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Published online: 10 Feb 2025.

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Fostering Civic Engagement on "Ghana X": An Analysis of Data-driven Journalistic Practices of Mainstream and Peripheral Media Actors

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ABSTRACT

This study employed qualitative content analysis to explore data-driven journalistic practices employed by mainstream and citizen journalists on X (formerly known as Twitter) and how these practices foster civic engagement among Ghanaian X users. The study was grounded in the materiality, performativity, and reflexivity framework of data journalism and the civic engagement model. The findings were that the main themes of data-driven narratives on X were politics, socioeconomic discourse, and particularly economic metrics. Materiality and performativity showed up in the human agency of journalists and in the skills and expertise of those who contextualise and interpret the data. Data journalists liaise with allied data production specialists to convert raw data into data artifacts to tell stories. Ghanaian X users actively used the offered data stories to participate in civic arguments and discussions on social media. They back data stories with personal anecdotes. Through the proactive deployment of surveys, the creation of X polls, and other cooperative efforts, the examined narratives illustrated the performativity of data journalism as a technique that subverts power structures. The study provides evidence for the important role of peripheral actors in data journalism and how their efforts drive civic discourse to potentially drive tangible societal transformations.

Introduction

Traditional media outlets, through the production of news and other journalistic practices, have long played a central role in shaping public discourse, mobilising public action and fostering civic engagement (Ahmad 2016; Barnett 2011; Hao, Wen, and George 2014). But as a result of digitalisation's impact on the media landscape, competing new media have emerged, and legacy media have frequently been compelled to integrate digital platforms to hold onto their rapidly declining audience (Reveilhac and Morselli 2020).

The above studies resonate with Ghana's context where Facebook, WhatsApp, and X are among the most popular social media platforms where users consume news daily (Sanny and Selormey 2020). According to Sanny and Selormey (2020), the majority of Ghanaians believe that these platforms make them more aware of current happenings and help them have more impact on political processes. Other Ghanaian scholars have also found that to fulfill their democratic function and to serve the thronging audience members who prefer to consume media content via digital platforms as well as to profit from their affordances, legacy media have had to incorporate digital methods and platforms into their practices (Yeboah-Banin and Adjin-Tettey 2023).

One of the main motivations of data journalism as a subset of broader journalism practice is democratising public interest data to audiences. Heravi (2019) describes data journalism as finding stories that are of interest to the public in data and presenting these stories most appropriately for public use and reuse. According to Appelgren and Nygren (2017), the utilisation of open source and public data in data journalism practices guarantees thematic and contextualised news reporting. In addition, data journalism provides a platform for "resistance and power where voices are threatened to be silenced, but activism, creativity, and collaboration occupy the centre stage in these marginalised spaces" (de-Lima-Santos and Mesquita 2021a, 110).

Mutsvairo, Bebawi, and Borges-Rey (2020) argue that adopting data in journalism as a practice is not new but its evolution has been boosted by the significant development of computing power, the accessibility of open data, and new tools for processing it. However, in recent years data journalism has emerged as a distinct genre of journalism, sparking calls for research into its unique identity in non-Western contexts and grounded in their cultures (Mutsvairo 2019). This is because in non-western contexts like Ghana, while some basic practices may exist, the practices around data journalism may differ due to specific constraints that are prevalent such as, financial resources required to invest in technology, newsroom capacity to hire skilled data scientists, and legally-mandated access to data. Thus, for this study, we submit that data journalism is journalistic stories told with the aid of public interest data, where journalists uncover connections of critical socio-political issues to the data. Such stories can be considered data-driven because the source of the news in its raw form is public or user-generated data which can be interrogated by the public since it is open source and transparent.

The lack of Freedom/Right to Information laws also results in data censorship and the criminalisation of unapproved data (Adjin-Tettey 2023; Appelgren et al. 2020), revealing the important role data accessibility plays in journalism in ensuring the accountability of public officers (Adjin-Tettey 2023). Thus, for some Global South countries, some of the important data journalism work has been conducted by indigenous non-governmental organisations as journalists tend to avoid the dangers involved in doing journalism, while civic technologists make data accessible to the public in certain contexts (Appelgren et al. 2020; Cheruiyot, Baack, and Ferrer-Conill 2019). It is our considered view that the gap that exists can be filled by peripheral media actors, like citizen data journalists, who are likely unencumbered by the restrictions their mainstream counterparts face.

Problem

This study proceeds from the assumption that the affordances of digital platforms like X to citizen and mainstream journalists combined with the interactive, collaborative, data-centric features of data-driven journalism have the potential to create interesting forms of African data journalistic practice and novel ways for citizens to participate in civic conversations. Despite the increased scholarly interest in the identity and practices of data journalism in non-Western contexts, the relatively few studies conducted in Africa have focused on the practice of data-driven journalism by journalists in print newsrooms in contexts such as Nigeria, Kenya, South Africa, and Tanzania (Sackey, Asiamah, and Osei-Mensah 2022) as well as the exploration of partnerships with peripheral actors (Cheruiyot, Baack, and Ferrer-Conill 2019). However, less scholarly attention has been paid to the evolution of this journalistic practice across new media platforms in these contexts.

Thus, this study aimed to analyse some relevant X accounts to explore data-driven journalistic practices that are leveraged on X to empower and engage Ghanaian X users about issues that affect them and other issues of public concern. To arrive at the objectives, the study was guided by the main question:

> RQ1. Which prevailing themes emerge from data-driven stories shared on X by mainstream and citizen journalists in Ghana, and how do materiality, performativity, and reflexivity manifest in the engagement strategies employed in the process to enhance civic engagement?

Literature Review: Peripheral Actors and Data Journalism

Data journalism requires unique data skills and knowledge which some journalists may lack (Appelgren et al. 2020). For this reason, journalists and citizen journalists sometimes rely on those with the requisite skills to help them analyse and present data in easy-to-understand ways. Also, peripheral actors like citizen journalists who may have backgrounds in data analysis/analytics or who are purely data enthusiasts use their skills in data analytics and communication to share data-driven stories for their followers to engage with them. Importantly, Cheruiyot, Baack, and Ferrer-Conill (2019) submit that African peripheral actors involved in news production and dissemination, like data journalists, consider their local and national origins when adopting data journalism practices. This means that consumers of content shared by citizen data journalists are likely to better appreciate and engage with the content.

The phrase "citizen journalism" gained popularity following the 2004 South Asian tsunami, when international news media largely relied on "amateur" images and videos from non-journalists and eyewitness accounts to report on the disasters (Allan 2013; Zeng et al. 2019). However, Hájek, Stefanikova, and Allan (2014) argue that the concept of citizen journalism is as old as journalism itself, having emerged from the decision of ordinary people to pursue journalistic activities in addition to the work that journalists perform, particularly when journalists are not present. Allan also prefers to categorise this type of journalism as citizen witnessing, contending that those that we consider "professional journalists" are also citizens (Allan 2013). We adapt the working definition of citizen journalism proposed by Wall (2019),

which is the creation of original media material by peripheral actors to foster community development (through civic participation) and occasionally bring about positive transformation of society. In this study, we consider citizen journalists in Ghana (as well as mainstream journalists) who share data-driven content on X.

