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The Power of Data From the Global South: Environmental Civic Tech and Data Activism in China

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This article explores how an established environmental nongovernmental organization, the Institute of Public and Environmental Affairs (IPE), engaged in data activism around a civic tech platform in China, expanding the space for public participation. By conducting participatory observation and interviews, along with document analysis, we describe three modes of data activism that represent different mechanisms of civic oversight in the environmental sphere. Unlike contentious data activism in the Western context, we argue that IPE activists' data practices are localized in the specific sociopolitical culture shaped by China's authoritarian system. These practices do not involve contentious political criticism against the government, although they have monitoring functions. By finding the middle ground between confrontation and state control, IPE activists participated in the political process as policy entrepreneurs who pursue their political goals in cooperation with the government. Rather than mobilizing radical contestation, environmental data activism in China works as a constructive alternative to the denial of the existing government system, transmitting public input into the policy-making process.

Keywords: data activism, environmental civic tech, big data, Global South, China

With the advent of big data technologies, quantified and datafied societies have come into being. Datafication has altered the conditions under which humans make sense of the world and take action (Baack, 2015). Although there are problems related to data surveillance or exploitation of data, datafication has the power to support public agency and revitalize the values of common good. Data activism, emerging as the "new frontier of media activism," addresses the empowering potential of data infrastructures and datafication (Milan, 2017, p. 151). The notion of data activism offers "a heuristic tool for the study of new forms of political participation and civil engagement in the age of datafication" (Milan & van der Velden,

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2016, p. 1). It develops the social-technical imaginaries that promote social change, thus offering alternative understandings about the dynamics of datafication and its societal impact.

Existing research has paid attention to various forms of data activism practices, ranging from civic hacking (Schrock, 2016) and journalistic data practices (Baack, 2018a) to data activism around open data initiatives (Baack, 2015). However, these studies are mostly dedicated to Western-centric interpretations of datafication and data activism rooted in liberal democracies. There is less attention paid to diverse alternative understandings of the power of data from the Global South (Milan & Treré, 2019). Milan and Treré (2019) argue that there is a need to open up the field of data activism to non-Western historical, sociopolitical, and economic contexts to gain a more varied understanding of the meanings and consequences of datafication. Therefore, a critical reconsideration of data activism emerging from the Global South, the so-called bottom of the data pyramid (Arora, 2016), is needed.

Building on Milan and Treré's (2019) call for a de-Westernization of critical data studies, we focus on data activism in the authoritarian context of China. We study a case of data activism practices by the Institute of Public and Environmental Affairs (IPE), an environmental nongovernmental organization (ENGO) that launched a civic tech initiative, aiming to make environmental data accessible to the public and facilitate civic engagement. Considering information as the prerequisite to public participation, IPE created the environmental data platform Bluemap in 2006 to gather raw environmental data, create a database, and then openly share the data with the general public. This study moves beyond the ways of thinking about datafication and its consequences rooted in Western liberal democracies, aiming to reveal the alternative dynamics of data, society, and politics in the underexamined context of China.

By conducting semistructured interviews with IPE data activists, along with participatory observation and document analysis, we investigate how IPE data activists engage in social-technical practices in relation to big data via designing and using the Bluemap data platform. We analyze three modes of data activism around IPE's three major data projects: (1) innovating PITI index in opening government environmental data; (2) enabling a civic monitoring and response system by establishing data-based *micro-monitoring* (*weijubao 微举报*) channels; and (3) coordinating the networked actions of multistakeholders in greening supply chains via Blue Ecochain, an automated information system. Our study shows that different participatory mechanisms for the publics to pressure governments and enterprises to make environmental changes have emerged in IPE's data activism practices. Unlike Western data activism, characterized by counterimaginaries (Milan & van der Velden, 2016) that empower citizens to resist government data surveillance or facilitate counterexpertise from civil society to pursue social change, IPE activists' data practices are localized in the specific sociopolitical culture shaped by China's authoritarian system, seeking more to deal with specific environmental issues than to challenge hierarchical structures. Adapted into the environmental governance structure, they do not involve direct political criticism of the existing political system; instead, they seek influence within the current norms of governance in China. By illustrating environmental activists' engagement with data in the authoritarian context of China, the study contributes to constructing a de-Westernized vision of datafication.

Datafication and Data Activism

As big data technologies rapidly develop, people live in an increasingly datafied society. Scholars have begun to think about datafication and the new conditions under which people could participate in public life. Data activism is an emerging perspective from which to study datafication, exploring the transformative potential of big data to enable new forms of civic engagement (Baack, 2015, 2018a, 2018b; Kennedy, 2018; Lehtiniemi & Ruckenstein, 2018; Milan, 2017; Milan & Gutierrez, 2018; Milan & van der Velden, 2016; Schrock, 2016). As "the newest form of media activism," data activism "appropriates information and technological innovation for political purposes" and "identifies spaces for people to enact their democratic agency" in new ways of participating in politics (Milan, 2017, p. 152). It involves "a form of technopolitics from the ground–up" (Milan & Gutierrez, 2018, p. 95), examining how citizens make sense of the political sphere by engaging with data infrastructure and datafication.

The rise of big data has provoked critical reflections on the harmful effects of datafication, including various forms of data colonialism that treat citizens as resources for exploitation (Couldry & Mejias, 2019), violation of privacy, and the expansion of inequality and discrimination (Leurs & Shepherd, 2017). Although there are exploitative forces shaping the process of datafication, data activism in particular produces alternative social-technical practices that are capable of resisting oppressive data arrangements and catalyzing social change through just forms of datafication (Milan & van der Velden, 2016). As Baack (2015) argues, alternative social imaginaries might emerge around the process of datafication—algorithmic aggregation, correlation, or calculation—under which new rationalities can be developed. Moreover, Milan and van der Velden (2016) also illustrate that data activism practices generate "novel epistemic cultures within civil society" (pp. 68–69) and advance the traditional forms of knowledge production and circulation.

