the story process to the public while the story itself is still in the making. Doing so increases transparency and openness, turning crowdsourcing into an open journalistic practice» (Aitamurto, 2018: 2). By doing this, journalists will attract the attention of individuals who «want to advance social change, and [who] perceive journalism as a means to contribute to societal progress» (Aitamurto, 2018: 5). These people «seek to mitigate power and knowledge asymmetries and to empower their peers, and they perceive the sharing of information through crowdsourcing as a way to do so» (Aitamurto, 2018: 5).

This discussion's main point is that journalism crowdsourcing is not easy, and it is important to stress that not every journalist is able to exploit this approach's benefits. Those who wish to experiment with crowdsourcing must be willing to adapt their reporting styles to gain the attention of a crowd and to invite it to participate in the journalistic process. Depending on the journalist's interests, this audience can be asked to support the «story process» but individuals' willingness to participate in this project depends on whether their interests align with the journalists' interests and values. Once the audience sees that the journalist's work speaks to their values and interests, they will be willing to respond to his or her open calls for information. Let us look at Begnaud's background and his reporting style, which may explain why so many people responded to his «open call».

1.2. Begnaud's Experiment with Crowdsourcing Journalism

Begnaud joined *CBS News* in August 2015 (CBS News, 2021). During the 2017 hurricane season, he was first sent to Houston to report on Hurricane Harvey's effects on eastern Texas and then he went to Florida to cover Hurricane Irma. He arrived in Puerto Rico a few days before Hurricane María made landfall on September 20, 2017. Unlike many of the journalists sent to the island to cover the hurricane, he remained in Puerto Rico for «nearly two months» (Boedeker, 2018) covering its aftermath. Begnaud's reporting helped people around the world understand the magnitude of the island's destruction and the unfolding humanitarian crisis. On top of his news stories for *CBS This Morning, CBS Evening News*, *CBS Sunday Morning,* and *48 Hours*, he used his Facebook and Twitter accounts to document the island's challenges, to hold politicians and government officials accountable, and to give voice to the hurricane's victims (Ho, 2018). Begnaud even kept posting content connected to Puerto Rico's recovery on his social media accounts after *CBS News* sent him to California to cover that year's wildfires and to Hawaii to report on the eruption of the Kilauea volcano (Ho, 2018).

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Begnaud, who had never visited Puerto Rico prior to his assignment or knew much about its culture, developed a deep connection with many Puerto Ricans living in the island and in the continental United States (US). Given that most of the major US news outlets did not cover Hurricane María's aftermath (Yordán 2021; Mehta, 2017; Shah, Ko & Peinado, 2017), Begnaud's reporting allowed him to increase his visibility, credibility and influence in the Puerto Rican community (Díaz, 2018). This helped him gain a strong social media following. Kris Wartelle of the *The Daily Advertiser* reported that his followers in Facebook «jumped from 10,000 to 315,000 in just under one month» (2017) after he arrived in Puerto Rico. Today, more than 740,000 people follow his Facebook page. Similarly, in September 1, 2017, Begnaud had around 10,400 followers, increasing to 75,000 by early November 2017.[2] Over 260,000 currently follow his tweets. Based on these statistics, we can assume that many of his new followers following Hurricane María were either Puerto Rican or had some personal connection to the island.

Begnaud's work was not motivated by a desire to grow his following in social media. In an interview about his reporting on Puerto Rico, he explained that his approach was the same he had taken to other stories (Ho, 2018). What surprised him was Americans' general disinterest in the island's devastation (Waldow, 2018) and US news networks decisions to decrease their reporting of the situation a few days after the storm made landfall. This helped Begnaud understand Puerto Ricans' «second–class status» and «emboldened [his] desire» to keep the story going, even when he was sent to cover other disasters (Waldow, 2018). Many of his social media followers appreciated his steadfast commitment to the island's plight. This helped him establish a close relationship with his followers, allowing him to tap their «collective wisdom.» While Begnaud's has crowdsourced at least three of his news stories on Puerto Rico's recovery, I focus on the Begnaud's first «open call», which was viewed by more than 260,000 Facebook users and generated over 3,500 comments. Given that these responses informed his reporting on Puerto Rico's recovery six months after Hurricane María made landfall (Begnaud, 2018d), it is important to ask whether his followers' comments correctly described the island's challenges and mentioned the most affected municipalities six months after Hurricane María made landfall.

2. **Testing the Crowds' Collective Wisdom**

In *The Wisdom of the Crowds*, Surowiecki (2005: xiii) argues that «under the right circumstances, groups are remarkably intelligent, and are often smarter than the smartest people in them.» The book reviews several cases which help the author

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[2] The number of Begnaud's Twitter followers were located using the Internet Archive.

specify the «right circumstances» that enable groups to answer interesting questions or to address specific coordination and cooperation problems (Surowiecki, 2005: xvii-xviii). Thus, Surowiecki demonstrates that not all crowds are wise. He argues that for researchers to exploit the intelligence of a crowd they need to make sure that their experiments meet the following four conditions.