The rise of (independent) citizen journalists can be attributed to professional news organisations' failure to keep up with the changing public communication scene (Wall 2019) and technological affordances (Allan 2015). Citizen journalists play an important role in fragile democracies and in contexts where democratic life is absent (Zeng et al. 2019). For this reason, some have pushed for the expansion of citizen journalism to complement the work of the media in a democratic society as fragile as Ghana's (Abdullah 2021). Thus, in Ghana, mainstream news organisations include news stories of ordinary citizens in the form of film footage of prominent events in local communities, public comments, and suggestions on social media platforms in their prime-time news (Wiredu 2022). Citizen journalists in Ghana also share large volumes of journalistic content on digital platforms, like as X, which is heavily interacted with and consumed.

Data journalism is often most effective when it engages the dominant sociopolitical issues of the audience, which are defined by the social and political realities of a people (Peters 2022). Sociopolitical issues could potentially have a detrimental impact on personal well-being and also pertain to issues that concern governance, government, and public affairs. We argue that socio-political discourses on X contribute to positive transformation because they provide opportunities for positive evidence-based dialogue. This is especially true when citizen data journalists and mainstream media operating under the norms of citizen witnessing and transparency share data-driven, evidence-based stories on X to enhance civic discourse.

We conceive of citizen data journalism as a community-driven approach to data-driven reporting that empowers marginalised groups (de-Lima-Santos and Mesquita 2021a) and peripheral actors in journalism to tell their own stories. It leverages collaborative practices (Dodds et al. 2024) and digital tools while focusing on local issues and developing data skills within communities (de-Lima-Santos and Mesquita 2021a). This form of journalism challenges existing power structures by enabling community members and groups to collect, analyse, and present their data giving voice to overlooked perspectives and inventing new routines (de-Lima-Santos and Mesquita 2021b).

Research on how citizen data journalists use engagement strategies to curate and share data-driven stories on X is warranted because it is changing how mainstream media produces and disseminates news (Wiredu 2022). Significantly, the utilisation of participatory platforms such as X by citizen journalists and mainstream journalists fosters a greater sense of locality by increasing collaboration and offering a means of engagement in socio-political discourses (Allan 2007; Mututwa and Mare 2021). Besides, data-driven stories are by their very nature evidence-driven and could potentially stem the spread of fake news and misinformation which is sometimes linked to the practice of citizen journalism and provide the needed evidence for those who interact with it to engage in productive socio-political discourses and civic participation.

Theoretical Framework

Data Journalism as Materiality, Performativity, and Reflexivity

Technologies to quickly process data have proliferated alongside the superabundance of data that modern societies produce (Borges-Rey 2016). Consequently, the affordances of technologies as well as data science reasoning and methodology can be utilised by media to ensure accountability and responsive governance (Adjin-Tettey and Braimah 2023) and to hold data organisations accountable (Borges-Rey 2016). As the trend advances, conceptualizations have been developed to explain how data journalists and other peripheral actors, such as citizen journalists and data enthusiasts, use data power, as well as the materiality and professional practice of data journalism.

These actors "work on the periphery of the profession while directly contributing content or products to the creation and distribution of news" (Holton and Belair-Gagnon 2018, 73). The media of peripheral actors are referred to as "interloper media," which Eldridge (2018, 858) described as a subgroup of journalistic players and digital native media who come from outside the traditional journalistic profession but whose work represents the identities, roles, and socio-informative purposes of journalism. Examples of peripheral actors are technologists who automate newsroom routines (Wu, Tandoc, and Salmon 2019), bloggers and blogs that produce a variety of media content that includes journalism (Eldridge 2018), data scientists who interpret web analytics data (Belair-Gagnon and Holton 2018) as well as those producing user-generated news (Tong 2015)—have been referred to in different ways. Citizen data journalists fall under peripheral actors of journalism, contributing journalistic content and getting followers or audiences to consume and engage with it.

Largely, four frameworks - materiality, performativity, reflexivity, and power - have been the explicative frameworks to understand how data as a material entity intermediates the professional practice and mindsets of data journalists (Borges-Rey 2016, 2020; Chiumbu and Munoriyarwa 2023). Borges-Rey (2016) draws on Foucault's conceptualisation of power strategy and argues that the materiality, performativity, and reflexivity of data journalism inevitably must interact with an emerging breed of power holders including "big tech" and public agencies.

Materiality provides a lens through which to view how the tools and technology of data journalism interact, affect, and are influenced by editorial decisions and processes (Hermida and Young 2019). According to Borges-Rey (2020), two important factors— the human agency of journalists and the knowledge and prowess of experts who contextualise and make sense of the data—determine the material identity of the data. The practice of data journalism is also made easier by external elements like algorithms, automated systems, related software, and programming skills. Then there are other factors, such as regulations governing access to information, which offer a way to obtain data (Borges-Rey 2020) from which interesting stories could be told. In essence, materiality refers to how data is obtained, and it may be said to be "the chief definer of data journalism" (Chiumbu and Munoriyarwa 2023, 845).

Performativity refers to the skills needed to make sense of the data and newsroom infrastructures (Chiumbu and Munoriyarwa 2023). Given that journalistic performativity is rigorously adopted as axiomatic standards and norms, the performativity of data

journalism may inspire trust or suspicion. Thus, the importance of the data source and avoiding human bias increases. To ensure standards are met, journalists collaborate closely with subject matter experts from various fields to make reliable judgments. They also must disclose the information sources they use. When they lack the necessary abilities, journalists will occasionally adopt open-source principles and look for internal or external collaboration to, first, get over these constraints and, second, simultaneously originate and explain occurrences.

The other component of data journalism is reflexivity, which is "the way different kinds of linguistic, social, political and theoretical elements are woven together in the process of knowledge development, during which empirical material is constructed, interpreted and written" (Alvesson and Sköldberg 2009, 5). According to Chiumbu and Munoriyarwa (2023, 845), "the interaction between materiality (access to data) and performativity (ability to interpret and use the data) leads to journalists' reflexivity (entrenched norms, values and mindsets)". Thus, Borges-Rey (2016, 2020) argues that the continual interaction of the materiality of data and data journalists' performativity consequently mediates the reflexivity of these journalists.

As data journalists and enthusiasts on X work with different organisations and individuals to fulfil their mission of informing their followers on X, we seek to learn about how materiality, performativity and reflexivity are expressed through collaborations, engagements and spaces created for discussion of data-driven stories.

