

Hidden in plain sight- Audience engagement in China's data journalism

Journalism
2024, Vol. 25(7) 1559–1577
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DOI: 10.1177/14648849241248349

journals.sagepub.com/home/jou



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Abstract

This article delves into the strategies of different Chinese news organizations' (e.g., state-owned media, we-media, private news organizations) engagement with audiences in data journalism, aiming to attain dual legitimacy (identity legitimacy and institutional legitimacy) within the unique landscape of the digital media era in China. Utilizing the lens of organizational legitimacy, qualitative interviews were conducted with 26 Chinese data news practitioners. The findings reveal that news entities have adopted “restrictive involvement” and “substitutive involvement” strategies to limit audience engagement to superficial interactions within the consumption process of data journalism. Identity legitimacy has traditionally served as the primary incentive for news organizations to engage audiences, while institutional legitimacy has constrained the forms and degrees of audience engagement. The study posits that audience deployment by news organizations is more of a rhetorical maneuver than a practical engagement, symbolically involving audiences in China's data news production. This research contributes an institutional perspective to the understanding of data journalism and audience engagement dynamics, shedding light on the intricate interactions between news entities, audiences, technology and the state within China's context.

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Keywords

Audience engagement, China, data journalism, digital news, legitimacy

Introduction

In the past two decades, the traditional news production process, along with journalistic values, norms, and professional authority rooted in objectivity, has encountered significant challenges in the era of widespread digital technology and the emergence of big data. Consequently, discourses surrounding a crisis of journalistic legitimacy have permeated the news industry (Carlson, 2017: 163–179). In this context, journalism is believed to be moving towards more openness and engaging in the digital era, and data journalism has been considered an innovative form and prominent feature of today's journalism (Tong, 2022a: 47–60). Data journalism has been regarded not only to be more immersive, objective and accurate than traditional journalism by introducing huge data, digitization and visualization techniques, and computational science into news production, but also to be more interactive and engaging, which affords new opportunities for the audience to engage in the creation, distribution and consumption of news (Boyles and Meyer, 2016; Miller and Nelson, 2022).

The participatory nature of data journalism and its potential for audience engagement enables complex interplay between news organizations and audiences, while the role and influence of audience engagement in data journalism has drawn the attention of scholars. Scholars found that although audience engagement has challenged news organizations' control of news production and professional authority, news organizations can also benefit from audience engagement for plenty of data, improved transparency, enhanced reliability, and public interest commitment to rebuild journalistic legitimacy in the big data and digital age (Anderson and Borges-Rey, 2019; Boyles and Meyer, 2016; Tong, 2022b: 48). However, the vast majority of research has mainly been conducted from technological and professional perspectives in the Western context where open government, democratic culture, investigative journalism and participatory journalism are widely accepted (Young et al., 2018). The findings of the research may not apply to non-Western countries, in which historical experiences, political cultures and journalistic traditions are different from the liberal West (Appelgren et al., 2019; Wu, 2022).

In recent 5 years, focusing on the influences of contextual and institutional factors such as journalistic cultures, media market structure, political environment on data journalism (Appelgren et al., 2019), a few studies have been conducted outside the Western countries, such as Arab (Lewis and Nashmi, 2019), Latin America (Palomo et al., 2019), Asia (Wu, 2022), etc. These studies can provide important supplements to the previous Western-centric data journalism research. Nevertheless, these studies have rarely investigated the participatory nature and audience engagement in data journalism.

Following the contextual and institutional perspectives proposed by Appelgren et al. (2019), we regard China as an important case for audience engagement in data journalism in non-Western countries. First, the government-led society digitalization, the broad application of mobile technologies, the popularity of smartphones, and the promulgation

of policies related to data use and disclosure have brought the rapid growth of data journalism in China. Nevertheless, an immature civil society, a low level of political participation and strict political control of journalism such as China may also bring challenges and restrictions to the interactivity and engagement of data journalism. Second, in recent years, the rapidly emerging digital platforms have provided opportunities and spaces for new types of news organizations, such as private companies and individual media (we-media) who have not been authorized news licenses to enter the journalistic field which used to be monopolized by state-owned media. Moreover, these digital platforms have afforded key networks and supported channels to these organizations to actively produce data news content (Zhang and Feng, 2019). Therefore, China's unique institutional environment may further induce different types of news organizations in different institutional statuses to form complex relationships with audiences and develop different audience engagement strategies in their data news production. As a result, audience engagement features a specific trajectory and characteristics that are different from those in the Western contexts.