In recent years, various forms of public participation through and around big data have arisen; they include civic hacking as a form of data activism and advocacy (Schrock, 2016), journalistic practices entangled with data activism around civic tech (Baack, 2018a), data hacking supporting the agency of the public (Baack, 2015), and so forth. From the Western perspective, data activism is mostly viewed as data-driven contestations emerging from the realm of civil society, amounting to a counterpower (Milan & van der Velden, 2016). It involves "the contentious politics of data" (Beraldo & Milan, 2019, p. 1), ranging from subversion of or resistance against government surveillance or algorithmic discrimination to data-based collective actions challenging authorities or hierarchal power relations. Despite the power of data to strengthen civil society, Coleman (2017) has doubted the potentials of digitally mediated collective actions in transmitting public opinion into the institutional policy process, forming "a constructive alternative" (p. 22) to radical denial of the entire system and thus closing the gap between institutional politics and grassroots democracy.

Moreover, Milan and Treré (2019) rightly point out that most of the reflections on data activism are situated in practices around big data emerging from Western countries, which tend to highlight the theoretical views and claims rooted in liberal democracies. So far, less attention has been paid to the social-technical dynamics of datafication in non-Western contexts. Therefore, they call for a de-Westernized approach of interpreting datafication in relation to power dynamics by moving beyond "data

universalism," which tends to be blind to the context-specific values and meanings embedded within data practices outside the Western context. Drawing on the emerging de-Westernizing approach to data activism (Chenou & Cepeda-Másmela, 2019; Milan & Treré, 2019), this study explores how citizens engage in bottom-up data activism around civic tech in the authoritarian context of China. It aims to reveal the potential of data activism to affect the existing governance system in contemporary China. More specifically, the study shows how data activists leverage the power of data to facilitate and deepen public participation in environmental politics. By doing so, this study enhances our understanding of the bottom-up claims and expectations underlying data activism in China, contributing to the expansion or repair of the West-centric interpretation of datafication and data activism rooted in the context of liberal democracy.

Locating Data Activism in the Landscape of Environmental Governance in China

As environmental pollution has increasingly become an important social and political issue in China, it poses a severe challenge to the legitimacy of the regime. In recent years, tackling environmental problems has been placed on the national policy agenda. China's environmental politics are characterized by a green transformation as the government reforms its environmental governance strategies. In particular, since Xi Jinping came to power in 2012, the state has prioritized environmental protection and tightened its environmental policies (Kostka & Zhang, 2018). Meanwhile, Xi's administration has made several efforts to enhance the state's capacity for environmental governance. One prominent change was the restructuring of the relevant administrative units to reduce inefficiencies inherent in the bureaucratic system. Another change concerned centralizing reforms in the environmental management system; higher level officials (provincial level) are taking more responsibility to monitor the environmental performance of local governments (city or county level) and enterprises.

These adjustments to the governance structure aim to address the shortcomings associated with the fragmentation of policy implementation inherent in the state's authoritarian rule. In China, although the state is the central player in making environmental policy decisions, the enforcement authority is delivered downward to local governments and agencies. Although local enforcement agencies are subject to compliance with national environmental policies, they often give priority to economic goals, leading to discrepancies between central planning and local implementation. The central–local discrepancies remain as the principal–agent problem in China's bureaucratic system, characterizing the Chinese political system as "fragmented authoritarianism" (Lieberthal & Lampton, 1992). Under the decentralized authoritarianism, local government performance *evaluation* (*kaohe* 考核), which directly impacts the careers of officials, has been the most effective way to hold grassroots governments accountable. Different from Western countries, where citizens have rights to hold local governments accountable through voting, the evaluation (kaohe), coupled with central supervision, performs as the mechanism for higher level administrations to bolster their power and efficiency at the local level in China.

At the same time, the increased emphasis on environmental protection highlights the role of the public, providing a supportive atmosphere for public participation in solving environmental problems. To strengthen the government's capacity in making environmental changes, relevant laws and regulations have been proposed to safeguard publics' participatory rights in environmental politics in recent decades.

For instance, the new environmental Impact Assessment Law passed in 2003 specifies citizens' legal right to participate in decisions that affect the environment, laying the foundation for the public to claim effective and direct participation in environmental politics. In addition, the 2012 revision of the Environmental Protection Law encourages expanded public participation, bringing more citizen input into lawmaking (Zhu & Wu, 2017). Another notable change in the landscape of environmental governance is that a group of new players have become involved in the state-led environmental battle against pollution, including judges, prosecutors, ENGOs, and the general public (Van Rooij, Stern, & Fürst, 2016).

Since the 1990s, ENGOs have become a major force mobilizing the public to participate in environmental issues, opening up a "green public sphere" for citizens to debate topics relating to the environment, claim public interest, and engage in policy deliberation (Han, 2014; Yang, 2005; Yang & Calhoun, 2007). While the green public sphere grew and expanded in the first decade of the 21st century, it has been controlled more tightly under Xi Jinping's rule. Since Xi's ascension, it has become more and more difficult for both domestic and foreign ENGOs to register in China; therefore, they fall under the pressure of complying with government regulations of NGOs (Kostka & Zhang, 2018). Despite the limited political room for ENGOs, they are still actively leading environmental participation as important actors in China's environmental governance system. As a matter of fact, the Environmental Protection Law amended in 2014 grants ENGOs legal rights to represent the public interest in holding local authorities or enterprises accountable in the courts. In practice, ENGOs also make determined efforts to create "a matrix of free spaces" (Yew, 2019) out of relatively autonomous organizational and digital spaces where they could produce resistant thoughts, but they avoid direct contentious practices against the state; thus, they find their own way to engage citizens in talking about environmental issues, increasing citizens' civic awareness and mobilizing them to take action to make policy change.

