

Measuring social network influence on power relations in collaborative planning: A case study of Beijing City, China

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ABSTRACT

Social media has recently become a networked public sphere for social interactions and power struggles in planning practice. However, little research has been done to understand the impact of social media on power relations in collaborative planning. This study uses the Bell and Drum Tower planning practice in Beijing as a case study to elaborate on whether and how social media empowers citizens, experts, and third parties to influence decision-making and promote a communicative planning process. It develops a mixed-methods approach that combines web scraping, social network analysis, and interviews to examine networked power generated by social media. It applies the three dimensions of a network (structure, symmetry, and strength) to measure new forms of power imbalances. The findings show that experts and journalists hold a significant amount of networked power and that social actors can enhance their influence by managing and controlling information flows. Power inequalities exist in the networked public sphere but shift away from governments to other actors, yet without jeopardizing the ultimate decision-making on the ground by the government. This study bridges the gap between network power theory and network science, turning the metaphor of network power into an evidence-based analysis based on a quantitative approach.

1. Introduction

Embedded in Habermasian communicative rationality, collaborative planning theory (CPT) focuses on power neutralization, equality, dialogue, and consensus building among diverse stakeholders (Innes & Booher, 2015). However, collaborative planning has been criticized for neglecting power relations, institutional contexts, and the political economies of planning practice (Goodspeed, 2016; Watson, 2016). As a result, the debate on CPT continues, as the reality of power struggles in planning practices is seen as a political process that contradicts the notion of depolitized neutral power (Fainstein, 2000; Fainstein, 2005; Flyvbjerg & Richardson, 2004, p. 3; Huxley & Yiftachel, 2000). While there have been numerous attempts to explain the operation of power in CPT, the definition of power remains ambiguous in planning studies. Recent scholarship has attempted to examine how CPT operates in different contexts and how it fits or does not fit with the reality of power inequality (Agger & Sørensen, 2018; Calderon & Westin, 2021). The advances in information and communication technology (ICT) and social media have also presented new avenues for power struggles. The proliferation of social media has created new public spheres and new

forms of power relations, greatly affecting planning practice (Lin, 2022). But the extent to which all these advances can empower civil society and citizens and reshape power relations in collaborative planning practices remains unclear.

The extensive use of social media has contributed to the emergence of a network society and the phenomenon of mass self-communication (Castells, 2007, 2010). It is a form of Internet-based communication in which information is produced and disseminated by individuals who have the potential to reach a global audience. This new form of communication has had a significant impact on recent planning practices (de Waal & de Lange, 2019; Lin, 2023). The public dialogue on planning has been extended to the online arena, which is referred to as a networked public sphere that emphasizes the networked environment for individuals, civil society and communication (Friedland et al., 2006). In this sphere, intensive information exchange and power conflicts occur.

Castells (2011a, 2011b) posits that power is exercised through communication platforms and proposes the theory of network power, which provides a fresh perspective for analyzing complex and dynamic power relations in planning. Although some scholars have applied this

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network view of power relations to planning studies, they have overlooked the practices that occur in the online sphere (Bafarasat & Baker, 2016; Booher & Innes, 2002; Fox-Rogers & Murphy, 2014). Few recent studies have explored network or communication power in planning practices (Deng et al., 2015; Zhao et al., 2017), and so it remains unclear how networked power is developed in social networking sites and how network power can be measured quantitatively.

This study aims to bridge the gap between network power theory and network science in the planning literature. It applies social network analysis (SNA) especially three S-dimensions (the strength of interaction, the symmetry of interaction, and the structure of the network) and several related indicators to quantitatively measure the complexity of network power generated by social media platforms. To implement this approach, we use the regeneration of the Bell and Drum Tower Area in Beijing as a case study. The Bell and Drum Tower Area regeneration is an infamous Chinese planning controversy in which civil society organizations, experts, and citizens utilized social media to establish their networks and facilitate public debates to influence decision-making and enable a more communicative approach to planning practice. The Bell and Drum Tower Area (BDTA) controversy was selected as the subject of study for three reasons: the diverse participants formed a complex online network; the actors used social media intensively; and the online actions influenced the planning process and outcomes. Our approach comprises web scraping, SNA, and semi-structured interviews. We collected digital data from the Chinese social media platforms and applied SNA to measure the power relations in the networks that were generated by the platforms by examining the three dimensions of the networks (structure, symmetry, and strength). In-depth interviews were also conducted to ascertain the influence of online network power on offline power relations in the planning practice.