To make a theoretical contribution to data journalism and audience engagement research, this study introduces organizational legitimacy theory and the concept of *dual legitimacy* (Yin et al., 2023a) to explore to what extent and how audience engagement has been adopted by different types of news organizations, based on in-depth interviews with 26 data news practitioners in China's unique context. First, drawing upon organizational legitimacy theory, we regard the acceptance, control, and/or resistance of audience in data news production as strategies of news organizations to obtain legitimacy in the digital age, providing a new theoretical perspective to understanding the roles, motivations, and characteristics of audience engagement in data journalism in non-Western countries. Second, we adopt the concept of *dual legitimacy- identity legitimacy* and *institutional legitimacy* based on China's data journalism practices, that is, news practitioners not only deal with whether to be accepted by society as professional news organizations/journalists but also handle whether they are recognized by the dominant ideology and political institutions (Yin et al., 2023a). Then, we delve into the audience engagement strategies of different types of news organizations with different legitimacy statuses, discussing the interactions between institutions, technologies, news organizations, and audiences. This can also provide an institutional perspective beyond traditional technological and professional perspectives for data journalism research.

Literature review

Data journalism and audience engagement- An organizational legitimacy perspective

Organizational legitimacy theory states *legitimacy* is the recognition that an organization or its action is "desirable, proper, or appropriate" (Suchman, 1995: 574). Legitimacy is the source of justification for the actions of social groups and organizations, with it they could obtain social acceptance and the key resources, such as technical, financial, human, and

cultural capital, for their survival and development within a specific institutional environment (Dowling and Pfeffer, 1975; Scott et al., 2000).

In journalism, legitimacy is closely related to professionalism, which shows that professional journalism offers the public goods- educating the public and enlightening the citizenry (Murschetz, 2013). Since the 20th century, news organizations have advocated they can serve the public and democracy by providing objective and unbiased news. Thus, objectivity has become the most important cornerstone for news organizations to establish professional identity and cultural authority (Tong, 2018). However, the journalistic legitimacy built on objectivity has faced criticism for a long time, such as the impossibility of collecting complete information about a news event, and the subjective selection made by journalists in news collecting, writing and editing (Merrill, 1990). Moreover, over the past two decades, the decrease in revenues, distribution, trust and credibility of legacy media has also exacerbated the crisis of journalistic legitimacy (Boyles and Meyer, 2016; Freedman, 2019; Nielsen, 2016).

Under this context, as a new form of journalism, data journalism has been regarded as the future of journalism, carrying expectations to enhance the journalistic legitimacy of news organizations in the digital age (Rogers, 2012). On the one hand, data journalism has been considered to be more objective and accurate than traditional journalism through the heavy use of data and data algorithms (Cushion et al., 2017; Tandoc and Oh, 2017). On the other hand, data journalism has presented a distinctive feature of participation, which has been regarded to contribute to rebuilding the journalistic legitimacy (Lewis et al., 2014; Singer et al., 2011). First, the visualization and interactive presentation of data stories could enhance audience engagement in reading news stories (Loosen et al., 2017; Palomo et al., 2019). Second, data news reporting often relies on collaborative production which involves audiences in the process of collecting, analyzing and examining news (Anderson and Borges-Rey, 2019; Palomo et al., 2019). Third, the revelatory and social constructionist nature of data journalism may also largely inform audiences and foster civic conversation (Boyles and Meyer 2016; Felle, 2016; Tandoc and Oh 2017; Wu, 2023). Therefore, data journalism has allowed improved audience engagement, which indicates its potential to rebuild the authority, credibility and legitimacy of journalism (Boyles and Meyer 2016; Tong, 2022a: 56), even though audience engagement in news production may also weaken the journalistic legitimacy of news organizations previously established based on the objectivity norm (Tong, 2018; Tong and Zuo, 2021).

Therefore, not only does journalistic legitimacy take on increasingly multifaceted and complex connotations, but also audience engagement may become a strategy for news organizations to gain legitimacy. Previous research has noticed tension formed between audiences and news organizations in data journalism. Some news organizations limited the degree of audience engagement to maintain their professional authority (Boyles and Meyer, 2016), while some other news organizations enhanced audience engagement to fulfill the normative functions of serving the public and democracy (De-Lima-Santos and Mesquita, 2021; Palomo et al., 2019). However, what and how audience engagement strategies have been adopted by these news organizations, and how legitimacy shapes and influences these strategies have not

drawn much attention. Thus, investigating the role of audience engagement in data journalism from the perspective of news organizations and their organizational legitimacy will help us to further understand the interaction between news organizations and audiences in the digital media era.