In recent years, new digital technologies have been applied in response to environmental pollution in China. In particular, the emergence of big data techniques opens the door to new modes of environmental management. The Ministry of Environment and Ecology has been constructing a national big data platform (to be completed by 2021), aiming to gather environmental data from different levels of government and monitor and manage the environmental behaviors of enterprises through data platforms (Kostka & Zhang, 2018). In addition to the technological advances in the governmental sphere, ENGOs also embrace data technology innovations to better mobilize citizens to participate in the environmental public sphere. As mentioned earlier, IPE has been dedicated to designing an environmental civic tech platform since 2006 to enhance civic engagement and promote citizen–government collaboration in environmental protection. Keeping all these changes in mind, we ask how environmental activism under the conditions of datafication unfolds in the new landscape of environmental governance, extends the green public sphere for participation, and in turn reshapes power relations in environmental politics. The following sections discuss IPE activists' data practices to reveal the dynamics of environmental data activism.

IPE's Civic Tech Initiative: Bluemap Data Platform

IPE is a Beijing-based nonprofit organization founded in 2006 by Jun Ma, formerly an environmental journalist. Funded by Alashan SEE Foundation (Society of Entrepreneurs & Ecology), it has

grown from a small team of three people into an influential environmental organization that plays a major role in promoting environmental participation. Believing that widespread public input is the most important driving force in solving environmental problems, IPE has been dedicated to involving the public in environmental decision making. Recognizing that citizens' access to environmental data is prerequisite to participation, IPE's overarching mission is to make environmental data accessible to the public, facilitate citizens' use of the data, and coordinate multiparty collaborations to improve the environment. Thus, in 2006, IPE built its database website, which was first called "pollution map" and later renamed "blue map" to avoid social disruption. IPE gathers and consolidates sources of information from the website of China's Ministry of Ecology and Environment (MEE), the websites of ecology and environment departments and governments of provinces and prefecture-level cities across China, and other official channels. They incorporate and display environmental quality data, data on emissions, and pollution-source supervision records published by 31 provinces and administrative areas and 337 prefecture-level cities and direct-controlled municipalities across China.

In 2014, IPE developed the Bluemap app based on its environmental database. Since launch of the mobile app, Bluemap has attracted more than 3.5 million users, with an average of 20,000 active users per day. So far, the app has the capacity to provide real-time and site-specific data about air quality, water quality, and enterprise pollution in 380 cities to users across China. By using the app, citizens can easily find which (enterprises) entities are emitting what pollutants and affecting their living environment, with data evidence. Meanwhile, IPE members have been operating two major projects, integrating environmental data to serve green procurement and green finance, involving enterprises in the reduction of pollution. For example, they have made a "Green Brand Map" on the app, a data initiative dedicated to showcasing brand corporations' commitment to enacting environmental management toward factories in its supply chain. Given that IPE is an innovative environmental pioneer, some of its creative practices have been studied by scholars, especially its data project evaluating and monitoring local government performance in information disclosure (Guttman et al., 2018; Tan, 2014). However, IPE's practices around the civic tech initiative have received surprisingly little attention in media and communication studies. Most previous studies focus on the influence of IPE's data projects on environmental governance while overlooking the social-technical dynamics behind IPE members' design and use of their civic tech tool. Shifting the focus to their tactical innovations by applying big data technologies in the environmental sphere, we study how IPE members use the power of data and engage in data activism practices to meet their sociopolitical ends, facilitating citizens' intervention in environmental decision making.

Research Methods

To study IPE activists' social-technical practices around Bluemap and how data activism bolsters the public voice in environmental politics, this article draws on qualitative research methods. First, we engaged in participatory observations at two annual press conferences that IPE hosted, introducing functions of its civic tech tool and data activities it has organized using Bluemap. At the press conferences, we acquired the annual reports about IPE's data activities. We also talked with IPE's founder and data project managers to involve them in the process of making sense of their data practices. The participatory observations gave us an impression about the data projects in which IPE activists are involved. At the

same time, these observations also offered us the chance to learn how IPE forms networks with other NGOs, publics, the media, and governments and how it engages multiple actors in its data activism practices.

Second, we conducted 11 semistructured interviews with IPE members and relevant government policy experts between March and July 2019. Each interview lasted one hour on average. Nine interviewees were key insiders from IPE: its founder and director, a senior researcher, a communication officer, its chief technology officer, the IT manager, a database engineer, and three project managers. Each interviewee came from a particular department of IPE and was asked to describe and map the data practices in which that department is involved. The interview protocols were created not only to explore the social-technical practices in which IPE activists have engaged on the Bluemap platform, but also to learn their concerns, goals, and values behind certain technological innovations and specific data practices. Questions related to their understanding of the organizational mission and its vision of developing the civic tech initiative that shapes activists' data practices were asked later. We then interviewed two government policy experts who shared their views about the role of IPE members' environmental data activism in environmental governance.

Moreover, 22 documents containing information about their data initiatives and data activities in relation to environmental data were collected from IPE's website to complement the interviews and participatory observations. To address our research questions, we analyze three modes of data activism emerging from IPE's three data projects: (1) opening government environmental data (PITI); (2) enabling a mediated civic monitoring and responsive governance system (weijubao 微举报); and (3) coordinating the networked actions of multistakeholders in greening supply chains (Blue Ecochain). We focus on how they constitute alternative social-technical data practices and facilitate different forms of civic engagement, enhancing the position of the public in environmental governance.

PITI Index in Opening Government Environmental Data

Since 2003, the Chinese government has passed a series of environmental laws, regulations, and policies to guarantee people's right to know about the environment, promoting environmental protection. In 2008, the Measures on Open Environmental Information (trial) was released after the passage of China's first national regulations on open government information (effective as of May 1, 2008), setting forth the guidelines for environmental protection bureaus and enterprises to practice environmental information disclosure. Although the importance of open environmental information has been stressed by the state, some local governments are not positive about opening key environmental data because these data are still considered sensitive and may arouse social unrest in China (Interviewee 1, founder of IPE). To promote open data movement in the environmental sphere, IPE data activists have innovated an open data initiative, scoring and ranking the performance of governments in fulfilling the required information disclosure by drawing on its Bluemap database and governments' responses to public information requests. Cooperating with the U.S. Natural Resources Defense Council (NRDC), IPE activists develop the Pollution Information Transparency Index (PITI) annually to evaluate how well the environmental information disclosure requirements are implemented by local governments and

enterprises in practice (see annual PITI reports on IPE's website: http://wwwen.ipe.org.cn/reports/Reports_18336_1.html).