The article is structured as follows. **Section 2** is a literature review of power relations in collaborative planning, the influence of social media on network power, and networked power analysis. **Section 3** explains the integration of power relations analysis with SNA. **Section 4** explores the use of the three dimensions of power to measure power differences across actors quantitatively. Finally, **Section 5** critically examines the complex influences of social media on planning and highlights the influential role of journalism in online planning controversies.

2. Literature review

2.1. Power relation in collaborative planning

CPT is often criticized for neglecting power relations in practice. This neglect is rooted in the idealized communicative rationality promoted by Habermasian philosophy, which has been criticized for its depolitized understanding of power neutrality and its disregard for the role of power conflicts in planning. Critics have described this as “manipulation by power holders” (Tewdwr-Jones & Allmendinger, 1998), a “utopian planning imaginary” (Huxley & Yiftachel, 2000), and a failure to “capture the role of power” (Flyvbjerg & Richardson, 2004, p. 3). Recent developments in the research focusing on CPT include two important trends: the influence of specific local contexts on unequal power relations (Calderon & Westin, 2021; Forester, 2016; Watson, 2008; Westin, 2022), and an alternative planning theory with a focus on power struggles (Kühn, 2021; Mouat et al., 2013). These trends suggest that studying power relations in collaborative planning is becoming more complex. They also raise new challenges in planning practice, particularly in institutional systems that differ from those in western countries. For example, recent studies have revealed gaps between collaborative planning practices in non-western countries and CPT, which was born in democratic contexts (Calderon & Westin, 2021; Cao et al., 2021; Yuan et al., 2021). Additionally, the recent development of ICT has profoundly impacted power relations in planning practice. Several recent studies show that social media can play an active role in shaping online debates and challenging traditional power structures in planning

(Cheng, 2013; Deng et al., 2015; Lin, 2022). However, how it shapes or reshapes power relations remains unclear. More research is needed to understand the influence of digital platforms on power relations in planning practice.

2.2. Social media, public sphere, and network society

The advent of social media has created a new sphere of public dialogue, drawn a massive audience into public affairs discussion, sparked more communication activities, and influenced planning practices (Zhao et al., 2017; Fredericks & Foth, 2013; Lin, 2022). Due to the emergence of the Internet and social media, digital communication networks have transformed news and public affairs coverage, making them more diverse and complex. The Habermasian public sphere, which is based on hierarchical institutions and dominated by mass media organizations, therefore does not represent today's reality of a more complex media environment (Bruns & Highfield, 2015; Habermas, 2020). To distinguish it from the Habermasian public sphere, some scholars conceptualize the new public sphere as the networked public sphere that emphasizes the networked environment for individuals, civil society, and communication in the information age (Benkler, 2006; Friedland et al., 2006). Networked communication allows the public sphere to be organized in more distributed and open ways (Friedland et al., 2006). Social media platforms like Twitter have emerged as an important part of the networked public sphere, and have made it more accessible for individuals, enabling them to organize themselves and voice their criticism of or opposition to certain actions or decisions (Çela, 2015). As Shirky (2011) declares, the potential of social media lies primarily in its supportive role for civil society and public sphere change. In China, the fragmentation of the public sphere caused by social media changes the possibilities for public participation in changing power relations (Shao & Wang, 2017). However, the impact of social media on the public sphere and on the empowerment of citizens in China has been controversial. Some scholars argue that Internet censorship and state control limit public debates in authoritarian contexts (Stockmann et al., 2020), and that social media even opens new ways of state surveillance and oppression (Fuchs, 2015; Poell & van Dijck, 2018). Other scholars argue that social media platforms like Weibo have facilitated online public spheres for debate under certain conditions (Rauchfleisch & Schäfer, 2015; Sun et al., 2018).