Dual legitimacy and China's data journalism

Unlike its counterparts in Western countries, China's journalism under the party-media system is strictly restricted. For news organizations, obtaining an official license means that they are legally permitted to behave as news producers, and only state-owned media can be authorized a news license. Therefore, China's news producers not only need to practice a set of journalistic professional norms, but also need to be issued licenses and gain recognition of the dominant ideology to obtain legitimacy. Therefore, in previous research on China's journalism, we propose that China's news producers face two key types of legitimacy- *identity legitimacy* and *institutional legitimacy* (Yin et al., 2023a). *Identity legitimacy* refers to society's acceptance of news producers as professional news organizations/journalists whereas *Institutional legitimacy* is defined as the recognition of the institutions and party-state. Here we define the *institution* as a particular regulatory and organizing structure governed by the dominant ideology (Pan, 2000).

Although at the institutional level, only state-owned media can be allowed to get into the journalism field, there is still a *maneuvering space*, which is a residual space for journalistic practices (Pan, 2000; Tong, 2019). Benefiting from the openness and interactivity of digital platforms, some private news organizations and individual we-media have also taken part in the journalistic field together with state-owned media. In the context of the demonstration effect of the development of Western data journalism, the widespread use of data and data analysis tools adopted in the media, and the increasingly open environment for data acquisition in China (Su and Chen, 2014), these different categories of news organizations have also carried out data news reporting.

Currently, there are three categories of news organizations active in China's data journalism: (1) State-owned media represented by *The Paper* which is affiliated with the Shanghai United Media Group is the first category. On the platform of *The paper*, "Mei Shu Ke" column regularly publishes professional-generated data news reports by their own journalists, and the "Paikē" column is a user-generated data content platform/program. (2) Private news organizations, such as China's four major news portals Tencent, Netease, Sina, and Sohu. These news portals are the first batch of data news media (Liu, 2014). In 2011–2012, these portals launched the earliest data news reports in China, such as "Financial Samples under the tax-sharing system" (Sohu), "The number of children in mainland China going to Hong Kong to give birth: 10 years has soared by more than 50 times" (Netease). At the same time, with the rise of social media platforms, news start-ups such as Guyu and Huxiu have also emerged and carried out data news reporting. (3) We-media, which is generally an interest-based non-profit organization founded by teachers and students of the journalism department at universities, such as "RUC News Workshop" founded by the School of Journalism, Renmin University of China, and "Zhao Lu Ming" founded by a student at the School of Journalism, Fudan University.

However, these news organizations are different in terms of dual legitimacy. On the one hand, compared to state-owned media and we-media founded by journalism departments at universities that provide professional journalism education, private news organizations as new entrants in the journalistic field encounter greater challenges in obtaining identity legitimacy. On the other hand, compared with state-owned media who have solid institutional legitimacy because they possess news licenses, we-media and private news organizations have to find peripheral and alternative ways to produce news because they do not have a license in journalism. This also means that due to differences in legitimacy, these organizations may vary in their data news production practices, and have complex attitudes and strategies toward audience engagement, thus taking shape a unique landscape of audience engagement in data journalism in China.

Previous research on Chinese data journalism has mainly adopted a technological approach, with a focus on state-owned/licensed media regarding the impact of data adoption on their news norms, production and functions, and factors affecting their data adoption, such as heavy investment, commercial viability, access to data sets, work pressure (Du, 2019; Wang et al., 2023; Wright and Nolan, 2021; Zhang and Feng, 2019), which is helpful to understand China's data journalism. However, the forms and degrees of audience engagement adopted by these different types of news organizations in data journalism, and the interactive relationships between news organizations and the audiences still remain to be explored, especially in China's unique context in which media control is tight, news market is undergoing structural transformation, and civil society and participatory culture are immature. Therefore, this study aims to address two research questions:

RQ1: To what extent and what strategies have different types of Chinese news organizations engaged with audiences in data journalism production?

RQ2: How has dual legitimacy shaped and influenced these audience engagement strategies?