The PITI is published every year based on IPE's annual survey of local government information disclosure, making local information service transparent and stimulating better compliance with open data laws and regulations for environmental protection. Based on PITI, IPE activists develop strategic narratives by offering specific analysis and interpretation of the scores and rankings, aiming to increase the influence of the index on local practices of information disclosure. For instance, they make efforts to raise the awareness of competition among different-level governments by nominating the top cities scoring over 70 points on the index, as well as calculating and displaying the average scores for provinces. Because the evaluation results are publicized by IPE every year at their annual press conference and via social media channels, local governments with lower scores are under pressure from public monitoring and higher level government inspection to perform better in disclosing pollution information.

Another major goal of PITI is to evaluate whether the implementation of open data policies meets the needs of the public, efficiently supporting public participation in environmental governance. By making the annual index, IPE activists not only identify good open information practices at the local level, but also identify deficiencies such as local protection for polluting enterprises and fraudulent data reporting, which undermine the participatory capability of the public. To better serve public need for information, IPE thus makes policy recommendations to law-making institutes, improving national legislation on environmental information disclosure. For example, the 2012 annual survey of local information disclosure showed a downward trend in the disclosure of key information, with the largest number of cities getting lower PITI scores than in the previous three years. As China's air pollution neared an alarming level in 2013, IPE and NRDC recommended in their 2013 PITI report the implementation of a comprehensive system of pollution-source information disclosure to meet the public's demand for information to enable participation. Afterward, IPE and 25 other social organizations in China jointly called for the comprehensive disclosure of pollution-source information. Their recommendations were effective; consequently, significant progress has been made in national legislation on environmental information disclosure, requiring local disclosure of key information such as routine supervision records, enterprise emission data, and Environmental Impact Assessment documentation.

With the central government's efforts to improve open data laws in the environmental sphere, as well as the continuous push by IPE activists, a breakthrough in the disclosure of pollution-source supervision information was achieved between 2017 and 2018. According to the 2018 PITI report, there has been a huge increase in the amount of public data released, and leading cities have improved the disclosure of routine supervision information, with a trend toward normalization. The positive change in environmental data disclosure indicates that the PITI report, subjecting governments to annual evaluation of their performance, represents a type of data activism that is effective in facilitating public access to environmental data.

Here, the mechanisms of influence not only lie in the empowering potential of big data in the technological sense, but, more important, they also depend on IPE activists' local social-technical practices with the PITI in the specific context of Chinese environmental governance. The central

government has strengthened its grasp on power to manage local governments, with recent reforms improving the legal framework for open environmental data and strengthening environmental supervision. Against this backdrop, IPE activists find that borrowing authority from higher level governments is the key to making their data activism influential in pushing local implementation of open data policies. By leveraging the coercive force of the law requirements, IPE activists are able to pressure local authorities to disclose environmental data, which could not be achieved by increasing public transparency alone via publishing the PITI report. Moreover, the central government inspection is another facilitator for IPE activists to exert influence on the accountability of local governments in implementing the open information policies. In addition, IPE activists' data practices with the PITI are based on their understanding of public need. In their annual PITI reports, they provide policy recommendations to the central government based on public interest. By adopting strategies compatible with the rules of policy making and policy implementation under the fragmented authoritarian framework, IPE activists have successfully entered the policy process and influenced policy decision making.

Data-Based Civic Monitoring and Response System

With access to environmental data, IPE has set up the large database composed of data gathered from all levels of governments and enterprises. While providing environmental data alone does not result in reduction of air pollution, IPE activists have designed mechanisms for citizens to report polluting behaviors on Weibo (Chinese Twitter), using the data provided by the civic tech app. Seeing the importance of public scrutiny on environmental pollution activities, IPE activists have developed a Weibo-mediated micro-monitoring system (weijubao 微举报), opening a crucial bridge to channel citizens' concerns about environmental problems into the empowered space. IPE activists' activism practices with the micro-monitoring system has been proved effective not only to mediate civic monitoring of enterprises' polluting behaviors, but also to hold political institutions accountable to public complaints.

In addition to making a comprehensive database accessible to the public, IPE activists are dedicated to facilitating users' engagement with the environmental data. They transform raw data into structured data via the process of datafication, providing data conditions that enable citizens to monitor polluting enterprises and prepare to take action. To engage users in environmental protection, IPE members have designed an air quality map and map of pollutant emission enterprises on the app, presenting citizens with data facts about environmental pollution. The key part of IPE members' job is identifying the barriers to citizens using their data on the Bluemap app, and then making their data more easily understood and their civic tool user friendly by advancing the forms of datafication. For instance, they visualize the pollutant emissions data on the map of enterprises, presenting users a map on which enterprises are marked with different colors and signs according to their data records (Figure 1). As Figure 1 shows, enterprises that release pollutants within the standards are marked in green, and enterprises emitting pollutants exceeding the standards are in red. If citizens want to check more details about the pollution data, they can get real-time emission data by clicking the enterprise on the map. In this process of datafication, raw environmental data are interpreted to be more easily read by ordinary citizens, thus facilitating citizens' monitoring of pollutant factories. If citizens find a factory producing pollution on Bluemap, they can expose the factory's polluting behaviors based on its emission data on the social media platform Weibo by following the shared link.

Figure 1. Map of pollutant emission enterprises.