Before the upsurge in social media, Castells (2011a, 2011b) proposed a network perspective to observe such a networked society, claiming later (Castells, 2004) that a network society is “a society whose social structure is made of networks powered by microelectronics-based information and communication technologies”. Although Castells' theory of network society originally derived from traditional mass media such as television and newspapers, the burgeoning of the Internet in recent years has expanded the network society into cyberspace. The development of the network society and the online public sphere has led to profound changes in traditional power relations by shaping public discourses. Some studies reflect that social media have the potential to change the content of information and obscure the public focus (Afzalan & Muller, 2014; Bakshy et al., 2015; Cheng, 2013; Stromer-Galley & Wichowski, 2011). Recent critics have argued that social media could strengthen dominant power, reinforce digital segregation, and emphasize non-inclusiveness (Feeney & Porumbescu, 2021; Mattila & Nummi, 2022; Ruths & Pfeffer, 2014; Verdegem, 2011). As such, social media brings additional complexity to power relations and merits further investigation.

2.3. Network power and social network analysis

Studies in the field of media and communication suggest that actors in the network society are able to utilize social media to develop networks that challenge pre-existing power relations (Castells, 2011a, 2011b). This phenomenon has been widely discussed, as social media not only make online protests and actions accessible, but also encourage

the creation of informal networks of interactions (Freelon et al., 2018). Power relations in the networked public sphere are mired in the network metaphor of dominating or being dominated. Castells (1996, p. 500) and Castells (2011a, 2011b) refer to the power from discourses as network power or communicative power. In CBT, concepts such as “network power” and “communicative power” are used to highlight the influence of communicative activities on power (Booher & Innes, 2002, p. 225; Innes & Booher, 2015). This terminology is borrowed from Castells, but, according to Castells’ approach, they emphasize the role of communication to create new meanings and neutralize power relations and ignore the unequal power generated by digital networks. Castells has classified network power into four categories: networking power, network power, networked power, and network-making power (Castells, 2007; Castells, 2011a, 2011b). Of these, networked power is used to describe the power within a network, which is:

“*the form of power exercised by certain nodes over other nodes within the network. In communication networks, this translates as the agenda-setting, managerial and editorial decision-making power in the organizations that own and operate multimedia communication networks.*”

(Castells, 2011a, 2011b, p781)

Power relations are established through communication and the creation of a shared understanding of what constitutes power (Fuchs, 2009). This is particularly relevant in the context of online social media, which facilitates intensive, large-scale communicative interactions. Such power relations that appear between network nodes can be measured if the communicative actions that occur in the networked public domain can be counted. Existing research also suggests that the networked public sphere has the potential to give rise to alternative discourses, even in countries where the media is strictly regulated by the government (Soon & Cho, 2011). Castells (2007) used the concept of “counter-power” to define the ability of social actors to resist and challenge institutionalized power relations. Similar ideas can be found in Foucault’s power theory, where “counter conduct” is used to critique and reflect on government actions, reducing the dominance of power relations in self-formation and political action (Huxley, 2017).

By incorporating counter-power into the discourse of planning practice, public engagement in the planning process is also viewed as a potential source of counter-power (Elling, 2017). A few recent planning studies have attempted to examine power relations through the lens of network power, revealing unequal networked power between elites and citizens in Chinese collaborative planning (Zhao et al., 2017; Deng et al., 2015), but they have neglected to validate the detailed measurement and comparison of such inequality. The differentiation of strengths in networked power highlights the feasibility of using a quantitative social network approach to study power relations.

Although Castells shares the perspective of nodes and connection in networks with scholars in network science, in his discussion the features of networks are metaphorical. This theory has faced criticism, particularly regarding its disconnection from network science (Anttiroiko, 2015). The web’s tendency towards centralization also undermines Castells’ emphasis on network decentralization (Miconi, 2022). This makes it challenging to apply Castells’ network concept in planning studies. More importantly, network power has not yet been measured quantitatively. SNA in the field of network science offers alternative approach to analyze power relations by treating actors as nodes and interactional relations as edges (Jackson, 2010; Scott, 2017). SNA is both a theoretical perspective on how the interaction of actors forms the social structure and a set of techniques to measure the interaction between the actors in the network (Scott, 2017). As it allows structural influences in planning practice to be identified, measured, and analyzed (Dempwolf & Lyles, 2012). It provides a potential approach to bridge the gap between the network power metaphor and network science. Many studies from the fields of governance, public relations, and sociology have investigated the usefulness of this approach in analyzing relation-based networks (e.g., Faul, 2016; Kent et al., 2016; Kharanagh et al.,