Methods

As a relatively emerging type of journalism, data journalism has been studied in the past three decades by different methods along with the popularity of the internet, and qualitative interviews with practitioners are the most common method so far (Ausserhofer et al., 2020). We drew upon the previous research and deployed in-depth interviews with Chinese data news practitioners to address the aforementioned research questions. Even though our research focused on audience engagement, we aimed to investigate audience strategies from the perspective of news organizations, that is how news professionals utilize audiences for data journalism production. The interviews with news practitioners featured a high level of original insights to explore the forms, degrees and mechanisms of audience engagement adopted by different types of news organizations for China's data journalism.

The in-depth interviews were undertaken between Oct 2021 to March 2024. The interviews were conducted through purposive sampling- the interviewees were selected as representatives of different types of news organizations and 26 interviewees were recruited. Among all of these 11 were from private news organizations, eight were from we-media, five were from state-owned media and two were from universities. These interviewees include the chief editor, general manager, senior content planner, editor, individual creator in news organizations, and professors who taught data journalism courses and mentored undergraduate data journalism teams in universities. Moreover, due to the high mobility of practitioners in the Chinese news industry, 16 interviewees have work experiences in different types of news organizations, which can provide us with more insights to compare audience engagement of different organizations. Their work experiences vary from 4 months to 10 years (see [Table 1](#)).

The interviews were conducted in a semi-structured manner with a duration of one to 2 hours, and the questions mainly focused on four areas- their understanding and practices of data journalism, their attitudes and understanding of audience engagement in data journalism, the forms and ways of audience engagement in their data news production, factors that impact data journalism and audience engagement. Then, a thematic analysis was conducted. According to the guidelines of thematic analysis ([Braun and Clarke, 2006](#)), each author has independently reviewed and manually coded data from interview transcripts, and navigated potential themes. Then the research team discussed potential themes altogether. After carefully incorporating the above theoretical review on audience engagement, we finally identified three themes in terms of forms and scale, collaborative production and public role for data journalism.

Study findings

Forms and degrees of audience engagement

From the interviews, the practitioners were well aware that data journalism, as the innovative form of journalism based on data and digital technology, is critical for news organizations to gain cultural authority and competitiveness in the digital age. In their opinions, the adoption of data and digital technology can effectively ensure the objectiveness and truthfulness of the news reports (e.g., Interviewee 1, 9, 11, 14), and make the news stories more intuitive and easier to understand for audiences through visual presentation of these stories (e.g., Interviewees 2, 3, 5, 6). They believed that “if a news media organization does not have a data journalism business, it will be kicked out and cannot keep up with the pace of journalism development” (Interviewee 5).

Although “interactivity” and “visualization” presentation of data-based news was considered the most important feature of data journalism by the practitioners in our interviews, they also admitted that “data journalism is currently mainly data visualization” in their practices (Interviewee 6). All interviewees mentioned that “One-picture understanding (in Chinese: Yitu Dudong)”, which uses a long static picture to present the data information concisely and visually, was the most popular form of data news reporting in China. A chief editor (Interviewee 6) explained:

Table 1. List of interviewees.

No.	Gender	Current working organizations	Current position	Past working organizations	Years of working experience
1	Female	C	Chief editor	A	3
2	Female	C	Individual creator	A	1
3	Female	C	Individual creator	A	8
4	Male	B	Editor	/	1
5	Female	B	Individual creator	B	2
6	Female	A	General manager	A	13
7	Female	B	Responsible editor	B	5
8	Male	B	Chief editor	B	10
9	Male	A	Editor	A	4
10	Female	B	Chief editor	B	10
11	Male	C	Individual creator	/	7
12	Male	University	Professor	A	4
13	Female	University	Professor	/	5
14	Female	B	Responsible editor	C	5
15	Female	B	Intern editor	A, B	1
16	Female	B	Chief editor	B	5
17	Male	B	General manager	A	8
18	Male	B	Individual creator	/	5
19	Female	B	Editor	A	2
20	Male	B	Vice-general manager	/	2
21	Male	C	Editor	A	3
22	Female	C	Intern journalist	A, B	2
23	Male	C	Responsible editor	A	2
24	Female	A	Chief editor	/	15
25	Male	A	Editor	/	23
26	Female	A	General manager	/	6

Notes. A represents state-owned media; B represents private news organizations; C represents we-media.

The advantage of data visualization is that it can quickly catch the eyes and allow audiences to quickly see the information in the data. They can see whether this news is useful and how it has developed. It (one-picture understanding) can help audiences understand the content, core appeal, and news events.