Using the Bluemap app, citizens are able to report polluting factories to local governments via @ their official Weibo accounts based on the emission data. As a matter of fact, governmental Weibos work as an effective channel for environmental activists to act as a watchdog for environmental pollution (Figure 2). Based on the pollution data gathered by IPE, both the truthfulness and authority of citizens' complaints are increased, resulting in greater response from local governments and enterprises (Interviewee 2, senior researcher of IPE). To be responsive to citizen complaints, some local governments have established a Weibo-mediated response system and institutionalized the response process, ensuring adequate accountability.

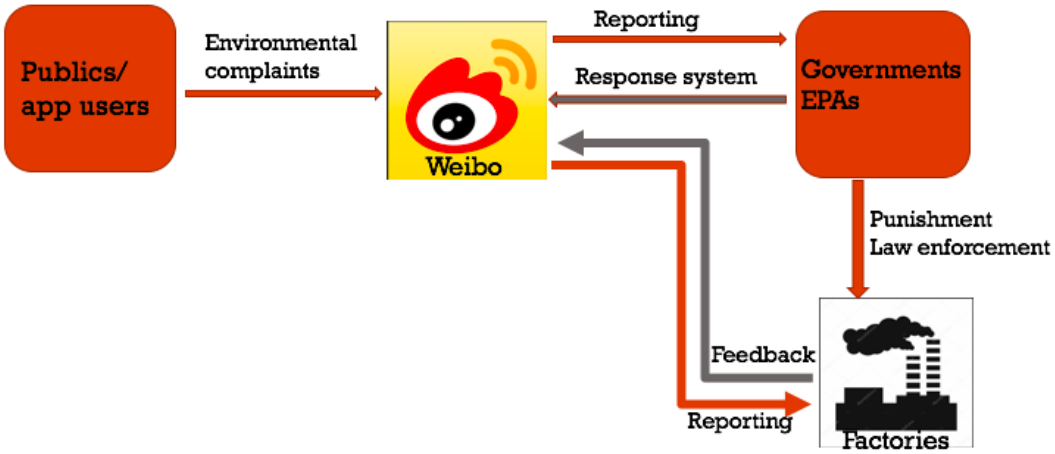

Figure 2. Weibo-mediated civic monitoring.

The government of Shandong province, which is often linked with heavy air pollution, has made a good example of being accountable to public complaints with its three-level response system established on Weibo. The response system has specified the work of governments, whether at the provincial, municipal, or county level. The government, which is supposed to respond to citizens' complaints, is required to address citizens' environmental concerns; otherwise, it will be forced to be accountable by the higher level authorities (Interviewee 11, an Environmental Protection Agency official in Shandong). The accountability principle requires the local Environmental Protection Agency (EPA) to adopt measures to control enterprises' level of pollution until their pollutant emissions meet the standards of environmental protection. With the effective transmission and accountability mechanisms demonstrated earlier, citizens' environmental claims enter the political space. The benefit of civic monitoring is quite obvious in Shandong's governance of environmental issues. According to Interviewee 3 (IPE's chief technology officer), public monitoring of factories' environmental performance facilitates the ability of local EPAs in Shandong to do their job, requiring those enterprises to stop producing pollution. This becomes possible because complaints from citizens relieve local EPAs of the burden to directly confront enterprises, especially large state-owned corporations whose administrative positions are higher than those of local EPAs in the hierarchy.

IPE activists' practice of designing the micro-monitoring mechanism to facilitate citizens' use of environmental data has been successful; their data activism has lowered the barriers for citizens to be informed and has empowered them to be civic watchdogs for factory pollution. More important, taking the hierarchical relationship among different levels of government into account, they have successfully integrated the micro-monitoring system into the local environmental governance structure. As of November 2018, ENGOs and ordinary citizens have reported a large amount of industrial pollution based on Bluemap data, and 1,421 state-owned enterprises have responded to the public monitoring of their environmental violations via the reporting and response system (Institute of Public and Environmental Affairs [IPE], 2018).

It is noteworthy that citizens' Weibo-mediated monitorial participation is not subversive in nature, but rather incorporated into the governance process of local governments as a constructive force. This is possible because IPE activists design the data-based micro-monitoring system in the specific context of environmental governance in China. They make the civic monitoring channel not only to facilitate public participation, but also to meet the goals of local governance. As Interviewee 1 (founder of IPE) illustrates, Shandong EPA officials actually invited IPE to build mechanisms to help local governments in Shandong boost environmental public participation in a constructive way. On one hand, public complaints should show (data) evidence of pollution, based on which local EPAs could make decisions in law enforcement. On the other hand, the response system must be added to the existing government process as a workable alternative, rather than countering the current governance system. In light of these specific demands, IPE activists have designed mechanisms for citizens to report pollution by using Bluemap data, while assisting local governments in being responsive to citizens' environmental concerns.

Blue Ecochain: Coordinating Multiparty Collaborations in Greening Supply Chains

In addition to government environmental regulations and civic monitoring, enterprises are driven to be responsible for the bulk of environmental impacts by market forces as well. Aware of the influential role business that actors can play in improving enterprises' environmental performance, IPE data activists strive to involve brand corporations or manufacturers in practicing green supply chain (GSC) management to push their suppliers to reduce environmental pollution. They have innovated Blue Ecochain, an automated information system that facilitates multiple stakeholders' working collaboratively in greening supply chains. The Blue Ecochain system is an account-based tool that allows publics, brands, and suppliers to receive dynamic, instantaneous updates about suppliers' environmental performance from the Bluemap app. IPE's data platform not only enables the connection among stakeholders and provides information conditions for the multiparty collaboration, but also makes the outcome of their environmental activism consequential.

By using IPE's data platform, users can identify and report enterprises' environmental violations. When notified of enterprises' polluting behaviors, IPE data activists transmit public inquiries into the empowered space of green chain actors through its action network. Brands become the actor that IPE data activists target first, because they are responsible for responding to public inquiries and managing enterprises through the supply chain to reduce harmful emissions. In the current situation, response is secured not only by brands' internal motivation to adopt the GSC management as a development strategy, but also by the brands' fear of losing their suppliers because of the Chinese government's increasingly tight policy to reduce environmental pollution (Interviewee 9, IPE's GSC project manager).