Civic Engagement Model

Civic engagement refers to how members of the public engage in the affairs of their communities to better the lives of others or to influence the community's future (Ramasubramanian and Albrecht 2018). According to Radke et al.'s (2013) model, civic engagement entails using processes of public discussion, reflection, and collaboration to make creative decisions and take collective action on public concerns. According to Radke (2023), intentionality, procedures that facilitate sincere dialogue, introspection, and cooperation—as well as reliable data, suitable individuals, and constructive processes—are fundamental to successful civic engagement. Beyond these are the two essential partners – conveners and community.

In the context of this study, the conveners and the community working as partners in civic participation are the journalists and/or citizen journalists, and their followers or audiences, respectively. The conveners, journalists, and citizen journalists, create a collaborative environment by sharing credible data (in this case, data-driven stories), while their engagement practices may include working with people with the relevant knowledge to deconstruct that data and encouraging followers to share their views, responding to follower's comments and queries and asking questions.

Materials and Methods

Qualitative content analysis was used in the study. Using qualitative content analysis allows one to systematically examine and identify concepts, patterns, and larger themes within data to gain insight into the context and meaning of content, communication or data (Delve and Limpaecher 2023). Qualitative data is descriptive and depicts

qualities or characteristics. Qualitative data describes the feeling, nature, and look of a thing and addresses many blind spots of qualitative data. It can be obtained through in-depth interviews, focus groups, and observations. Data obtained through these means include photos, observation notes, interview transcripts, written accounts, videos, text messages and social media content, such as tweets, videos, posts, blogs and other social media content.

In this study, data-driven journalistic content produced by citizen and mainstream journalists that were shared on X was qualitatively analysed for dominant issues in data-driven stories, strategies employed in engaging with audiences, and the active and passive strategies used by young people to engage with data-driven stories.

Data Collection and Analysis

The data collection process involved purposively selecting users/accounts based in Ghana who used data journalism strategies to create data-driven stories and share them on X. For mainstream media we applied a keyword search of data journalism relevant terms such as "data stories", "infographic", "visualisation", "chart", "graph" of the top 10 most followed Ghanaian media organisations on X cited in a 2023 Social Media Index Report: TV3, GhOne TV, UTV, Joy News, Citi TV, GTV Sports Plus, Metro TV, GTV, Max TV, and Onua TV (Penplusbytes 2023). We purposively selected three of those mainstream accounts (@JoyNewsOnTV, @Citi973 and @tv3_ghana) and added a public interest news organisation (@fourthestategh) based on how active they are and how many data stories they published between 2022 and 2023. We chose the 2022–2023 data stories because they provided the most recent information for analysis. Additionally, as the Ghanaian presidential and parliamentary elections approached, there was a lot of interest in the economy and the statistics that supported its current state and other evidence-driven social issues. This led to an increase in accounts with data-driven stories during that time. We then contacted data journalists in the organisations mentioned above to recommend accounts of citizen journalists that they follow on X that fit the criteria. Citizen journalists were defined as individuals who are not mainstream journalists or do not work for a recognised media house and who participate in the gathering, reporting, evaluating, and distribution of information (Bowman and Willis 2003) and data-driven news/stories on X. We received 15 recommendations in total, and after vetting these accounts using the process earlier described, we selected eight accounts that fit our criteria.

The units of analysis were the data-driven tweets, the shares, retweets, comments, and the various forms of engagements accompanying the tweets of the 12 selected accounts. This consisted of 10 data-driven tweets from each account (or about 120 tweets in total), along with various forms of engagement like comments and retweets.

Data analysis involved inductive qualitative content analysis. This is a bottom-up approach that makes meaning through an analysis of the entire data set (Hsieh and Shannon 2005). The benefits of this strategy are that it provides an exploratory technique to address research issues; it is useful when there is minimal literature on the subject already in existence; and it aids in examining many perspectives and viewpoints on a subject (Hsieh and Shannon 2005). The inductive approach was deemed appropriate to use because the topic of the study has not been extensively investigated within the context of Ghana.

Thematic content analysis was employed to study the data identified. This involved identifying "thematic units" (McClelland 1975) that were not evident in the data. Guided by Delve and Limpaecher (2023), the following steps guided the process: data collection, immersion of self in the data, developing a codebook from the data and generating codes, determining coding rules, coding and categorisation of data-driven content and engagement patterns and analysing results.

Ethical Considerations

Only publicly available accounts were used as units of analysis. Since data were public, there was no need to seek the consent of account owners before analysis. However, the second author messaged account holders on X to inform them that their posts were being used for research purposes.

Findings

Summary of Accounts and Dominant Issues Covered

Twelve main accounts were included in the analysis. Table 1 below provides the descriptions of the accounts and the subjects they mainly discussed or produced content about. The analysis also included the tweets of users who engaged or used content created by these accounts.

The results revealed that the most frequently engaged data-driven stories were usually in the form of infographics, surveys, polls, commentaries, and short explainer videos. Figures 1 and 2 below are such posts shared by @CallmeAlfredo who got over 5,000 views within minutes of sharing.

@JoyNewsOnTV posted a short video with the following as a caption

Forests under siege: Data from Global Forest Watch indicates trees sitting on 1.41 million hectares of land, equivalent to half the land size of the Ashanti region, were destroyed across Ghana between 2001 and 2021. #NoToGalamsey (*Post of @JoyNewsOnTV on August 29, 2023* https://twitter.com/JoyNewsOnTV/status/1696562353435816037)

Data Sources for Data-driven Stories

A key consideration for data-driven journalism involves the source of data being used for the story or the engagement content. We found that the accounts that were studied sourced data from their followers on X or through local and international public data. For the former, we found that some accounts designed a Google form survey which was posted and shared on X and a quick casual way of eliciting views from followers was through conducting X polls. Figure 3 is a post that was shared by @readJerome eliciting information on the earnings and salary levels of Ghanaians based on which financial advice was to be given later.

Figure 4 (below) illustrates data and evidence from public sources.

There was also an X poll by @jakuuire eliciting the views of followers on the term limits of members of the parliament of Ghana.

Table 1. Accounts that shared data-driven journalistic content identified and studied.