Practitioners all agreed that audience engagement in data news production was very limited in China, the audience mostly just browsed news linearly and clicked buttons for tasks and patterns, which still stay at low-level interactions according to [Weber and Rall's \(2012\)](#) grading of interactions in data news reports informs. Audiences rarely conducted middle-level interaction such as choosing a specific path, structure, or hyperlink, or high-level interaction such as independently setting the content frame and browsing path. Practitioners attributed the reason to the lack of media and data literacy of audiences. A chief editor (Interviewee 10) said frankly:

Although some comments in the comment area can correct and supplement the content of data news reports, or explain some problems in the data, they are essentially feedback on the news content and cannot be regarded as audience engaging in the production of data news. Moreover, the collection and analysis of data is mainly done by reporters. Although some audiences provide clues through messages, there is not so much news worth reporting from them.

Moreover, compared with state-owned media and we-media, the enthusiasm and ability of private news organizations to engage in data news and to innovate the forms of audience engagement is far lower. While professionals from state-owned media emphasized their innovations based on new technological tools of VR and H5 to attract audiences and increase their immersion (Interviewees 6 and 9), news stakeholders from private news organizations differently focused on chart and graph presentation of data (Interviewees 3 and 10). An important reason is the cost of the data news report is fairly high while the profit is tiny so the resources and capabilities of different types of news organizations are at different levels in data news production.

As an official media, state-owned media generally have sufficient funds, large teams, and abundant staff members of designers, programmers, and journalists. Therefore, they have relatively rich resources for data news production and diversely innovative practices for engaging with audiences. Non-profit we-media often conduct data news reports from university professional practice courses, and the team members are mainly teachers and students at universities. As a teaching tool and professional journalism training project, data news reporting by we-media is regarded as an innovative practice, which is generally supported by the universities and/or governmental education departments and publicity departments. Thus, these we-media are also willing to explore new forms of audience engagement regardless of cost and profit.

Different from the above two types of news organizations, private news organizations who are newcomers in the news industry and do not have news licenses generally encounter greater operation pressure for news production, so their willingness and ability to innovate audience engagement are relatively low. The data news teams of the private news

organizations we interviewed have three to ten employees while the vast majority of private news organizations only have one to two technicians or engineers, or even one journalist or editor shares the roles of a technician or engineer. Therefore, data journalism teams are on the edge in these organizations, whose data news publications are not extensive, and it is even more difficult for them to carry out innovative forms of data news related to audiences like state-owned media. A professor (Interviewee 12) who has been concerned about data journalism for a long time commented:

Data journalism is very expensive. With a large number of people, many types of work, and financial support, *The Paper* can maintain the data journalism business for a long time, and there is no short-term pressure for them to make profits. However, private media organizations can only produce data news on a small scale due to passion.

Therefore, obtaining cultural authority and identity legitimacy is an important motivation for news organizations to operate data news projects, and consider and engage with audiences in today's digital environment. Moreover, different types of news organizations have adopted different forms and degrees of audience engagement due to their dual legitimacy and the resources brought by this legitimacy.

Collaborative production with professional audiences

Data news reports involve huge and complex data and interdisciplinary knowledge with a high demand for various resources such as time, tools, manpower, and finances (Fink and Anderson, 2015). In addition to the internal team, data news production also needs the cooperation and support of outsiders. Therefore, in many countries, collaborative production is considered the main form of active audience engagement in data journalism (De-Lima-Santos and Mesquita, 2021; Palomo et al., 2019).

Compared with news organizations that produce other types of news, such as politics, economy, and society, which are mainly confined to the interior of the newsroom and present relatively closed news production characteristics, data news production is experiencing openness in China. The different types of news organizations all try to incorporate outsiders such as technology companies, experts, and scholars into the production process of data news. A responsible editor (Interviewee 7) shared, inviting experts to analyze and verify data news content "is a resource that enhances our professionalism". However, outsider participation is limited to these intellectual and technical experts and professionals rather than general audiences.

Moreover, user-generated content (UGC), which should be provided by general audiences, has become a game for professional news producers in the field of data journalism in China (Yin et al., 2023b). For state-owned media, setting up UGC columns is a necessary step in their media transformation. National policies such as "Guiding Opinions on Promoting the Integrated Development of Traditional Media and Emerging Media" (2014) and "Opinions on Accelerating the Deep Integration of Media Development" (2020) require state-owned media to accelerate their entry into the internet arena. Therefore, when other types of news are converged on top social media platforms and