Through communicative exchanges with brands, IPE activists aim to achieve consensus on green development with brand manufacturers by showing them the potential financial loss that may be caused by factories' polluting behaviors (Interviewee 9). Here, they construct their data practices around the Blue Ecochain system based on common interests between the public and brands, which support collaboration among multiple stakeholders in environmental activism. Meanwhile, applying the logic of green supply chain management, IPE creates a mechanism of accountability in its data activism. IPE engages brand corporations committed to buy from suppliers who have good environmental performance as shown by the Bluemap data platform. Under this purchasing pressure, suppliers are held accountable to public complaints;

they must explain their environmental problems to the public and work out plans to reduce pollutant emissions. By taking advantage of the relationship between buyer and supplier, IPE activists' data activities are effective in motivating brands to require suppliers to take corrective action to remedy their environmental violations. Between October 2018 and September 2019, IPE pushed more than 2,900 supply factories to address their environmental violations via the Blue Ecochain System, responding to public monitoring and taking actions to reduce pollution (IPE, 2019).

It is noteworthy that the simultaneous information sharing among all stakeholders (publics, brands, and supply enterprises) enabled by the app-based automated information system has enhanced the trust and commitment among all stakeholders, accelerating the process of holding green chain actors accountable to the public. By using the Blue Ecochain system, brands and suppliers receive synchronized, push-alert updates regarding new environmental violation records and public inquiries. The Ecochain data system automates the process by which a brand uses Bluemap data to screen its suppliers for environmental violations via single-line and/or batch searches, reducing supply chain management costs for brands. With the environmental data open to multiple stakeholders, supply enterprises cannot hide environmental risks from their brand customers. This increased transparency avoids a "cat and mouse game" between brands and suppliers, while motivating them to collaborate with each other to solve environmental problems (Interviewee 9). In other words, the big data system directly exposes the brands with data evidence of pollution, thus accelerating the process for brands to hold problem suppliers accountable in response to public inquiries (see Figure 3).

Figure 3. The Blue Ecochain system (Cited from IPE's website **Green Supply Chain 2019 CITI Evaluation Annual Report** at http://wwwoa.ipe.org.cn//Upload/201910251017411510.pdf*).*

Another important advantage of Blue Ecochain is its potential to render the outcome of multiparty collaboration consequential. To make its environmental action influential, IPE also provides guidance to suppliers on how to respond to environmental violation records:

> The supplier must at least take the initiative to issue public explanation(s) with content including but not limited to the reason for the violation, corrective actions already completed or in progress, and current compliance status in a timely manner. The brand must also adopt measures to be responsive if the supplier has not yet initiated corrective actions. (IPE, 2015)

Meanwhile, IPE applies the automated information system to track suppliers' information disclosure and corrective actions in real time and automatically generates a report summarizing suppliers' environmental performance, which is open to public supervision. In addition, IPE developed the green supply chain map, a data initiative dedicated to showcasing brands' commitment to supply chain transparency and environmental management. It openly links brands' supplier lists to publicly available environmental data, including real-time data for air emissions and wastewater discharge, to demonstrate brands' concrete actions to monitor and improve environmental performance along their supply chain (IPE, 2015) As a way to subject brands' and suppliers' environmental action to public supervision and evaluation by consumers, the green supply chain map works together with the Blue Ecochain system to make IPE's data activism influential in binding collective decisions and their implementation. Here, the salient characteristic of IPE's data practices is that they have successfully coordinated the environmental action of brands and their supply enterprises with external oversight power from consumer publics, thus meeting the purpose of their data activism.

Discussion and Conclusion

Focusing on the dynamics of datafication in the environmental sphere, we analyzed three modes of data activism in which ENGO (IPE) activists engaged with the Bluemap data platform to support new forms of civic engagement (Milan, 2017). IPE data activists have established different participatory mechanisms for the public to practice different forms of civic oversight to ensure that empowered agents operate as intended. Our empirical analysis shows that ENGO activists engage in alternative modes of data practices in the specific sociopolitical context of China, thus contributing to our understanding of the dynamics of datafication and its sociopolitical impacts from the Global South(s).

IPE's creation of the PITI evaluation works as a form of supervisory power by quantifying local governments' performance in environmental information disclosure. IPE activists' ranking of local governments in the PITI puts the competence of local governments in implementing information disclosure under examination and evaluation (kaohe 考核). At the same time, the state centralizes administrative power in environmental governance, requiring more careful top-down inspection to enhance efficiency in local implementation of environmental policies. Consequently, this supervisory power from the state serves as

the basis for IPE to exert influence over local implementation of information disclosure policies. By engaging in big data–driven evaluation, IPE activists have effectively gained a new form of supervisory power capable of incorporating public demands and citizen expectations into governmental practice of environmental information disclosure.

The objective of IPE's second data project is to establish a data-driven micro-monitoring system to mediate citizens' monitoring of the enterprises' polluting behaviors. Moreover, they also push the government to establish institutional mechanisms that could incorporate environmental activism very well into the formal political sphere. Their digital experiment with the micro-reporting system works similarly to "modeling" a type of data activism by civic hackers (Schrock, 2016, p. 593), which refers to using open data to develop alternative working prototypes for the government. Situated in the specific local context of China, IPE activists model the micro-monitoring system into the local governance process, assisting local governments to hold enterprises accountable for their environmental impacts. Thus, the micro-monitoring system serves as a prototype of an alternative, nonsubversive mechanism that IPE can lobby local governments to accept within their existing governance structure. As Baack (2015) finds, recommending that institutions adopt existing alternative services on the basis of datafication, and persuading them to do so, is a way for data activists to facilitate citizen-government interactions. In this context, data-based civic oversight has been adopted by local governments as part of their government agency, improving their direct communication with citizens in the Chinese landscape of environmental governance.