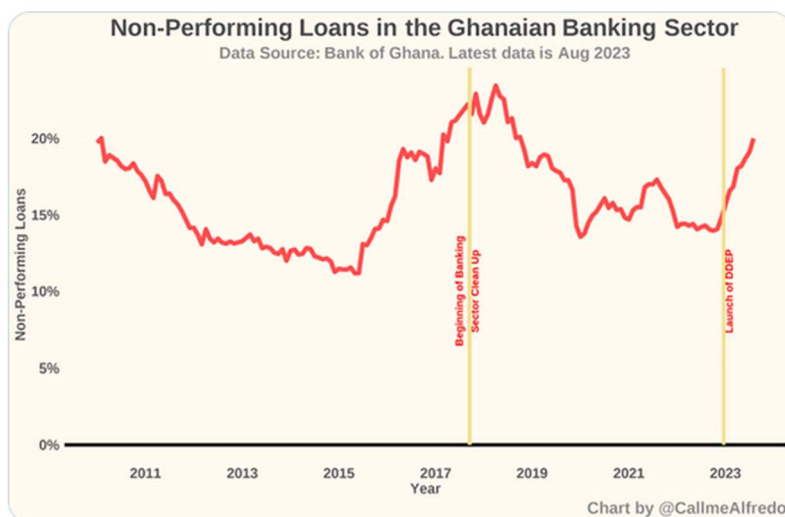| Name of account	Description	Followers	Subject covered
@readJerome	This account is manned by an economics and finance analyst who also manages and writes articles (mostly economic in nature) at https://ceditalk.com/	8,646	Finance, socio-economic conversations, including economic, price increase, national budgets, taxes, salaries, causes of economic migration (health service, rent, utility bills). Inflation
@callmealfredo	Data scientist and policy analyst. He also writes articles for online news sites.	8,845	Personal finance, health, education, sport, socio-economic related content, including price increase, national budgets, taxes, salaries, causes of economic migration (health service, rent, utility bills)
@Global InfoAnalytics	Reliable and Independent Opinion Research company in Ghana.	5,980	Politics and international relations, elections, social media analytics.
@Kenkeyindex	This account tracks and explains inflation trends using price changes of a food staple (kenkey) in Ghana.	279	Economy, food price inflation
@_edemkojo	Journalist with a background in finance, actuarial and data science	2,247	Economy, petroleum revenue, national imports and exports, and salary earnings.
@datadumpgh	This account describes itself as a "sporadic dumper of data"	918	Socio-economic content, including price increase, national budgets, taxes, salaries, and causes of economic migration (health service, rent, utility bills), inflation.
@jakuuire	The account holder describes himself as an African tech news content manager and a "data guy"	2,320	Housing/real estate, Government, economy, politics, finance, population, media industry trends.
@ObboatB	This account self-describes as someone "into #Data #Analytics and #Visualization"	689	Economy, politics, finance, and population.
@Citi973	Official account of Citi FM, an English-speaking radio station based in Ghana's capital	1,600,000	Economy, health, national debt, national revenue, road accidents, food prices, sports, salary earnings, elections, education (student enrolment, national examination results).
@JoyNewsOnTV	Official account of JoyNews, an English-speaking radio and television station based in Ghana's capital	1,100,000	Economy, climate, health, national debt, national revenue, road accidents, food prices, sports, salary earnings, elections, education (student enrolment, national examination).
@tv3_ghana	Official account of TV3 Ghana, an English-speaking television station based in Ghana's capital	22,500	Economy, national debt, health, national revenue, road accidents, food prices, sports, salary earnings, elections, and education (student enrolment, national examination results).
@fourthestategh	Official account of a news website described as a non-profit, public-interest investigative journalism project of the Media Foundation for West Africa	23,700	Economy, corruption, health, factchecking.

@jakuuire

Random Poll: Should Ghana MPs have term limits? i.e be restricted to a specified number of terms they can serve #Politics #Ghana (Post of @jakuuire on October 30, 2023 https://twitter.com/jakuuire/status/1719123446993420774)

One interesting account, @Kenkeyindex, tracks food price inflation using the price and weight of kenkey, a local corn-based meal, and collects data by buying and weighing kenkey from 32 communities in the Greater Accra Region as shown in Figure 5.

Figure 1. X post by @Callme Alfredo on "bad loans" in Ghana's banking sector.

For public data, we found that the most recurring sources were governmental sources susch as the Ghana Statistical Service, National Petroleum Authority, Motor Transport and Traffic Department of the Ghana Police Service, the Auditor General's report, local news media, global foreign news services like the BBC or Bloomberg and public facing research organisations like Afrobarometer.

Other tweets by other accounts also confirm how some users use publicly-available data to do interesting data-driven stories.

@callmeAlfredo

*Just a note that every data I tweet about is publicly available and verifiable. I have no access to any privately held info. When I have time, I go through different sources to find info published publicly (*Post shared by @callmeAlfredo on September 27, 2023 https://twitter.com/CallmeAlfredo/status/1707090918166401446*)*

@_edemkojo

*Out of the almost 688,000 workers on government payroll who draw salaries from the Controller and Accountant General, only 6,225 i.e less than 1%, earn a NET salary of over 10,000ghc. Infact, 80% earn 3,000ghc and below. Source: Ghana Statistical Service (*Post shared by @_edemkojo on May 8, 2023 https://twitter.com/_edemkojo/status/1655677380327768067*)*

Figure 2. X post by @citi973 on accident data in Ghana.

@jakuuire

Good morning. Here's a timeline of the perception of "corruption" of the Ghana Police from 2002 to 2022. Data is from @afrobarometer (Post shared by @jakuuire on October 31, 2023 https://twitter.com/jakuuire/status/1719267446689841315)

However, there were times when citizen journalists expressed frustration with data-producing organisations and what they perceived to be the general data averseness of Ghanaian and some African institutions.

@jakuuire

*I would kill for housing data in Accra. Especially historical data. I want occupancy rate for apartments and average cost for segmented areas in Accra. I wish we were more data-oriented in Africa. If we really think there's money laundering in real estate in Accra, the data will show it. That's how you create a transparency economy: Data (*Post of @jakuuire on October 28, 2023 https://twitter.com/jakuuire/status/1718341816523636789)

@CallmeAlfredo

*Dear @DSD_GHS, the update for June 19 had no table for testing data. And now we have testing data for the June 20 update. Is it possible to upload table 2 for the June 19 update as well to enable calculation of daily test positivity rates and other day/day changes? (*Post of @callmeAlfredo on June 21, 2020 https://twitter.com/CallmeAlfredo/status/1274802622378070017)
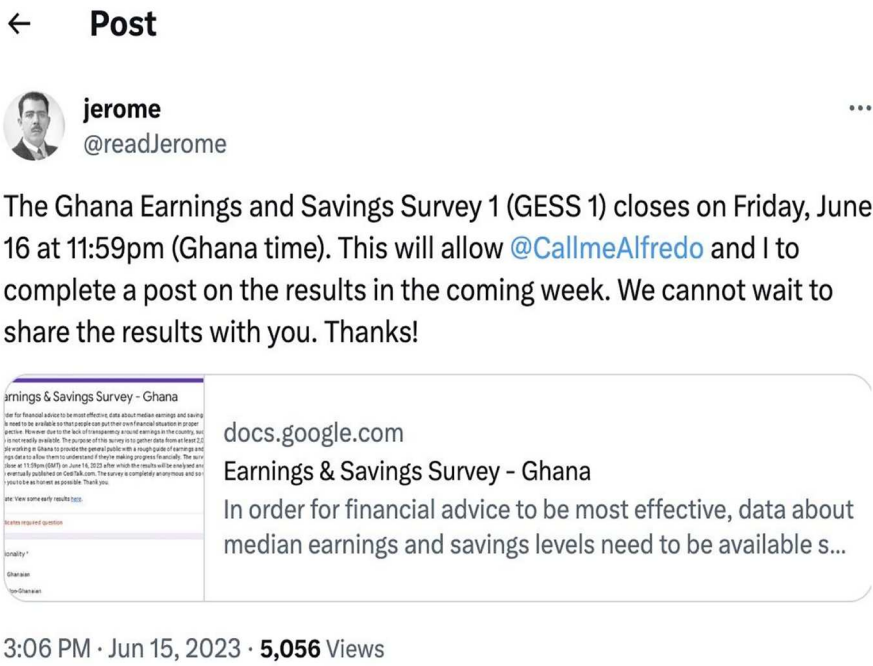
Figure 3. X post by @readJerome announcing his Ghana earnings survey call.