2020; Ramia et al., 2018; Vallet et al., 2020). For instance, Faul (2016) applied SNA to analyze the networked forms of collaboration and governance and find that a formal network does not moderate existing asymmetries of power. Yet, Kent et al. (2016) noted the limitation of using network theories to reveal organizational relations in public relations studies. Most of these studies have also used traditional methods and qualitative data such as interviews for SNA and power analysis. In the field of new media and political science, some studies have utilized SNA to investigate power relations generated by social networking sites during the events of American presidential elections, Indonesia politics, and the Arab Spring (Al-Hasan et al., 2018; Habibi, 2019; Sudhahar et al., 2015). However these studies focus on political power and social interactions on the macro level. In recent years, few studies have used SNA to understand power relations in urban planning, revealing the existence of unequal networked power generated by social networking sites (Deng et al., 2015; Zhao et al., 2017). However, it remains unclear how to further measure and compare such unequal power relations.

Conventional SNA approaches for power analysis are often simplified and may lead to a neglect of power’s complexity (Kent et al., 2016). Therefore, this study applies approaches from network science to measure the complexity of networked power generated by social network sites. In particular, we use three S-dimensions (the strength of interaction, the symmetry of interaction, and the structure of the network) to examine the patterns of interactions (Limtanakool et al., 2007). This approach was previously applied in urban studies to examine the flows and interactions between many urban areas as nodes. It can help to reveal information flows and interactions among various actors as nodes in the networks generated by social media. Since networked power is exercised through networks, where a particular actor is located (i.e., the node in the network) profoundly affects networked power. As Kent et al. (2016) and Smith et al. (2014) indicate, power can be measured by accessibility in networks, where degree centrality, closeness, betweenness, and eigenvector centrality are important metrics. In this perspective, the number and significance of the linkages in possession indicate the extent and degree of influence an actor can realize. Therefore, the strength of power becomes a comparable dimension when power can be differentiated based on position in the network. Furthermore, social media enables actors to receive and deliver information in real-time, and power is reflected by controlling information flows. Thus, symmetry and asymmetry are the central issues when analyzing power relations, as power is directional as information flows (Wolff, 2020). The structure of individual networks is an essential dimension in investigating the differences in cross-network comparisons, since different networks vary in size, depth, and efficiency of information flow (Sandström & Carlsson, 2008; Scott, 2017; Zhang, 2010). In short, the three dimensions with several related indicators yield novel pathways for analyzing the complexity of power relations generated by social media.

3. Research methods

As illustrated in Fig. 1, this study develops a new methodology comprising five steps: information positioning, web scraping, data preparation, network calculation, and interviews and comparisons. First, we screened the online platforms and major accounts in which the online controversies evolved. After scraping, cleaning, and organizing the target data, we computed a series of network indicators. Calculating the indicators and the supporting information obtained from the interviews allowed us to compare the power of different actors from the network perspective.

(1) Information positioning

We first used the name or keyword of the case study to search related public social media profiles on Weibo as well as information in forums such as Douban and Tiantian that have many participants and discussions about the case study. Douban and Tiantian are forum-type websites that allow users to post threads, repost content and make comments. We were also able to collect the content of online discussions and the