news aggregation platforms, these state-owned media have to build the UGC column of data news to absorb different types of data news practitioners to their proprietary platforms, thus they can become the “leader” in this field. A chief editor (Interviewee 6) of the data news department in a state-owned media introduced his intention to set up a UGC column- “Our column is part of our media group’s platform strategy. We have invited many we-media to join us to create a circle of data journalism.” For private news organizations and we-media, cooperating with state-owned media as “users” can solve the problem of lack of institutional legitimacy. Although they firmly believe that they are journalists, they can only appear as “authors” and “hosts” when publishing data news works because they do not have a news license. Similarly, when they publish their works on the data news columns of these state-owned media as “users”, they do not violate the regulations that non-state-owned media are not allowed to engage in news production, but obtain credibility due to their publication on state-owned media. These private news organizations and we-media staff explained these cooperations in this way:

It is definitely easier to work with a professional data news team in state-owned media, because everyone knows what a workflow looks like. If you have no concept of data journalism and just want to bring in outsiders to make a special article, then it will be more troublesome to cooperate... When we cooperate with state-owned media, we always start cooperation with topic selection. We discussed the topic, data source, visualization, and copyright together, so the state-owned media led the topic selection. However, the final reports were completed by us. (Interviewee 1)

Moreover, these cooperations present significant circle characteristics. As an individual creator (Interviewee 3) said:

The state-owned media also hope to improve the internet traffic of the column, so they want to find external resources to achieve it. Their editors have some lists for cooperation. He/she would also look into some professional competitions or conferences and take the initiative to find these organizations or teams to settle in (UGC column) for data news production. Therefore, state-owned media always invite some teams that are recognized by the public in the field of data journalism. These teams do data analysis but not news.

In this process, different types of news organizations have reached a convergence of interests and alliances. Private news organizations and we-media have established a close relationship with state-owned media through UGC columns to avoid the problem of non-licensed news production by masquerading as “users” and expanding their survival space (Yin et al., 2023b). State-owned media acquire the content resource to become a hub for data journalism and a leader in this field, which could cement their authority in data journalism. Therefore, collaborative production in China’s data journalism is mainly carried out within the professional circle, rather than with the general audience, which is actually “circle sourcing” rather than “crowdsourcing”.

Providing public services rather than expressing public interests

In Western countries, data journalism has allowed audiences to interpret, contextualize, analyze and examine news based on multiple sources of data new methods and technologies related to data science and new tools, showing investigative and advocacy characteristics that can better inform the public and act a watchdog role (Boyles and Meyer, 2016; Felle, 2016; Parasie and Dagiral, 2013). However, previous research based on content analysis demonstrated that the China's data journalism has not functioned as a watchdog (Wang et al., 2023), whereas our study further discovers that data journalism have played a role of a public service provider in China's unique institutional context.

Due to the persistent reinforcement of media control since 2012, and the significant diversion of public opinion guidance and market profits from state-owned media to new media, these state-owned media have presented a great reliance on the Chinese Communist Party (CCP) and the government's resources and support (Wang and Sparks, 2019). This not only shifts media's primary role to publicize government services, but also limits its expression of public interests that may challenge the political authority. An editor (Interviewee 7) in charge of the data news department of a state-owned media told us:

If the problems behind the data will cause impetuosity, instability, or instability in society, this kind of news may have been blocked during our internal review and check. We have a good grasp of the degree of news reports, and will not get ourselves into trouble because of a news report.

Private news organizations and we-media are in the "grey" area of news production due to a lack of news licenses- if they are not careful, they will face more severe punishment that not only delete articles, but also shut down businesses and close accounts. Therefore, these organizations are treating data news reports with major public issues more cautiously, and avoiding expressing public interests. A responsible editor (Interviewee 23) of we-media shared:

Data journalism, originated from the West, faces a different practical environment in China. It is difficult to supervise or criticize the government through data news in China. Entertainment, sports, life, and other non-important social issues can be reported and verified in form of data news, but political issues cannot. Journalism in China adheres to its unique baseline and political principles. While data journalism represents a technological advancement, it encounters challenges in navigating the implicit political framework.

Meanwhile, state-owned media, private news organizations and we-media all treat data sources and conduct data analysis with a cautious attitude. Under consideration of the accuracy, reliability and collection cost of data, and data privacy, data acquisition by these news organizations relies heavily on institutional sources, especially government departments, not the general audience. To practitioners, data from the government can ensure the news report is objective and credible. A state-owned media editor stated, "we

can only use data published by governments or collected by ourselves, because we are responsible for the data news we publish” (Interview 25). Compared to state-owned media, private news organizations and we-media are more cautious in data acquisition due to their lack of news licenses. A chief editor (Interviewee 10) of a private news organization told us:

Although we do not have editorial rights, we can reproduce and repost the news. We do not obtain the data through interviews, but use public data in our data news reports, so these news reports won’t pose a risk to our operations.