The first condition is the «diversity of opinion.» The second condition is «independence,» which is closely connected to the first. The next condition is «decentralization». Taken together, these three conditions guarantee that individuals' opinions are based on their own «local knowledge» and that these views are not influenced by other persons' thoughts (Nguyen, 2017: 132). The fourth condition is «aggregation». The researcher must find a way of collecting these opinions and aggregate them to estimate the crowd's collective knowledge (Lehrer, Juhl & Gschwend, 2019: 101). Octavio Gonzalez Aguilar (2021: 241) makes an important observation regarding this last condition. The crowd's wisdom is not measured by averaging the responses. Instead, it «comes from the aggregation of their diversity.»

Begnaud's first experiment with crowdsourcing meets these four conditions. At the time, he drew on the opinion of a wide audience of social media followers. Given that we are analyzing his Facebook followers' responses; we know that more than 260,000 users saw the video that included his «open call» for information. We can assume that many of these individuals lived in different parts of Puerto Rico or in the continental US. In addition, we presume that these respondents were free to share their opinions and they used their personal knowledge to provide Begnaud ideas of what issues deserve more news coverage, where he should visit, and who he should interview for his news story. Because each of these individuals entered the journalistic process with the hopes of improving Begnaud's reporting, this helped secured a decentralized process, where these participants could act independently of each other, producing a diverse number of opinions. While Begnaud has a big production team that supports his reporting (Colón Badillo, 2018), it is not clear whether they aggregated these comments' insights, though he insisted that these insights helped his team determine what to issues to cover, where to go, and who to interview (Begnaud, 2018d).

Before explaining how I analyzed the responses to Begnaud's «open call», it is important to highlight the scholarly debate regarding how to measure a crowd's collective intelligence and how to test the accuracy of its opinions. While journalists may use crowdsourcing to «find knowledge that would otherwise remain hidden» (Lamprou *et al.,* 2021: 422), their reporting must also be accurate and factual. The way journalists or researches tap into a crowd's collective intelligence affects the accurateness of their combined opinions. For example, multiple experiments demonstrate that crowds perform very well when estimating «physical quantities (e.g., the number of jelly beans in a jar) or general knowledge (e.g., the number

of people living in a country), or providing answers to multiple choice questions (e.g., choosing which of a set of cities is the capital of a country)» (Yi *et al.,* 2012: 1–2). These type of questions allow researchers to easily aggregate and average the responses to measure the accuracy of the crowd's collective judgement.

What happens when a journalist asks a crowd to answer questions «without known» or «well-defined answers» (Makin, 2017)? How can researchers who want to tap a crowd's intelligence judge the accuracy of these responses? This is an interesting dilemma. Questions that lack a known answer are still valuable in the process of crowdsourcing, as they can generate new knowledge that may spur new ideas or innovations (Ipeirotis & Gabrilovich, 2014). But the absence of distinct answers creates problems for journalists or researchers who want to test the accuracy of the responses. Begnaud's «open call» for information included several questions that lacked a distinct answer. Given that I want to measure the collective intelligence of the Facebook users who answered Begnaud's open call, I will analyze these responses using «text as data» (Grimmer & Stewart, 2013) methodologies. As noted below, this approach will allow me to extract key features from the comments and an aggregate some of the responses in order to measure whether Facebook users' collective judgement correctly described Puerto Rico's challenges and mentioned the most affected municipalities six months after Hurricane María made landfall.

2.1. Methodology

I downloaded these Facebook comments on March 18, 2018, using Pablo Barbera's *Rfacebook* package for R[3] (2017). This package is currently not being maintained, as Facebook (2018), in reaction to the controversy connected to Cambridge Analytica's misuse of its data (Chang, 2018), established new rules that has limited researchers' access to its content. Although more than 3,500 Facebook users posted comments, I only downloaded 2,658 comments, including comments posted on March 17 and March 18, 2018. Of these responses, 88 percent were written in English, while 10 percent were written in Spanish. The remaining comments, representing 2 percent of the total, were discarded as these included emoticons or URLs, which do not inform my text analysis.

I used the *quanteda* package (Benoit *et al.,* 2021) for R to turn these comments into a corpus, compromising over 88,000 words. Because some of the Facebook users who responded to Begnaud's «open call» used diacritical marks in their writing, I converted the text format from «UTF-8» to «ASCII/Translit» to remove

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[3] R is a free, open source software and programming language for statistical analysis and graphing.

accents and tildes.[4] Because many Puerto Ricans were frustrated with the slow pace of rebuilding the island's electrical system, I decided two analyze two corpora. One corpus included all 2,658 comments. The other extracted comments that made references to words associated with the word, «electricity».[5] This second corpus, which I refer to below as the electricity corpus, included 861 comments.