Table 2. Breakdown of engagement strategies to increase the reach of data-driven stories.

Primary data sourcing engagement strategies	Post-poll engagement strategies	Collaborative engagement strategies
Design surveys using an online survey tool to be shared with their Twitter account	X Spaces to discuss results/data	Repost other users' data stories
Reposts other users' surveys for their followers to respond to them	Quoting trending tweets with data content that provides better context	Tagging other data journalists/agencies/ enthusiasts
Creates X polls to invite the audience to weigh in on an issue	Offering advice based on data shared	Tagging the account of relevant governmental agencies to respond to queries on the data
	Posting performing stocks to back shared data	Sharing links to data stories to invite collaborations and feedback from related accounts such as graphic designers, programmers, data analysts

Experts in a range of disciplines who analyse public policy while working in policy development, consulting, etc., frequently read and share the data-driven articles and narratives published by citizen journalists. Occasionally, they also share data they may have, alert citizen journalists to it, discuss important analyses they have conducted, and urge citizen journalists to disseminate important discoveries from data analysis or even use their data to tell additional stories.

Citizen journalists also occasionally seek data-backed, analytical expert viewpoints on significant topics by tagging experts on X. For instance, on 6 December 2023, in response to a statement from the Bank of Ghana addressing Ghana's credit score, @CallmeAlfredo urged policy expert Bright Simmons to explain the performance of forex in Ghana to his followers, as evidenced in Figure 6.

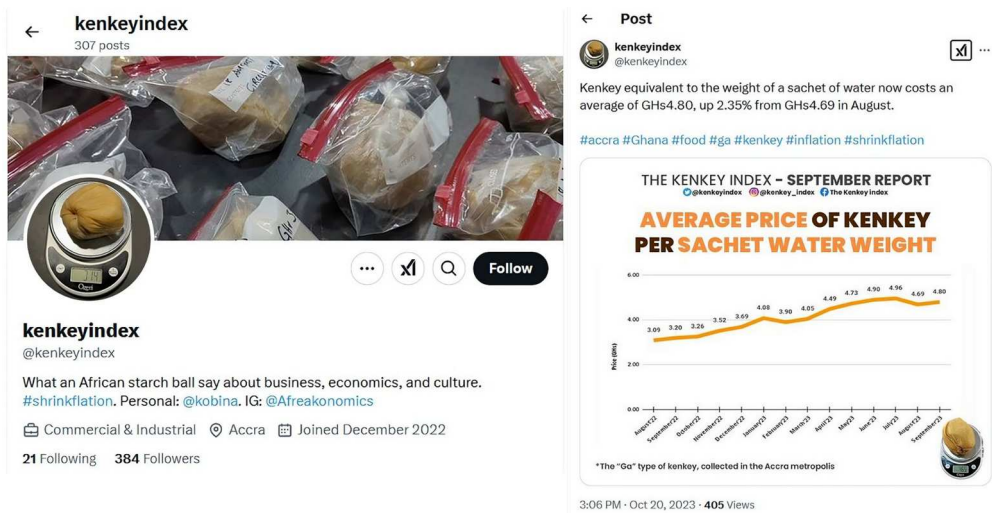**Figure 4.** X post by @fourthestategh shows data sourced from a public health facility.

Figure 5. X post by @kenkeyndex; A data-driven visual narrative story of the Kenkey Index.
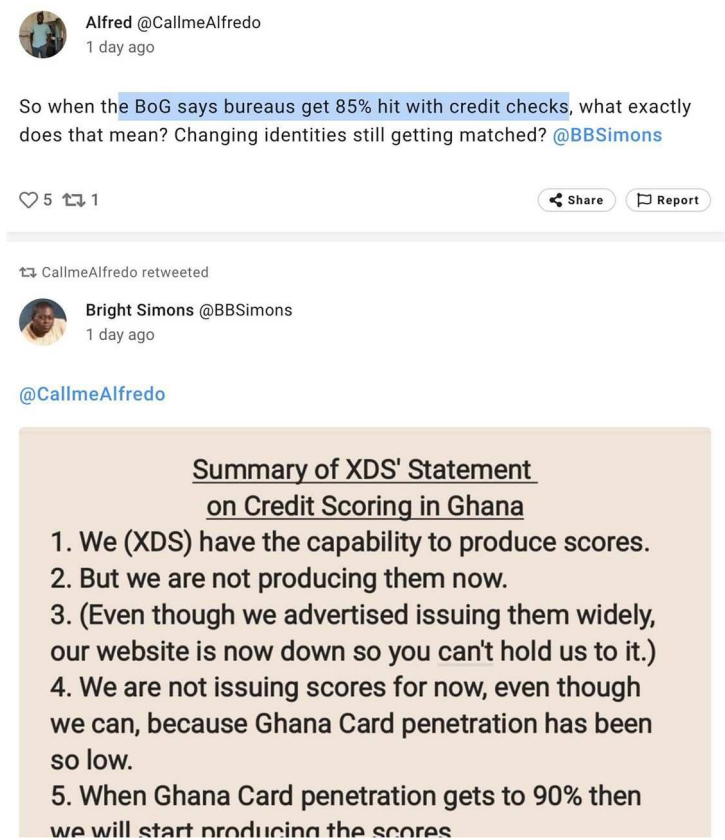
Figure 6. X post by @CallmeAlfredo requesting a policy expert's opinion.

Engagement Strategies Employed by Mainstream and Citizen Data Journalists

The affordances of the microblogging site enabled data journalists to employ varied means of grabbing the attention of their audience and sustaining interest in the data-driven news or conversation they present for engagement. We found that these engagement strategies could be grouped into: primary data-sourcing engagement strategies, post-poll engagement strategies and collaborative engagement strategies as shown in Table 2.