A professor (Interviewee 13) who directed a data news project of a we-media also stated:

I would encourage students to give priority to official data, such as the National Bureau of Statistics, Forestry Bureau, etc. These data are more rigorous with good quality. It is released by the state, so the data should have already been audited. If students feel that the official data is not enough and want to use data or reports from commercial organizations, I would ask them to check whether these reports have commercial purposes. If students want to crawl data, they can only use a small amount of crawled data as a supplement to official data. If students intend to conduct a questionnaire survey, they need to follow rigorous sampling and analysis methods, and I do not encourage them to obtain data in this way.

Moreover, the interviewees also pointed out that because the volume of China’s public data is not large and the granularity of these data is not high, it is unnecessary to engage audiences in further mining the data. A responsible editor (Interviewee 14) explained:

The granularity of public data in China is still limited, far below the level of those in Western countries. Although the data news content we produced can provide audiences with certain information increments, the raw data (we collected) related to politically sensitive topics or negative events cannot be open to audiences for analysis due to national security and ideological risks.

For these news organizations, whether the data is granted political authority and permission is far more important than the richness and depth of data mining. Our interviewees (Interviews 3, 9, 23, 25) also indicated that the focus of their data news reports is to interpret the public data, especially focusing on topics related to public policy or people’s daily life. This means the relationships between news organizations and audience follows the service approach- news organizations provide information, knowledge and advice about goods and services which is highly related to audiences’ everyday lives, rather than a civic approach that pushes audiences to engage in public debate (Mellado and Van Dalen, 2017).

Therefore, although the widespread use of data and engagement with the audience can enhance the public interest expression of data journalism in academic discussions, news organizations have regarded providing public services rather than expressing public interests as their priority in China’s data journalism. Especially private news organizations

and we-media have been more reluctant to express public interest due to their insufficiency of resources and institutional legitimacy.

Conclusion and discussion

We conducted exploratory research on audience engagement practices and dynamics of different types of news organizations in Chinese data journalism, in which digitalization has been developing rapidly while the news industry is strictly restricted. Our findings suggest that audience deployment by news organizations in data news production has mainly been shown as a rhetorical maneuver and symbolic participation, which has been largely shaped by dual legitimacy (Yin et al., 2023a). This study thereby illuminates the role of audience engagement in data journalism through the lens of organizational legitimacy uncovering intricate relationships between news entities, audiences, technology and institutions in the non-Western context.

For RQ1 that is related to the extent and strategies of audience engagement of news organizations, our empirical research showed that *restrictive involvement* and *substitutive involvement* have been employed by news organizations to limit audience engagement to low-level and superficial participation. First, *restrictive involvement* has emerged as a pivotal strategy employed by news organizations to moderately engage with audiences. Recognizing the enhancement of audience engagement in data journalism as a crucial avenue for driving digital transformation, securing social recognition and rebuilding journalistic legitimacy in the digital age, news organizations have adopted audience-centric “visualization” techniques and metrics to involve audiences in their data news production. However, these news organizations have confined audience engagement to low-level interactions during the consumption process with practices such as clicks, likes and comments while seldom encouraging high-level interactions like audience participation in data collection and analysis. Furthermore, they have primarily concentrated the function of data news reports on providing information and public service to audiences, but have conscientiously compressed the function of expressing public/political interests. This not only echoes previous research that audiences in China’s data journalism are perceived more as consumers rather than citizens (Wang et al., 2023; Wu, 2023), but also provides further details on the interaction between news organizations and audiences behind this phenomenon.

Second, *substitutive involvement* has been adopted as another audience strategy by news organizations, leading the audience only nominally participate in the data news production. In China’s data journalism, audience engagement has also become a cover/shell for collaborative production among different types of news organizations. The state-owned media with relatively high institutional legitimacy have established their professional authority in the data journalism field and consolidated their identity legitimacy by absorbing private news organizations and we-media as “users” into their own news production and platforms. While the private news organizations and we-media without institutional legitimacy have used the title of “user” to join the socially influential news space constructed by state-owned media, they also have obtained the dual legitimacy of state-owned media, as these private news organizations could openly publish news to the

public, and has been recognized as media by state-owned media and readers/audiences. While the term “user/audience” here differs from the conventional understanding, it serves as a clandestine identity offering a gateway for unlicensed professional news entities to enter the journalistic realm and partake in data-driven news production. However, the mass audience has not been engaged in collaborative production. Therefore, these audience strategies of news organizations demonstrate that while data journalism is recognized for its potential to empower audience engagement and enhance democratic qualities in the digital age (Tong and Zuo, 2021), China’s data journalism has yet to exhibit the participatory nature that distinguishes it from conventional journalism.