IPE's third data project shows how data activists engaged in designing an automated information system for citizens to supervise business actors, influencing brands to push their supply enterprises to make environmental changes. Blue Ecochain, the automated information system, not only enables citizens' civic oversight of the enterprises, but also accelerates the process of holding enterprises accountable for their environmental violations by engaging brand corporations. Taking advantage of the ideas in green supply chain management, IPE activists imagine the automated information system as a service provider to facilitate brands' management of the environmental performance of the factories in its supply chain. Their vision of the data platform is associated with the market logic inherent in green supply chain management. In their negotiation with brand corporations, IPE members persuade and motivate brands to engage in environmental action by showing them the financial loss that may be caused by their supply enterprises' environmental violations. Identifying and serving the needs of brands, IPE activists also develop data initiatives to involve the public in overseeing the performance of brands, pressuring them to fulfill their mission of greening their supply chain. The power of public oversight plays a powerful role in making green supply chain management effective in China.

The three modes of data activism practices highlight the technical potential of the data-driven civic tech tool to facilitate civic oversight in environmental politics. In the three types of data activism, IPE activists play the role of "empowering intermediaries" who make data accessible to the public and facilitate public use of data via the process of datafication (Baack, 2015). As demonstrated in this study, a major part of IPE data activists' job is to gather environmental data released by governments and enterprises and make them openly accessible. Moreover, IPE data activists are engaging; they innovate big data initiatives that suit the public's need to enhance different forms of public supervision and civic oversight. To facilitate public use of the civic tech app, IPE activists transform raw data into information that can be easily understood by

users, and they design user-friendly functions by advancing forms of datafication. Their efforts to create data conditions that lower the barriers of civic engagement contribute to rendering "datafication as a productive force" (Milan, 2018, p. 508). Sharing similar visions with data activists in Western countries, IPE activists are empowering intermediaries in that their practices meet the criteria of being "data-driven, open and engaging" (Baack, 2015, p. 6).

Our empirical analysis also suggests that locating data practices in China's specific political culture, governance structure, and existing legal system is essential for data activists to meet their sociopolitical ends. Previous research has revealed that the local context influences how civic tech organizations develop goals and activities around their projects (Cheruiyot, Baack, & Ferrer-Conill, 2019). Further, it is important for activists to adopt data technologies into local needs and locate their social-technical imagination of big data into a specific sociopolitical context, whether in the West (Schrock, 2016) or Latin American countries (Chenou & Cepeda-Másmela, 2019; Treré & Carretero, 2018). The Chinese experience of data activism also echoes the trend to translate innovative data practices into the local context.

In this case study, data activists' social-technical practices are situated within ongoing power relations in China's environmental sphere. Our analysis reveals that IPE activists' data practices are closely tied to and shaped by China's fragmented authoritarianism (Lieberthal & Lampton, 1992), which explains the decentralization and centralization in terms of authority distribution and power dynamics in China's bureaucratic practices. In particular, IPE's first two data projects clearly illustrate how data activists find ways to effectively engage local governments in order to implement open data policies and respond to citizens' environmental concerns by taking advantage of China's central-local hierarchical governance system. Sharing the same goal with the state's move to prioritize environmental protection, IPE could borrow the (central) government authority to support public participation and hold local governments accountable to address citizens' environmental concerns. Then, by using government environmental data and mobilizing the public supervisory force, IPE activists gain the power to persuade brand manufacturers to push their suppliers to take environmental action.

By reaching consensus with all stakeholders and enabling new forms of civic engagement, IPE activists have involved governments, publics, and enterprises in their environmental data activism and coordinated multiparty collaboration to improve the environment. We conclude that IPE activists play a dual role in their data activism: They are both think tanks and pressure groups for the decision makers in the governance system. On one hand, IPE activists help the state and local governments deal with deteriorating environmental pollution as policy advocates; on the other hand, IPE gets the opportunity to expand the green public sphere for public participation with the emergence of the new data-based constellation of supervisory powers.

In contrast to Western modes of data activism that take root in the realm of civil society and emerge as counterpowers challenging authorities or political system dysfunction, data-driven political interventions in the Chinese context are not antisystem nor antigovernment. Although the new forms of political activism function as supervisory power in China's environmental governance system, they do not involve contentious political criticism of the existing political system. Instead, they are issue specific, seeking influence in the space allowed by the state. Rather than mobilizing radical contestation, environmental data

activism in China works more as a "constructive alternative" (Coleman, 2017, p. 22) to the denial of the existing governance system, aiming to transmit public input into the policy-making process. More specifically, the boundaries between government advocate and political activist become blurred in the ENGO's data activism. By finding the middle ground between confrontation and state control, IPE activists have participated in the political process as "policy entrepreneurs" who work in cooperation with the government and pursue their political goals within the fragmented authoritarian system (Mertha, 2009). Finally, although IPE's data activism practices have been proved influential, their success is still contingent on national open data policies and local implementation of relevant policy regulations. As data activism continues to be particularly enabled and constrained by big data and datafication, more data transparency, accessibility, and reliability are required for effective civic supervision and public participation. Thus, to facilitate civic engagement, pushing the administrative units to institutionalize measures ensuring that local governments and enterprises adequately open their environmental data will still top the IPE's working agenda in coming years.

References

Arora, P. (2016). Bottom of the data pyramid: Big data and the Global South. *International Journal of Communication, 10*, 1681–1699.

Baack, S. (2015). Datafication and empowerment: How the open data movement re-articulates notions of democracy, participation, and journalism. *Big Data & Society, 2*(2), 1–11. doi:10.1177/2053951715594634

Baack, S. (2018a). Practically engaged: The entanglements between data journalism and civic tech. *Digital Journalism, 6*(6), 673–692. doi:10.1080/21670811.2017.1375382

Baack, S. (2018b). Civic tech at mySociety: How the imagined affordances of data shape data activism. *Krisis: Journal for Contemporary Philosophy, 1*, 44–56.