The following post by @readJerome encapsulates a cross section of the strategies described in the table. It shows his data source (primary data from a survey), describes the data content presentation and engagement strategies (X spaces, articles, charts), and shows the other accounts on the platform invited to collaborate with while sharing a link to the raw survey data.

I've received so much useful feedback on the survey results. We're planning two Twitter spaces. First one hosted by@DesmondBredu will be about personal finance - earnings capacity, savings, investing etc. We will dig into the results to see how we can improve our finances. The second one will be hosted by @ybsnroh and we will discuss the sociopolitical implications of the results. We'll
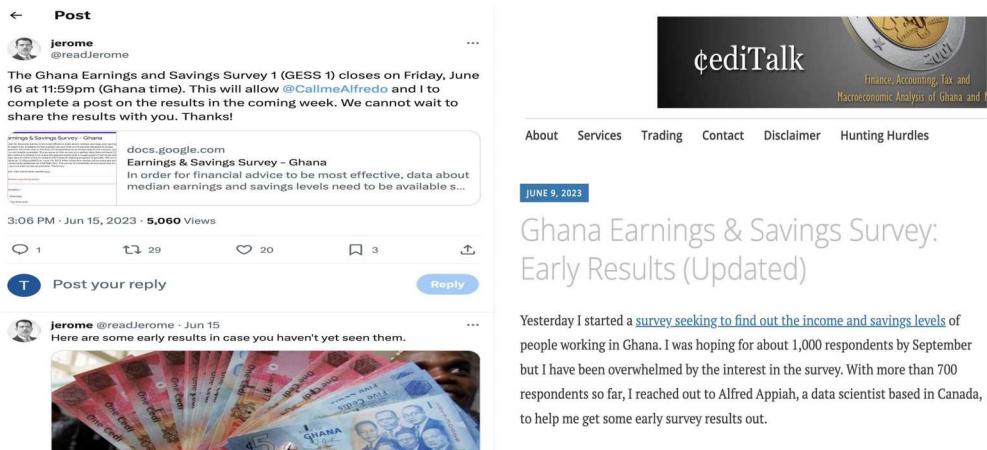
Figure 7. X post of @readJerome explaining the sourcing and publication of the earnings and savings data story.

> discuss wealth & income inequality, the role of the state, privatization & job creation, alternative economic models, industrialization etc.
>
> So please watch out for them. In the meantime, please read the article. It'll give much more insight. And right at the bottom is a link to *@CallmeAlfredo*'s GitHub where you can download the responses in a csv file, all the charts, as well as his R script. (Post of @readJerome on June 22, 2023 https://twitter.com/readJerome/status/1671890124500795394)

To assist in making sense of the data acquired, citizen and mainstream journalists, who may require the expertise of data analysts, often collaborate with data technicians/scientists to assist in data analysis. In some cases, while the surveys are still in progress, they work with data scientists to conduct preliminary data analysis and publish the results on X and other relevant digital platforms. This serves to both pique interest in encouraging more people to participate in the surveys and to give interested parties an idea of how the surveys are progressing and an early look at the findings as found in Figure 7.

Engagement Patterns of Audiences with Data-driven Stories

A crucial element of this study involved determining how audiences, particularly young people react or engage with these data stories which are meant to provoke civic awareness and conversations. We found that audiences use the data stories of these journalists and other data sources to support civic arguments or discussions on social media. Also, audiences supported data stories with personal evidence in a bid to relate to the data story. Some evidence from our data is presented in Figure 8.

In the quoted exchange below, @readJerome tries to address @abotiwine's call for a survey on lawyer salaries with results from his own data story earlier published.

> **Original post** *from @abotiwine*
>
> Hello Law Twitter, as promised, we will be conducting a survey on Friday on salaries and other working conditions for lawyers. We owe it to each other to make the profession better, especially for young lawyers so please be on the lookout for the survey. Your input

Figure 8. X user @bougiefeminist affirms @readJerome's data insight sourced from his survey.

is key! (Post of @abotiwine on October 25 2023 https://twitter.com/abotiwine/status/1717237240831615071)

@readJerome responding to the post with data from his study

In #GESS1, this was the distribution of income for people who chose "Legal Services" as their industry. 41% made < 5,000 cedis/month. Full report here https://tinyurl.com/3wtbx4ab *Use this tool by @its_comoo to generate your own report* https://tinyurl.com/54pn22zu (Post of @readJerome on October 25, 2023 https://twitter.com/readJerome/status/1717244275660923374)

Reply to @readJerome response *from @abotiwine*

Thanks man. Should be helpful but we're looking to gather more specific information about other benefits, correlation of pay structure to academic credentials, firm culture etc. Great job on this survey btw! (Post of @abotiwine on October 25, 2023 https://twitter.com/readJerome/status/1717244275660923374/quotes)

In a few instances some followers of these accounts cited these data stories in articles published by traditional media organisation like Ghana's *Business and Financial Times* and Aljazeera thereby increasing the reach of these stories from X to a wider audience. Journalist Anakwa Dwamena, a follower of @readJerome with the X account @kwatrekwa, wrote an article published by Aljazeera titled "Lack of safety nets hurt Ghana's most vulnerable as economic woes deepen" which cited @readJerome's GESS data and stories from the food price inflation data account @kenkeyindex. The link to the article was shared by @readJerome to his audience.

Great article by @Kwatrekwa on the impact of the economic crisis on people's livelihoods. Cites data from the *@kenkeyindex* and the Ghana Earnings & Savings Survey (GESS 1). (Post

of @readJerome on 5 October 2023 https://twitter.com/readJerome/status/1709913009139663187)

We found that while some followers were interested in the methodology employed to arrive at conclusions, others asked for clarity on the data collection procedures, where that information had earlier been provided. Some followers also expressed their interest in data stories by calling for similar data stories and sometimes made recommendations to extend the study to make it more representative. These requests and suggestions signal enthusiasm and the importance followers of accounts place on the work of mainstream/citizen journalists who are interested in telling data stories in simple terms.

@PaulAAgbodza

Great initiative Sir! Have you also compared your data with GSS's Population and Housing Census 2021, or GLSS 7 of 2017? Great charts by the Data Scientist. Ghana R Users Community could also make such charts. I have already downloaded the dataset and getting engaged with it.

(Post of @PaulAAgbodza on July 5, 2023 https://twitter.com/PaulAAgbodza/status/1676708756996890624*)*

@JicnivFarlordNx

If you have the time and resources, I suggest you do a new one. Extend the duration in order to increase the sample size. l enjoyed reading it. This is very informative. I wish we have [sic] a lot of data driven conversations like this in Ghana. Kudos bro.