For RQ2 that is related to the influences of dual legitimacy on audience engagement strategies of news organizations, the findings indicate that identity legitimacy has been the original incentive of news organizations to engage audiences, while institutional legitimacy has determined the patterns of audience acceptance and behaviors regarding engagement. Our study demonstrates that all types of news organizations have strongly featured aspirations to develop data journalism and engage audiences in news consumption to enhance their social influence and recognition, while they are unwilling to truly introduce audiences into data news production process, which may threaten their dominant position. Additionally, they have undermined audience media and data literacy to exclude the general public from the news production process. This reveals that these news organizations have still inherited traditional elitist journalistic norms and enclosed boundary work based on objectivity to establish professional authority and consolidate identity legitimacy, but they have not truly embraced the participatory nature of data journalism.

Moreover, institutional legitimacy has further constrained the forms and degrees of audience practices in data journalism. State-owned media and established we-media possessing institutional recognition and ample journalistic resources have exhibited a greater willingness to experiment with innovative formats, establish UGC platforms and foster audience engagement strategies to attract and retain viewership. Conversely, private news organizations entering the journalism landscape without news licenses contend with challenges such as the absence of institutional legitimacy and limited resources, which leads to less creativity in audience engagement. This observation highlights the increasing complexity of China’s media ecosystem in the digital age where various news organizations occupy diverse structural positions- authorized or not traditional or emerging- significantly influencing their legitimacy statuses and innovation behaviors.

To this end, the concept of dual legitimacy sheds light on the profound influence of the party-state on China’s data journalism landscape. In China, the CCP and governmental bodies wield considerable influence over media development through the issuance of news licenses, bestowing professional authority, and allocating financial resources. Our research uncovered that institutional legitimacy significantly constrains and shapes the attitudes and practices of audience engagement among news organizations, making restrictive involvement a common strategy for news organizations to engage with audiences. Nevertheless, we cannot deny the autonomy of news organizations. Substitutive involvement also demonstrates that audience engagement emerges as a tool for news producers with different institutional legitimacy statuses to navigate pressures from

political stakeholders and institutions. This underscores the autonomy exhibited by Chinese news organizations enabling them to explore and expand their survival and development avenues within a considerably regulated media system. Therefore, the concept of dual legitimacy not only enriches our comprehension of journalistic legitimacy, but also unveils the intricate dynamics between different types of news organizations, audiences, the state and institutions within China's data journalism landscape.

Actually, as with many non-Western countries, their media systems and data cultures may share similar characteristics to China. For example, in some African countries, non-authorized news producers have been on the rise, where the government verifies who is a journalist by authorizing a press pass (Belair-Gagnon et al., 2019). In some Asian countries, such as Singapore and Malaysia, where press freedom is restricted and political participation is at a low level, news media has built a collaborative relationship with the government due to the limited disclosure of data (Wu, 2023). Therefore, the data news producers in these countries may not only simply encounter the challenge of identity legitimacy, but also the legitimacy issues brought by institutional restrictions, so audience engagement in data journalism in these countries also has to adapt to their unique institutional environments and legitimacy. In this regard, the concept of dual legitimacy proposed based on China's practice could provide a new institutional perspective for the study of data journalism and audience engagement in these countries beyond the traditional technological and professional perspectives (e.g., Anderson and Borges-Rey, 2019; Boyles and Meyer, 2016; Lewis, 2015).

Although we try to tease out different dynamics that impact audience engagement in data journalism, there are undeniable limitations of this study. First, this study takes China as a case study of non-Western countries. However, the diversification of different states in the non-Western context could be taken as a future direction of studies in relevant areas. Second, this exploratory study was mainly based on in-depth interviews mainly from private news organizations after our efforts and focused on news organizations' strategies due to the timing of conducting the research. To obtain a comprehensive understanding of audience engagement in data journalism, different research methods and perspectives could be employed in later research to supplement the existing scholarship.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the National Social Science Fund of China (21BXW062).

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