Both corpora were preprocessed by removing punctuations, numbers, whitespaces and stopwords. I also combined tokens to create «multi-word expressions» to enhance the analysis of the data. For example, I joined the words «Puerto» and «Rico» to produce «Puerto_Rico». This technique was also applied to the 17 municipalities which names have two words, such as San Juan or Santa Isabel. These procedures reduced the size of the main corpus to 6,780 words and the electricity corpus to 2,657 words (Watanabe & Müller, 2021c).

To conduct a frequency analysis of the top terms, I used *quanteda* to create a «document-term matrix» (DTM). This procedure turns the processed tokens into «a matrix in which rows are the [comments], columns are terms and cells indicate how often each term occurred in a document» (Welbers, van Atteveldt & Benoit 2017: 252). By constructing a DTM, we can easily count and determine the top words in a corpus. To understand the relationship between these tokens, I used *quanteda's* feature co-occurrence matrix (FCM) function to plot these interrelationships (Watanabe & Müller, 2021a).

One of the limitations of computational text analysis methodologies is that these can fail to capture the context that informs an author's decision to use a specific keyword or phrase. Thus, a frequency analysis may count tokens that may not be connected to the research question. This shortcoming requires researchers to carefully validate their findings to minimize these errors (Grimmer & Stewart, 2013: 271). For example, San Juan, the island's capital city, is mentioned 95 times in the main corpus and 55 times in the second corpus. This is surprising, given that the metropolitan area was not experiencing too many challenges in March 2018. Using *quanteda's* «keyword-in-contexts» function (Watanabe & Müller, 2021b), I noticed that many of the commentators were encouraging Begnaud to ignore San Juan and to visit smaller towns and cities in the island's mountainous interior or

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[4] In this step, I reformatted the text using the «iconv» function, which is part of base R.

[5] These are the words associated with «electricity» I used to subset the corpus: electric, electricity, electrical, power, light, grid, energy, energia, electricidad and luz. Note that because I removed all the accents in the corpus, the word «energia» did not have an accent. Also, the word «lights» was not included in this list. All the references to «lights» were connected to Department of Transportation's failure to fix the traffic lights in many of Puerto Rico's metropolitan areas.

in its southeastern coast.[6] For this reason, I did not include San Juan in the list of municipalities below. Another problem is the number of misspelled words found throughout the corpora. Because of my small sample size, I decided to manually correct these errors and add them to both corpora before executing the analysis of the comments.

As already noted and as I expand below, one of the main issues raised by those individuals that answered Begnaud's «open call» was the Puerto Rican government's and the U.S. federal authorities' inability to quickly rebuild the island's electrical system (Coto 2018). In addition, Facebook users who responded to Begnaud's video recommended places he should visit. Puerto Rico is divided into 78 municipalities. Each is governed by an elected mayor and legislature. These municipalities are often referred to by Puerto Ricans as *pueblos* (or towns) because they all have a *plaza* (i.e., public square) with a cathedral or a parish church. To test the collective intelligence of these commentators, I assume that the most referenced municipalities were the ones most damaged by the hurricane and they were the ones with the highest number of customers without electricity. Although these people also encouraged Begnaud to visit specific *barrios* (i.e., neighborhoods), I decided to make the municipality the main unit of analysis.[7]

Starting in mid-January 2018, four months after Hurricane María made landfall, the United States Army Corps of Engineers (USACE), which was working closely with the Puerto Rico Electric Power Authority (PREPA) to rebuild the island's electrical system, began reporting the number of customers with electricity (US Energy Department 2018). The data was not communicated at the municipal level. Instead, the USACE and PREPA shared the data at the regional level, using PREPA's division of Puerto Rico's 78 municipalities into seven «administrative regions» (AEE, 2021). At the time, PREPA had close to 1.5 million customers (PREPA 2018a). These included residential, industrial and commercial customers. Figure 3 includes a map of Puerto Rico with these regions and a line depicting Hurricane María's path across the island.

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[6] For example, one user wrote «don't stay in San Juan.» Around 20 percent of the comments argued that San Juan was «almost back to normal». Another comment read «you need to move away from San Juan in order to get visibility» of the damages. Others commented that tourism had picked up in San Juan, making the case that things had improved dramatically. Although I did not systematically analyze the comments associated with Begnaud's «open call» in Twitter or Instagram, the ones that referenced San Juan echoed these views.