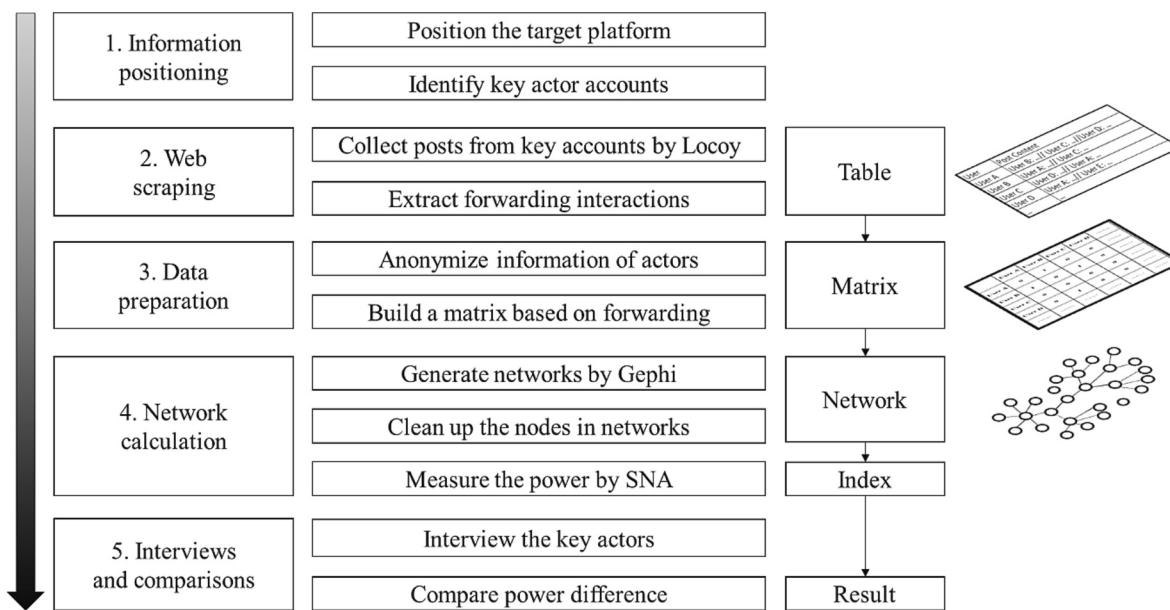


Fig. 1. Research methods.

information of interactions. Through an online search, we finally identified Sina Weibo as a major platform with ongoing debates. We identified three Weibo accounts created by an expert, an unregistered CSO, and the Dongcheng District Government in Beijing for web scraping (see below).

(2) Web scraping

Extensive web data collection is the basis of this study. After locating the key actors' public accounts by keywords, we used the Locoy web crawler tool to capture their post data on the Weibo platforms, including information on the actors, the interaction between actors in terms of forwarded messages, and the content of discussions. Locoy is a data collection tool that collects structured information through an API. The collected data was stored in an Excel file. Three primary datasets were scraped from the three major Weibo accounts created by an expert, an unregistered CSO, and the Dongcheng District Government. These datasets were used to create three networks: Network I, Network II, and Network III. The raw data for Network I included 5872 Weibo posts and 5972 users (as nodes of the network). The time period for informal flows in this network was from 2012 to the first half of 2013. The raw data for Network II included 1626 posts and 541 users, with the time period from 2013 to 2014. The raw data of Network III consisted of 322 posts and 207 users, with the time period from late 2012 and early 2013.

(3) Data preparation

We anonymized the data by assigning each actor in the data a letter and random code (e.g., A0001). The interactions between actors in terms of forwarding messages were transformed into a digit (0 for no interaction and 1 for an interaction) that can be used for SNA. We also identified three key actor categories: experts, official authorities, and unregistered civil society organizations. By so doing, we transformed the raw data into a forwarding matrix, where different users' forwarding activities to the same content were cumulative.

(4) Network calculation

Having created the matrix, we used the collected social media data and then applied SNA to measure the information flows and the relations between various actors in the case study. Each individual user was considered to be a node. All information was then anonymized, and the forwarding interaction was translated into edges between nodes: see Fig. 2. We then applied SNA to investigate the power embedded in the entire network by Gephi and Excel. SNA is a quantitative research strategy that is based on graph theory and network science and can compute, examine, and analyze social structures and relations (Otte &

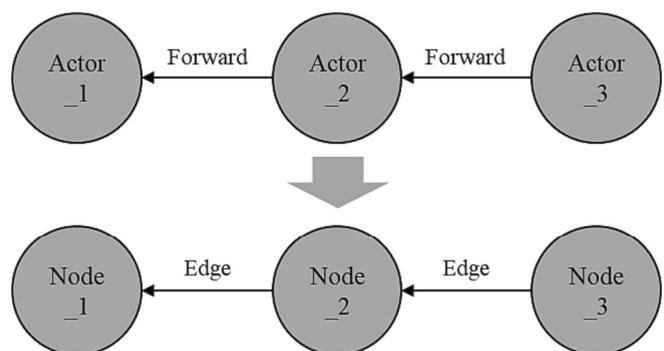


Fig. 2. An example: from forwarding chain to network.

Rousseau, 2002; Scott, 2017).

The social network consisted of nodes and edges, with *nodes* representing different Weibo accounts, and each account being an actor, such as an expert, organization, or citizen. In visualization, the size of the nodes was generated from the selected parameters of nodes. The larger nodes imply stronger social networks and rich information flow in general. The link between the two nodes is an *edge* and represents the forwarding connection. The width of the edges is generated from the frequency of information flow between actors. Community detection (Newman & Girvan, 2004) was used to label the different interaction communities (the groups formed by people with strong ties) as different colors in visualization, thereby helping to identify crucial social actors as nodes. Different colored communities were usually developed by one or more key actors. This study focuses on the function of graph exploring rather community analysis. With Gephi's Giant Network feature, we pruned the nodes that strayed from the main network to exclude invalid data before calculation. All forwarding chains were woven together in order to create networks. For measuring the networked power in online networks, a three-dimensional model (Lintonakool et al., 2007) was developed to calculate the strength, symmetry, and structure characteristics of the networked power. Detailed algorithms are shown in Table 1.