Beraldo, D., & Milan, S. (2019). From data politics to the contentious politics of data. *Big Data & Society, 6*(2), 1–11. doi:10.1177/2053951719885967

Chenou, J. M., & Cepeda-Másmela, C. (2019). #NiUnaMenos: Data activism from the Global South. *Television & New Media, 20*(4), 396–411. doi:10.1177/1527476419828995

Cheruiyot, D., Baack, S., & Ferrer-Conill, R. (2019). Data journalism beyond legacy media: The case of African and European civic technology organizations. *Digital Journalism,* 1215–1229. Advance online publication. doi:10.1080/21670811.2019.1591166

Coleman, S. (2017). *Can the Internet strengthen democracy?* Malden, MA: Polity Press.

Couldry, N., & Mejias, U. A. (2019). Data colonialism: Rethinking big data's relation to the contemporary subject. *Television & New Media, 20*(4), 336–349. doi:10.1177/1527476418796632

Guttman, D., Young, O., Jing, Y., Bramble, B., Bu, M., Chen, C., . . . Liu, L. (2018). Environmental governance in China: Interactions between the state and "nonstate actors." *Journal of Environmental Management, 220*, 126–135. doi:10.1016/j.jenvman.2018.04.104

Han, H. (2014). Policy deliberation as a goal: The case of Chinese ENGO activism. *Journal of Chinese Political Science, 19*(2), 173–190. doi:10.1007/s11366-014-9288-0

Institute of Public and Environmental Affairs. (2015). *CITI 6.0 evaluation guidelines*. Retrieved from http://www.ipe.org.cn/GreenSupplyChain/userguide/CITI%20Evaluation%20Guideline.pdf

Institute of Public and Environmental Affairs. (2018). *Environmental information disclosure: Moving towards normalization*. Retrieved from http://wwwoa.ipe.org.cn//Upload/201904190423050506.pdf

Institute of Public and Environmental Affairs. (2019). *Green supply chain 2019 CITI evaluation annual report*. Retrieved from http://wwwoa.ipe.org.cn//Upload/201910251017411510.pdf

Kennedy, H. (2018). Living with data: Aligning data studies and data activism through a focus on everyday experiences of datafication*. Krisis: Journal for Contemporary Philosophy, 1*, 18–30.

Kostka, G., & Zhang, C. (2018). Tightening the grip: Environmental governance under Xi Jinping. *Environmental Politics, 27*(5), 769–781. doi.org/10.1080/09644016.2018.1491116

Lehtiniemi, T., & Ruckenstein, M. (2018). The social imaginaries of data activism. *Big Data & Society, 6*(1), 1–12. doi:10.1177/2053951718821146

Leurs, K., & Shepherd, T. (2017). Datafication & discrimination. In M. T. Schäfer & K. van Es (Eds.), *The datafied society: Studying culture through data* (pp. 211–231). Amsterdam, The Netherlands: Amsterdam University Press.

Lieberthal, K. G., & Lampton, D. M. (Eds.). (1992). *Bureaucracy, politics, and decision making in post-Mao China*. Berkeley, CA: University of California Press.

Mertha, A. (2009). "Fragmented authoritarianism 2.0": Political pluralization in the Chinese policy process. *The China Quarterly, 200*, 995–1012. https://doi.org/10.1017/S0305741009990592

Milan, S. (2017). Data activism as the new frontier of media activism. In G. Yang & V. Pickard (Eds.), *Media activism in the digital age* (pp. 151–163). London, UK: Routledge.

Milan, S. (2018). Political agency, digital traces, and bottom-up data practices. *International Journal of Communication, 12*, 507–527.

Milan, S., & Gutierrez, M. (2018). *Technopolitics in the age of Big Data*. In F. S. Caballero & T. Gravante (Eds.), *Networks, movements and technopolitics in Latin America* (pp. 95–109). Cham, Switzerland: Palgrave Macmillan.

Milan, S., & Treré, E. (2019). Big data from the South(s): Beyond data universalism. *Television & New Media, 20*(4), 319–335. doi:10.1177/1527476419837739

Milan, S., & van der Velden, L. (2016). The alternative epistemologies of data activism. *Digital Culture & Society, 2*(2), 57–74.

Schrock, A. R. (2016). Civic hacking as data activism and advocacy: A history from publicity to open government data. *New Media & Society, 18*(4), 581–599. doi:10.1177/1461444816629469

Tan, Y. (2014). Transparency without democracy: The unexpected effects of China's environmental disclosure policy. *Governance*, *27*(1), 37–62. doi:10.1111/gove.12018

Treré, E., & Carretero, A. B. (2018). Tracing the roots of technopolitics: Towards a North-South dialogue. In F. S. Caballero & T. Gravante (Eds.), *Networks, movements and technopolitics in Latin America* (pp. 43–63). Cham, Switzerland: Palgrave Macmillan.

Van Rooij, B., Stern, R. E., & Fürst, K. (2016). The authoritarian logic of regulatory pluralism: Understanding China's new environmental actors. *Regulation & Governance, 10*(1), 3–13. doi:10.1111/rego.12074

Yang, G. (2005). Environmental NGOs and institutional dynamics in China. *The China Quarterly, 181*, 46–66. doi:10.1017/S0305741005000032

Yang, G., & Calhoun, C. (2007). Media, civil society, and the rise of a green public sphere in China. *China Information, 21*(2), 211–236. doi:10.1177/0920203X07079644

Yew, W. (2019). Matrix of free spaces in China: Mobilizing citizens and the law through digital and organizational spaces. *International Journal of Communication, 13*, 3341–3360.

Zhu, X., & Wu, K. (2017). Public participation in China's environmental lawmaking: In pursuit of better environmental democracy. *Journal of Environmental Law, 29*(3), 389–416. doi:10.1093/jel/eqx012