[7] While all of Puerto Rico's municipalities are divided into *barrios*, many municipalities have barrios with the same name. For example, the municipalities of Bayamón, Caguas, Carolina, Hatillo, Humacao and Las Marias have a *barrio* called Buena Vista. Consequently, it is difficult to pinpoint the location of these *barrios*.
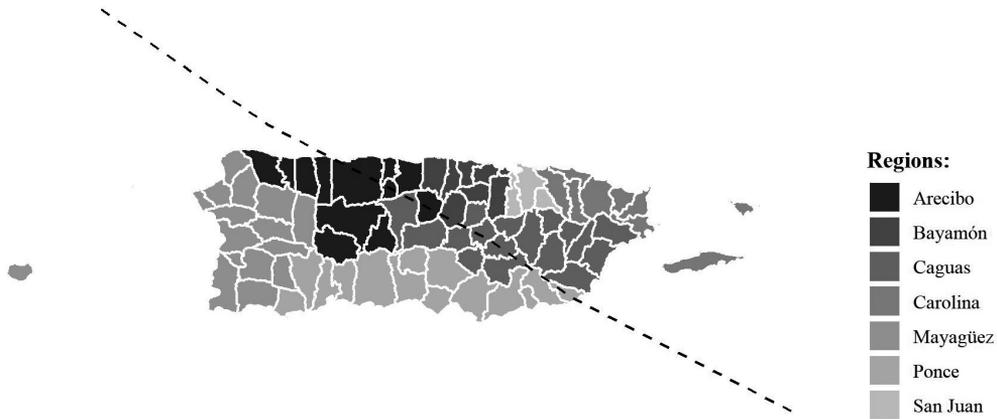
The line represents *Hurricane María's* path across Puerto Rico (National Hurricane Center, 2021). For the data for PREPA's regional division, see: AEE 2021.

FIGURE 1

PREPA's Administrative Regions

Table 1 summarizes the total number of muncipalities and the number of electricity customers per region.[8]

TABLE 1

**Number of Electricity Customers and Number
of Municipalities in PREPA's Administrative Regions**

PREPA Region	Total Number of Customers	Total Number of Municipalities
Arecibo	153,397	12
Bayamón	226,035	8
Caguas	214,417	17
Carolina	132,932	9
Mayagüez	229,297	15
Ponce	207,779	14
San Juan	309,143	3

Source: PREPA 2018a.

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[8] The number of customers is not equal to the number of individuals who lack electricity. Multiple people may live in a residence. PREPA's numbers account for the number of electric meters that are connected to the grid's electrical distribution system. Thus, it is difficult to account for how many people did not have access to electricity during this time period.

As illustrated in Figure 1, Hurricane María criscrossed the island, entering Yabucoa and continuing its path across the Caguas Region and exiting via the coastal municipalities of the Arecibo Region. These two regions' municipalities sustained heavy damages. Efforts to reconnect these regions' customers to the electricity grid was slowed by many of these municipalities' mountanious terrain and «thick vegetation» (Kwasinski *et al.,* 2019: 86). Given Puerto Rico's topography, the USACE and PREPA decided to first reestablish electricity to the municipalities located on the western side of the island and to the major metropolitan centers, which are mostly located on coastal plains. The towns on the island's mountanious interior and the coastal towns in Puerto Rico's southeastern corner were the last to be reconnected to the electrical system. Figure 2 captures the effects of this strategy.
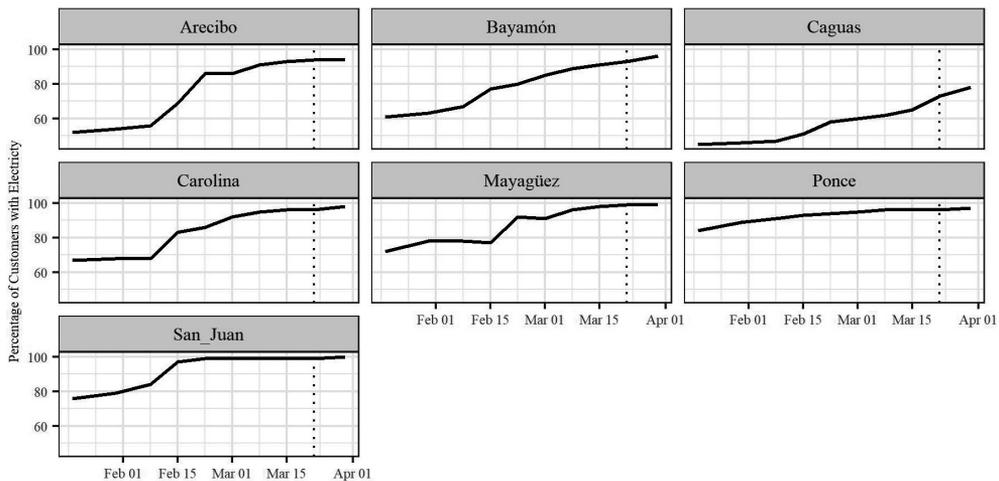

Dotted lines mark the six months anniversary of *Hurricane María's* landfall.

Source of data: US Department of Energy (2018).