The *structure* analytical dimension measures the level and status of the entire network. Size is the number of nodes. Transitivity is the efficiency of information exchange across the network. Perfect transitivity

Table 1

The indicators used to measure networked power.

Analytical dimensions of network power	Parameters of network
Structure	Size Transitivity
Symmetry	Average Path Length Ratio of weighted out-degree centrality to weighted in-degree centrality (RoWDC)
Strength	Degree Centrality (DC) Closeness Centrality (CC) Betweenness Centrality (BC) Eigenvector Centrality (EC)

means that everyone in the network is interlinked with everyone else. Average path length is the average number of steps along the shortest paths for all possible pairs of network nodes. The metric calculates path lengths for all possible pairs of nodes and reflects the distance of information flows between nodes. The *structure* analytical dimension is an overall characteristic of networks, which contributes to networks' comparison. The *symmetry* dimension, which is different from the structural dimension, regards the direction of edges (or interactions). The dimension of *symmetry* measures the preference for the direction of information emitted, transmitted, and received, as embodied by the position of a node. It characterizes the degree of dominating or being dominated by social actors using information. The *ratio of weighted out-degree centrality to weighted in-degree centrality (RoWDC)* is calculated to represent an individual node's symmetry attribute. The larger RoWDC is for a node, the more information output (rather than input) capability the node has. *Degree centrality (DC)* is the sum of a node's in-degree and out-degree, and this metric is utilized in conjunction with RoWDC for the symmetry analysis, as well as the basis for other subsequent centrality calculations. The dimension of *strength* measures a node's capacity to control information to influence others in the network, which characterizes the level of power in an online collaborative network. Since this interpretation of capacity is diverse, this study assesses power strength in terms of different computational indicators, *closeness centrality (CC)*, *betweenness centrality (BC)*, and *eigenvector centrality (EC)* (Bonacich, 1987; Cherven, 2015; Das et al., 2018). CC represents an actor's capacity to reach any other actors in a collaborative network. It is the reciprocal of the sum of the shortest path lengths between a node and all other nodes in a graph. BC reflects an actor's capacity to control the flow of information in a collaborative network. The metric uses all the shortest paths between every pair of nodes of the network and then counts how many times a node is on the shortest path between two others. It can be used by an actor or group who occupies the intermediate position between two other actors or groups. EC represents an actor's capacity to influence those important actors in a network. This metric is applied to identify potential actors that possess connections to key actors in a network, even if they only have general DC. CC represents an actor's capacity to reach any other actors in a collaborative network. It is the reciprocal of the sum of the shortest path lengths between a node and all other nodes in a graph. BC reflects an actor's capacity to control the flow of information in a collaborative network. The metric uses all the shortest paths between every pair of nodes of the network and then counts how many times a node is on a shortest path between two others. It can be used to an actor or group who occupies the intermediate position between two other actors or groups. EC represents an actor's capacity to influence those important actors in a network. This metric is applied to identify potential actors that possess connections to key actors in a network, even if they only have general DC.

(5) Fieldwork and interviews

Because social media data captures only the online aspect of the controversy, we also examined the offline actions and outcomes of planning efforts. To ensure the validity of the information gathered, we conducted in-depth fieldwork in the case study site in June and July

2022. We observed the current status of the site and the ongoing renovation activities in the neighboring areas. We also conducted semi-structured interviews with key stakeholders to ascertain how networked power and online debates influence offline decision-making. The interviews were conducted with a total of seven participants, including three local residents, two planning experts, and two members from the civil society organization. In addition, we collected news from the mass media and government, and web archival material and policy documents.