(Post of JicnivFarlordNx *on June 22, 2023* https://twitter.com/JicnivFarlordNx/status/1671845592195055621)

@EricTheFest

Congratulations to you @readJerome and @CallmeAlfredo for this work. This is the kind of work we should take seriously, nationalise and make the sample more representative. In a serious country, findings like this would lead to action in policy to make our country better. Kudos. (Post of EricTheFest on June 21, 2023 https://twitter.com/EricTheFest/status/1671770782425309184*)*

Some people also advocated reform/policy actions based on the data story they were engaging with. Others also suggest other ways citizen/mainstream journalists could go about generating data for analysis

@KwabenaAbeam

Mostly because the government has placed over 70% of public workers salary below 5000 GH cedis. 5000 cedis could buy 500 cement bags in 2010. Now, 5000 cedis buys <50 bags of cement. The depreciation is sickening and workers ain't fighting for monetary value of their work.why?

(Post of @KwabenaAbeam on July 3, 2023 https://twitter.com/kwabenaabeam1/status/1675998180385628162)

@gamelmag

Great example of #crowdsourcing #opendata for actionable insights. Great job,

@readJerome! (Post of @gamelmag on June 21 2023 https://twitter.com/gamelmag/status/1671654736221687809)

Original post *from @CallmeAlfredo*

Say we put a list of all 170 1D1Fs in operation on here, it'd be easy for folks in the respective districts to check if they're actually in operation or not, correct? Would anyone be willing to do that as a contribution to demanding accountability?(Post of @CallmeAlfredo on November 27 2023 https://twitter.com/CallmeAlfredo/status/1729202279784538212)

Response *from @MacJordaN*

I can recommend volunteers from the @Barcampghana team to assist with this initiative in the various towns and districts we've held events in. cc: @Abocco

(Post of @MacJordaN on November 27, 2023 https://twitter.com/MacJordaN/status/1729207081868374143)

Discussion

We saw above in the literature review that previous studies have established the link between news consumption and civic-mindedness (Ahmad 2016; Barnett 2011; Hao, Wen, and George 2014), while other studies have suggested a decline in news consumption via traditional media particularly among the youth (Amadu et al. 2018; Fosu and Akpojivi 2015; Laor and Galily 2022). The literature also showed that social media platforms, such as X, on the other hand, are an increasing source of news for this same demographic (Schwaiger, Vogler, and Eisenegger 2022). The affordances of digital platforms, specifically their capacity for interactive engagement and facilitation of new modes of digital journalism present opportunities for a reversal in news consumption trends.

This study provides evidence, albeit exploratory and tentative given the small sample size and non-systematic methods used, that X as a media platform facilitates the production and engagement of data-driven news content by journalists (mainstream and citizen) and their audiences resulting in these audiences participating in civic-related conversations. The conveners on X are the mainstream journalists and citizen journalists. The convenors' methods for engaging followers include asking questions, answering followers' questions and comments, and collaborating with those who possess the necessary expertise to dissect the data. Furthermore, the patterns found serve to further reinforce the concepts of performativity, reflexivity, materiality, and power. These concepts inform follower engagement tactics that improve civic participation as well as the curation and deconstruction of data stories.

Our investigation aimed to shed light on the subjects that dominate data-driven journalistic narratives within the Ghanaian context and how materiality, performativity, and reflexivity manifest in the engagement strategies employed in the process to enhance civic engagement. Our findings underscore that these data-driven narratives primarily revolved around socio-economic conversations, politics, and specific economic indicators. The prevalence of topics like appropriate salaries, inflation, and the national budget speaks to the impactful role of data-driven stories in shaping public discourse on critical societal matters. Accounts with data analysis and economic expertise such as @readJerome and @callmealfredo emerged as significant contributors to discussions on finance

and socio-economic issues. This resonates with the assertion that data journalism serves as a source of accountability for governance and can be used to scrutinise data-producing organisations in a democracy (Adjin-Tettey and Braimah 2023; Borges-Rey 2016).

An interesting dynamic between the accounts of the professional and citizen journalists was observed which can be interpreted through the materiality aspect of the theoretical framework. Two important factors—the human agency of journalists and the knowledge and prowess of experts who contextualise and make sense of the data—determine the material identity of data (Borges-Rey 2016). This is revealed in multiple occurrences where accounts of mainstream news organisations such as @joy997 present a trending news report which is then quoted by these experts with infographics, charts or text explainers that give further context to the news story. Other instances involve allied data production professionals such as graphic designers, data analysts, and software developers responding to calls by primary data collectors to transform the raw data into data artefacts (infographics, data presentation software tools, data story). The act of tagging other data journalists and citizen journalists demonstrates a collaborative mindset within the data journalism community. This practice not only amplifies the reach of data-driven content but also encourages cross-disciplinary discussions and knowledge-sharing. In these kinds of collaborations, data in news transforms an episodic, brief, one-way traditional news reportage into a multi-dimensional interactive artefact that presents news consumers with varying angles of engagement with the story. It also signals that similar to what Polaino, Fernández, and Fernández (2024) found, if mainstream journalists are more active on X and use the appropriate tools in terms of materiality and performativity, they can play a significant role in disseminating and getting their followers engaged with data-driven stories.

Our exploration of data sources provides a further reinforcement of the performativity and materiality component of the theoretical framework. Mainstream journalists and citizen journalists demonstrated diverse strategies for obtaining data, including sourcing from followers on X through surveys and polls and accessing public data from entities such as the Ghana Statistical Service and foreign news services. This emphasises the significance of collaborative approaches in the production of data journalism as alluded to by de-Lima-Santos (2023) who also made the case for the necessity of collaborating with governmental and non-governmental organisations to acquire information that can act as essential input for their data-driven stories.

Notably, the unique approach of @Kenkeyindex, tracking food price inflation using a staple food item, exemplifies the materiality aspect by providing insights into how data is obtained and used in journalistic practices (Borges-Rey 2020; Chiumbu and Munoriyarwa 2023a). Accounts such as @callmealfredo and @jakuuire while making prodigious use of publicly available data from data-producing institutions also lamented the unavailability of current data or the complete lack of data on specific indicators from these bodies. These accounts on occasion tagged the X accounts of these institutions in these critiques. Tagging relevant governmental agencies indicates an intention to foster transparency and accountability. By directly involving these agencies, data journalists aim to elicit responses and engage in a dialogue that extends beyond the journalistic realm. This aligns with the theoretical framework's emphasis on power relationships in data journalism.

The engagement strategies employed by both mainstream and citizen data journalists align with the theoretical framework's performativity and reflexivity components. By actively designing surveys, creating X polls, and engaging in collaborative efforts through platforms like X spaces, accounts like @readJerome showcased the performativity of data journalism. Additionally, it dismantles power dynamics.