FIGURE 2

**Customers with Electricity in PREPA's Administrative Regions
(January 19–April 1, 2018)**

These graphs' dotted lines marks the six months anniversary of Hurricane María's landfall. As noted above, efforts to restore elecricity to the Caguas Region lagged behind the other regions. As demonstrated in Figure 3, over 50,000 customers in this region did not have access to electricty on March 20, 2018 (US Department of Energy, 2018).
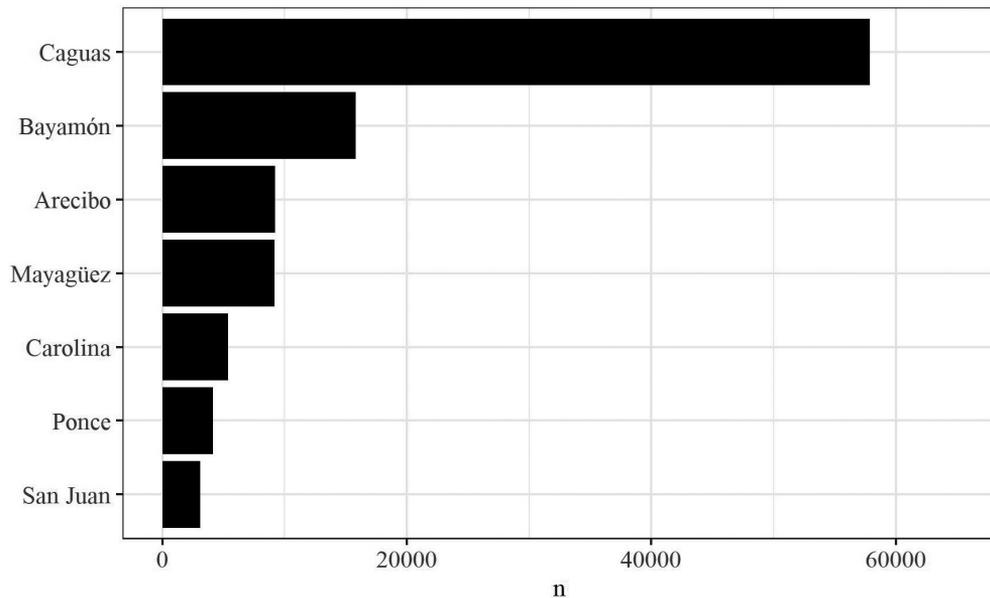
Source: US Department of Energy (2018).

FIGURE 3

Customers with Electricity in PREPA's Administrative Regions

In early March 2018, I traveled to Puerto Rico to research the USACE's mission to restore electricity to the island. I had the opportunity to interview several USACE personnel, including Lieutenant Colonel Cullen Jones, who at the time was the Deputy Commander For Task Power Restoration. One of my interviewees shared with me a map with the estimated percentage of clients with electrcity in each of the municipalities. This map was prepared for a briefing the USACE organized with Puerto Rico's governor and mayors on the reconstruction of the electricty system (Chasteen, 2018). In Figure 4, I reproduce this map and I highlight the 10 municipalities with the lowest number of customers with electricity on March 1, 2018.

While this map does not capture the situation in the municipalities at exactly the six months mark of Hurricane María's passing, conditions in the worst affected municipalities did not dramatically improve in 20 days. Indeed, many of these towns' customers were not reconnected to the grid for serveral months (Fernández Campbell, 2018). Thus, this map can help us estimate which municipalities had the highest number of customers without electricity.

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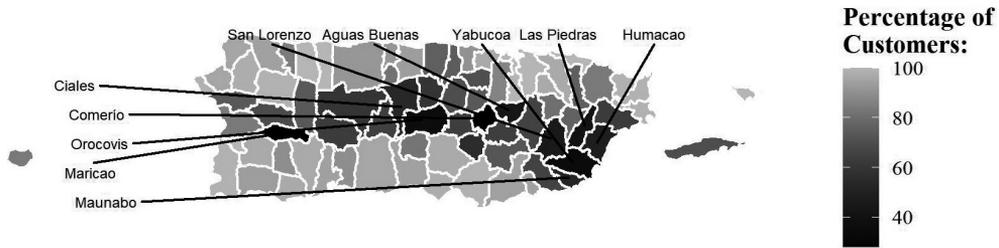
Referenced municipalities are the ones with the most customers without electricity (Chasteen 2018).

Figure 4

Estimated Percentage of Customers with Electricity by Municipality on March 1, 2018

Even though Begnaud's «open call» included many open-ended questions without a distinct answer, I use Facebook users' responses to evaluate the collective wisdom of this crowd. Using *quanteda*, I can extract information from the original corpus to explore users' description of the situation in Puerto Rico and to test whether the reconstruction of the electricity system was one of Puerto Ricans' top concerns. In addition, I mine references to specific municipalities in the electricity corpus to see whether they are the ones with the highest number of customers without electricity. I also aggregated these references by PREPA administrative region to test whether the crowd's collective opinion corresponded with the challenges described above. The next section documents my investigation's main findings.

2.2. Findings

On March 16, four days before the six-month anniversary of Hurricane María's landfall, Begnaud asked his Facebook followers the following open-ended questions:

> I have 35 hours to get what I need to do. That means I need to see as much as I can, interview as many people as I can, report, capture... We want to get a sense of what life is like in the island... I need to know from you where you think we must go and must see. Where are things getting better? Where they are still deplorable?

A computational text analysis of the original corpus exposes four overarching themes. First, 37 percent of the comments pointed out that many people across the island did not have electricity. The responses also mentioned individuals' lack of access to potable water. The second theme was commentators' expressions of

gratitude for Begnaud's reporting and his commitment to Puerto Rico's plight. Third, these responses captured the people's frustrations with the government's inability to meet the public's needs. Finally, 11 percent of the comments asked Begnaud to ignore San Juan and other major metropolitan areas and focus his reporting on the challenges faced by the communities in the island's mountainous interior.

Table 2 includes a list of the top 20 words in the original corpus, their frequency, their rank, and the number of «comments» that mention each word. Figure 5 is a wordcloud, constructed with the top 50 words mentioned in this corpus. Both the table's contents and the wordcloud echo the four observations noted above.

TABLE 2

**Top 20 Words Mentioned in the Corpus
with All the Facebook Comments**

Feature	Frequency	Rank	Number of comments referencing the token
still	853	1	669
go	668	2	581
people	637	3	444
island	624	4	471
power	553	5	425
david	529	6	514
thank	495	7	442
please	452	8	392
yabucoa	414	9	375
water	395	10	310
electricity	380	11	326
help	378	12	303
puerto_rico	325	13	262
many	319	14	248
without	316	15	271
need	277	16	238
can	263	17	217
humacao	250	18	235
pr	242	19	205
back	233	20	207

Figure 5

Wordcloud of the Top 50 Words Referenced in the Corpus

While these two visualizations help us understand which are the top words in the corpus, these analyses fail to capture the context of these interactions. To verify that the lack of electricity was one of the commentators' main concerns, I created a feature co-occurrence matrix (FCM) to understand the interrelationships between the top 35 terms.

Figure 6

Feature Co-Occurrence Matrix of the Top 35 Words in the Corpus

The darker lines show the interrelationship between the words: «still», «without», «power», «electricity», «people» and «water». The plot also shows the connection between «david» and «thank», demonstrating Begnaud's followers support for his reporting. In addition, we can see the links between «help» and «need» as well as «please», «go», «yabucoa» and «humacao» – the last two are the names of two coastal municipalities where Hurricane María made landfall. This FCM demonstrates that lack of electricity was one of the main issues raised by individuals who responded to Begnaud's «open call.»

Having established that Puerto Ricans were especially frustrated with the slow reconstruction of PREPA's electrical grid, I now to turn to test whether the responders' collective wisdom correctly determined which municipalities had the highest number of customers without electricity. I also clustered these responses using PREPA's administrative regions to decide whether their collective judgement matched the conditions described in Figures 2 and 3. From this point, I analyze the electricity corpus. This approach reduces some of the noise in the collected data. For example, Vieques is the fourth most referenced municipality in the original corpus. While it was mentioned 132 times, many of these responses were not related to the condition of the electrical grid. In early March 2018, the USACE's estimated that 70 percent of Vieques's residents had electricity. While many Facebook users did talk about the electricity situation, the majority of the comments raised other issues as well.

Using *quanteda's* «keyword-in-contexts» function, I noticed that many respondents criticized the lack of basic health services. Others expressed frustration with the ferry service between Vieques and the Puerto Rican mainland, which had limited the residents' access to different types of commodities (Benzel 2018). Even though Begnaud did not visit Vieques in March, he did so in September when he returned to Puerto Rico to report on the one-year anniversary of Hurricane María's landfall (CBS News 2018). In comparison, Vieques was mentioned 49 times in the electricity corpus. These comments acknowledge that many of the municipality's residents had electricity, but they were concerned by the USACE's inability to repair the undersea cable that connects Vieques to PREPA's grid. While diesel generators owned by the US federal government were providing electricity, many Facebook users noted that it was not clear when «permanent power» would be reestablished.

Like Vieques, Utuado faced multiple challenges. It was mentioned 172 times in the original corpus. Although 61 of these references are connected to customers without electricity, other comments expressed frustration with the slow reconstruction of the bridges Hurricane María destroyed. Some responses also noted residents' lack of potable water, which at the time was a big challenge in Utuado and many of the towns in the island's mountainous interior (Metro PR, 2018).

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Table 3 lists the top 20 municipalities referenced in the electricity corpus. It also includes a column featuring the number of times each municipality was mentioned. In addition, the table includes a column detailing PREPA's estimated number of customers without electricity on March 1, 2018 (Chasteen 2018) and a column that categorizes each municipality in one of PREPA's seven administrative regions.