Hosting X Spaces to discuss results and data provides an interactive platform for engaging with the audience. This approach goes beyond static content presentation and creates a space for real-time conversations, allowing immediate feedback and clarification on presented data. This involves the skills needed to interpret data and underscores the reciprocal nature of power relationships discussed in the theoretical framework. Importantly, it also fosters more genuine audience engagement and aids in the establishment of institutional legitimisation (Martin, Camaj, and Lanosga 2024).

Strategies such as quoting trending tweets with data content not only leverage the popularity of trending tweets but also position data-driven content within broader online discussions and add a layer of context to the presented information. It aids in making data more relatable and accessible to a wider audience. We observed that the accounts of these audiences refer to this data content in supporting a conversational point highlighting the success of this strategy.

A pivotal aspect of our study centred on understanding how audiences, particularly young individuals, engage with data stories crafted to elicit civic awareness. Our findings reveal that audiences actively leverage the presented data stories to contribute to civic arguments and discussions on social media platforms. This resonates with the overarching goal of data journalism, emphasising its role as a source of accountability and responsive governance (Adjin-Tettey and Braimah 2023). Through an examination of various tweets, we observed instances where audiences referenced the presented data to bolster their perspectives and actively engage in civic conversations. Interestingly, audiences demonstrated a propensity to support data stories by providing personal evidence either on the X spaces created to discuss the news stories or through commenting and quoting on the data story tweet, illustrating a sincere endeavour to connect with the narratives presented. This form of engagement not only strengthens the authenticity of the discourse but also underscores the reliability of data-driven content in the eyes of the audience, speaking to the deliberate processes and methods that enable real dialogue, reflection, and collaboration—all essential components of fruitful civic engagement (Radke et al. 2013).

A noteworthy finding emerged concerning the audience's keen interest in the methodology employed in data collection. The audience actively sought clarity on data collection procedures and occasionally recommended extending the studies for greater representation while offering encouragement and congratulations to the journalists. They contributed to data collection posts and reposted tweets that bore the link to surveys for their following too. This engagement reflects a discerning audience (peripheral actor) eager to contribute to and participate in news production.

Beyond passive consumption, our study identified instances where individuals actively advocated for reform or policy actions based on the data stories they engaged with. This goes beyond the immediate impact of awareness-raising to the realm of actionable outcomes, emphasising the potential influence of data-driven narratives on shaping public opinion, stimulating calls for tangible change and mooting civic action.

The engagement patterns identified underscore the active role audiences play in shaping the narrative landscape of data journalism within Ghana. The findings resonate with the theoretical frameworks, emphasising data journalism's often-fluid performativity and reflexivity. As audiences actively participate in civic discussions, leverage personal evidence, and advocate for change, the reciprocal relationship between materiality and performativity becomes increasingly evident and the role of peripheral actors in data journalism also becomes apparent. This interaction amplifies data journalism's influence in civic discourse and sharpens its potential to drive tangible societal transformations.

Conclusion and Recommendations

We contribute an understanding of how data-driven practices influence journalistic engagements and heighten news consumption of audiences (particularly young audiences) on social media platforms, thus advancing scholarship on the role of data journalism in shaping civic awareness and conversations among the youth. As explored in our findings, the material identity of data serves as a pivotal determinant in understanding and shaping data journalism practices. Our study illuminated the diverse sources, methods, and tools employed by data journalists, highlighting their crucial role in defining the nature and impact of data-driven narratives.

The integration of data from followers, coupled with insights from public data sources, underscores the evolving landscape of data journalism in Ghana. Performativity as manifested in the various engagement strategies identified, demonstrates the rigorous standards and norms adopted by data journalists to present information effectively. The collaborative nature of data journalism, exemplified by the hosting of Twitter spaces, tagging fellow journalists, and involving governmental agencies, reflects an evolving power dynamic and a commitment to fostering a collaborative ecosystem within the data journalism community. The reflexivity of data journalists, mediating the interaction between materiality and performativity, is evident in the audience's active participation in civic discourse. From supporting arguments with presented data to providing personal evidence, engaging with the methodology, and advocating for reform, audiences showcased a profound and meaningful interaction with data-driven narratives. This reciprocal relationship reinforces the societal impact of data journalism beyond information dissemination.

Our study, thus, contributes to theory by providing evidence for how peripheral actors within the journalism field, such as data enthusiasts, and mainstream journalists and media houses, take advantage of the advances in technology, the liberalisation of the media, data availability and power, thereby exercising their agency (materiality) to tell data-driven stories on X. They do this in a manner that is appealing to their followers (performativity), leading to a new norm in journalistic storytelling (reflexivity). Materiality is manifested through the acquisition of data through the use of publicly available data, the proactive deployment of surveys, the creation of X polls, and other cooperative efforts with allied data production specialists like graphic designers and data analysts, who help convert raw data into data artifacts to tell stories.

Building upon our findings, we present some recommendations to enhance the practice of data journalism and guide future research endeavours. Firstly, we encourage creating and utilising collaborative spaces, such as X spaces and other interactive platforms, to

amplify audience engagement. These spaces should be leveraged for discussion, co-creation, and collaboration between data journalists and their audiences.

Data journalists should also continue to prioritise transparency in their methodologies. Providing detailed explanations of data collection procedures and fostering dialogue around methodology enhances audience understanding and contributes to the credibility of data journalism, as discovered in this study.

For future research, we recommend the evaluation of the impact and influence of data-driven narratives on policy actions and societal reforms. We believe that understanding how advocacy based on data stories translates into tangible outcomes will contribute to the broader discourse on the societal role of data journalism.

Limitations

The primary limitation of this study lies in the relatively small sample size of selected accounts for analysis. Hence, the findings may offer insights into the behaviours of the sampled accounts and provide exploratory evidence for such but may restrict the generalizability of findings to a broader population of Twitter users engaged in data journalism in Ghana or engagement practices in general. A more systematic approach involving a larger sample and probabilistic sampling methods could mitigate potential biases. A study looking into the dynamics and impact of the audience's interest in data-driven stories could also hold some value. Nonetheless, this study is important in assessing how data-driven journalistic practices could harness civic-mindedness and participation, which in the big picture can equally be applied to a larger corpus of data-driven stories and posts on various digital platforms to arrive at broader conclusions that stretch beyond the set of data that this study analysed.

Also, while this study asserts that explicit consent was not sought due to the public nature of tweets, it is crucial to acknowledge the ongoing ethical discussions surrounding social media research. Future research should carefully consider and address ethical considerations, including transparency, privacy concerns, and evolving ethical guidelines in social media research.

Disclosure Statement

No potential conflict of interest was reported by the author(s).

Data Availability Statement

The authors confirm that the coding instructions supporting this study are available via the link: https://osf.io/we5nf/?view_only = 368e651353b8442bb3694285c056e6c8. Data extracted from accounts and used for analysis, as well as the data analysis guide, are among the data deposited there.

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