TABLE 3

**Top 20 Municipalities Mentioned in the Corpus
with All the Facebook Comments With Words Associated with Electricity**

Municipality	Frequency	PREPA's Estimated Percent of Customers Without Electricity (Chasteen 2018)	PREPA Administrative Region (AEE 2021)
Yabucoa	173	65%	Caguas
Humacao	115	51%	Caguas
Utuado	61	40%	Arecibo
Caguas	57	34%	Caguas
Vieques	49	30%	Carolina
Orocovis	46	64%	Caguas
Las Piedras	40	59%	Caguas
Bayamón	33	13%	Bayamón
Comerío	33	72%	Caguas
Morovis	32	40%	Arecibo
Naguabo	32	37%	Caguas
San Lorenzo	32	54%	Caguas
Jayuya	27	35%	Arecibo
Ciales	26	46%	Caguas
Maunabo	26	48%	Ponce
Naranjito	22	26%	Caguas
Rincón	21	1%	Mayagüez
Cayey	20	27%	Caguas
Corozal	20	30%	Bayamón
Barranquitas	19	36%	Caguas
Juncos	18	23%	Caguas

Overall, the collective wisdom of the Facebook users who responded to Begnaud's «open call» adequately identified many, but not all, of the municipalities with the highest number of customers without electricity. There were three problems with the comments' recommendations. First, despite the fact that 72 per–cent of Maricao's customers lacked access to electricity, this municipality was only referenced four times in the corpus. In contrast, Comerío, which had the same percentage of customer without electricity, was referenced 33 times. Second, Aguas Buenas was not listed in Table 3 because it only got 17 mentions and did not

make it into the top 20 most referenced municipalities in the corpus. However, only 50 percent of this municipality's customers were connected to the grid. Third, although Rincón was mentioned 21 times, 99 percent of its customers had electricity. Using *quanteda's* «keyword-in-contexts» function demonstrates that some of these comments, while making a reference to the challenges associated with the reconstruction of the electrical system, mentioned Rincón as a place where things were «getting better». Nevertheless, several comments did say that some of the town's residents lacked access to electricity.

These problems raise some important questions regarding Facbook users' individual judgements. These opinions could have been skewed by the following three factors. The first factor is a town's popularity. For example, Rincón, Humacao, and Vieques are popular tourism destinations. Less well known smaller communities may have less public attention. Second, media coverage could have shaped individuals' knowledge of the situation in Puerto Rico six months after Hurricane María made landfall. While I did not analyze newspaper stories in the days leading to this anniversary, some Facebook users who responded to Begnaud's «open call» shared links to news stories describing the situation in Yabucoa and Humacao. These two municipalities were the first to experience Hurricane María's strongest winds. Third, many of these Facebook users' recommendations were based on their own personal connections to certain municipalities. Thus, a municipality's population can influence the crowd's collective judgement. For example, while 72 percent of Maricao's customers lacked electricity, the town's population represented 0.17 of Puerto Rico's estimated population in 2017. In comparison, Bayamón's population represents 5.4 percent of the island's estimated population. Because 13 percent of Bayamón's customers were not connected to the grip, it is very likely that the number, and not the percentage, of customers without electricity is higher in Bayamón than in Maricao. Hence, this could explain why references to Maricao were lower than other municipalities with bigger populations.

It is important to re-emphasize that the USACE and PREPA did not publicly report how many customers had access to electricity at the municipal level. The figures I used were only shared with Puerto Rico's governor and mayors. This information was shared at the regional level (US Department of Energy, 2018). Thus, to further test these Facebook users' collective knowledge, I aggregated all the municipalities mentioned in the electricity corpus and clustered them in accordance with PREPA's administrative regions. As illustrated in Figure 7, and keeping in mind Figure 3's statistics, more than 50 percent of all references to Puerto Rico's municipalities in the electricity corpus were located in the Caguas Region, which had the highest number of customers without electricity six months after Hurricane María made landfall.
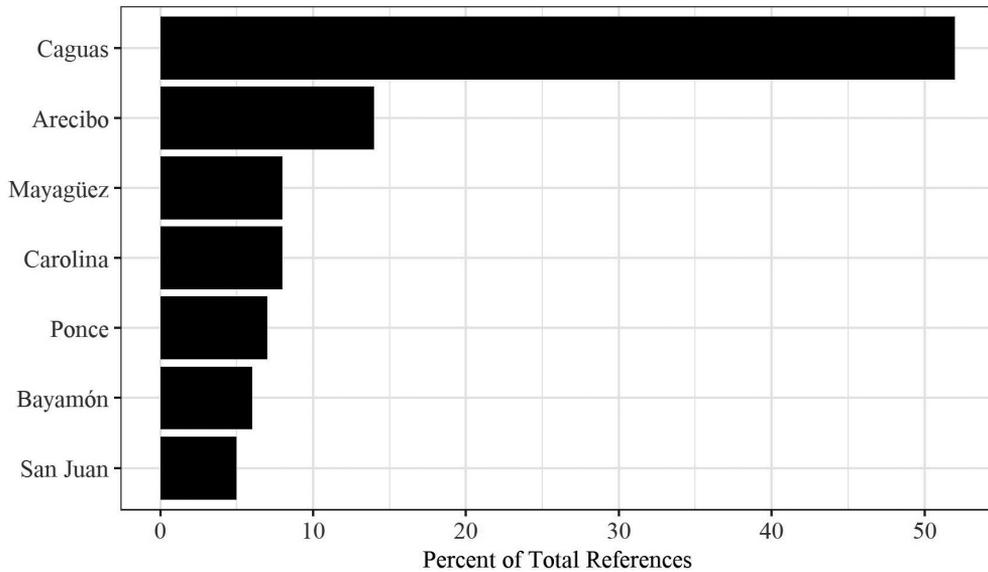
Total Number of Referenced Municipalities in PREPA's Administrative Regions

Although these Facebook users' collective judgement was accurate in this respect, as noted in Figure 3, the region with the second highest number of customers without electricity was the Bayamón Region, followed by the Arecibo Region. Figure 7 shows that these Facebook users' collective opinion failed to capture this reality.

Based on these findings, we can determine that the Facebook users' collective opinions correctly capture many of the frustrations Puerto Ricans had with the USACE's and PREPA's efforts to rebuild the electrical system and with the government's inability to meet the public's needs. The comments also captured these users' appreciation for Begnaud's journalistic style and his willingness to return to Puerto Rico to report on the island's challenges six-months after Hurricane María's landfall. While it is true that the Facebook users' collective opinions failed to precisely rank the municipalities and regions with the highest number of customers without electricity, their estimates were not incorrect. Despite Begnaud's open-ended questions and the lack of public data detailing the number of people without electricity at the municipal level, my text analysis of the comments demonstrates Facebook users' deep knowledge of the island's communities and their profound familiarity with the circumstances many Puerto Rican households faced during this time period. The responses also indicate that

these users correctly estimated a majority of the municipalities with the highest number of customers without electricity. Their collective response also pinpointed the Caguas Region as the one with the highest number of customers not connected to the electrical grid.

In the end, Begnaud's experiment with crowdsourcing helped his team decide which towns in the island to visit, who to interview, and which issues to cover (2018d). Begnaud and his team spent little time in San Juan and other major cities, opting to visit smaller towns in the island's mountainous interior and several communities in the southeastern coast. His experience with crowdsourcing was so positive that he used this approach in two more stories connected to Puerto Rico's recovery post-María.

3. **Conclusion**

Two questions informed this investigation. The first examined why journalists and media organizations have used crowdsourcing methodologies. While the rise of the Internet and the growth of social media have helped journalists employ different crowdsourcing methodologies to inform their reporting, executing these is not easy. Begnaud's experience, echoing some of the literature reviewed in part one of this article, indicates that journalists need to be able to establish a connection with their audience. While building a strong social media following is one step in this process, journalists must also cater to their followers' needs, sharing with them stories that aligned with their interests and values. Only then can journalists expect to use crowdsourcing to tap their followers' collective knowledge.

Begnaud did not set out to grow his social media following when he arrived in Puerto Rico. His reporting of Hurricane Harvey's impact in southeastern Texas was like stories that he produced in Puerto Rico. The difference was that Begnaud was *one of many* journalists covering Hurricane Harvey, while in Puerto Rico he was *one of a few* reporters that stayed in the island for an extended time period. Thus, Begnaud became the only source of information for many Puerto Ricans in Puerto Rico and in the continental US. This experience encouraged him to rethink his journalistic practices and to actively use his social media accounts to hold political leaders accountable and to give voice to Hurricane María's victims. This, in turn, helped him grow his audience, build a special bond with his followers, and emboldened him to explore other ways to report on Puerto Rico's post-hurricane challenges. Begnaud's experiment with crowdsourcing journalism is an outcome of this process.

Begnaud's work and his willingness to reimagine his journalistic style earned the praise of his colleagues. In 2018, Begnaud won the George Polk Award in

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Journalism for public service, and he was awarded the First Amendment Leadership Award in 2019 (CBS News, 2021). The organizers of the 2018 Puerto Rican Parade, one of New York City's biggest events, honored Begnaud for his reporting of Hurricane María and its aftermath (CBS New York, 2018) and its organizers conferred him the special title of «Puerto Rican Champion» (NPRDINC, 2018).

This article second question considered whether the responses to Begnaud's «open call» accurately described the island's challenges. One of the reasons journalists experiment with crowdsourcing is to tap on what Surowiecki (2005) aptly calls the «wisdom of the crowds». In spite Begnaud's open-ended questions, using a «text-as-data» approach, my analysis of the responses demonstrates that these correctly captured many of the island's challenges. Using the USACE and PREPA's data on the number of customers with electricity, I demonstrate that these individuals' collective knowledge estimated most, but not all, of the municipalities and the regions with some of the highest number of customers without electricity. The results of Begnaud's experiment helps explain why journalists should consider ways to include crowdsourcing methodologies in their reporting toolbox.

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