4. Case study

4.1. The Bell and Drum Tower controversy in Beijing

Before delving into the analysis, it is necessary to clarify the context, phases, and key actions of this controversial development. The Bell and Drum Tower is located in Beijing, which is the capital city of China. At the national level, public participation was already legalized through the Measures for Formulating City Planning (2006) and the Law of the PRC on Urban and Rural Planning (2008). As the political center of the country, the Beijing municipality has made several municipal policies to promote formal participation in housing expropriation and compensation (Zhang et al., 2020). However, urban redevelopment in China is a highly decentralized policy field, and district governments have much freedom to make their policies and practices. Urban redevelopment projects initiated by district governments may violate national policies and municipal plans (Zhang et al., 2019). In such a context, informal participation has taken place with the support of the internet and social media. The Bell and Drum Tower controversy is a microcosm of this phenomenon. The focal point of the controversy is the Bell and Drum Tower building and its surrounding quadrangle-style residential area. This area contains a large number of traditional residential neighborhoods known as hutongs. The area is located three kilometers north of the Forbidden City and is situated along the central axis of Beijing's cultural heritage area. The controversy can be divided into three phases: a precipitous initiation, a controversial restart, and a stealthy implementation. The first phase began in 2009: the controversy was precipitated by the sudden initiation of a commercial project known as the Time Culture City Project, which was intended to bring about the urban commercialization of the area. The developer was the Boston Design International Group. The project was approved by the local Dongcheng District authority at its annual plenary session in 2010. The Beijing Cultural Heritage Protection Center, a registered civil society organization, raised criticisms of the project's impact on cultural heritage. After information about the project was spread via social media, the authorities succumbed to pressure from the organization: they cancelled a public workshop planned by the organization and responded publicly to the criticisms. The original commercial project was ultimately discontinued and replaced by a smaller museum project.

In the second phase, which began in 2012, the Dongcheng District Government restarted the urban regeneration of the BDTA with the "Bell and Drum Tower Square Restoration and Improvement Project". This project, which aimed to demolish illegal structures and improve residents' quality of life, was met with extensive criticism from experts in the fields of heritage conservation, planning, law, and history. Despite the sustained criticism, the authorities' land expropriation proceeded as planned.

In the third phase, which began in 2013, an unregistered civil society organization (CSO) was established to monitor the local government-led demolition process. It used social media to share information about the demolitions and draw public attention to the issue but could not prevent the continued demolition of housing. In the past two decades, the number of unregistered CSOs has dramatically increased in Chinese cities, since the Internet and social media have provided a new platform for individuals and groups to expand their networks and create virtual communities (Lin, 2022). The unregistered CSO of the case study differs

from the registered CSO with corporatist forms embedded within government agencies, hindering them from providing a social base against government power (Spires, 2011). It is different from the officially encouraged civil society organization "Chaoyang Masses," which has a close relation with the Beijing government (Yang et al., 2022). Despite the efforts of this CSO, the project goal of "restoring the cityscape in a style of Ming and Qing dynasties" was partially achieved, albeit at the disappearance of markets, the displacement of residents, and the erection of utilitarian buildings. Today's open squares contrast with the densely packed illegal structures that they have replaced. (see Figs. 3 and 4).

4.2. Online network and power relations

Social media played an important role in all three phases of the project and supported the formation of online forwarding networks. In the first phase, a short Weibo blog posted by an anonymous citizen went viral and resulted in the development of the initial network. The message was an attempt to disseminate a warning of the existential threat to the historic Bell Tower:

"Beijing Drum Tower is in danger! A large-scale real estate project will occupy 12.5 hectares in the Drum Tower area of Beijing's central axis. The Beijing Cultural Heritage Protection Center (CHP), a civil society organization, intends to organize a public seminar on the matter for Beijing residents this weekend... Please help forward this!"

24/03/2010 By An Anonymous Citizen

In the first phase of the urban renewal planning process, a collaborative network was established through social media platforms such as

Weibo, Douban, and Tianya Forum. Citizens utilized these platforms to share information, exchange ideas, and comment on the schematic design phase in the networked public sphere. This resulted in a successful mobilization of the public, as the authorities responded to the concerns raised by the citizens. Despite the government's restrictions relating to offline seminars, this collaboration succeeded in bringing urban renewal issues into the public sphere, as the citizens used social media as a tool to create broader public discussions and challenge the original scheme proposed by the local authorities.

The second phase of the planning process saw the involvement of an expert with a significant number of followers on Weibo. The expert posted a warning about the demolition of the traditional courtyards between the Bell and Drum towers. The message received widespread support from other prominent experts and was widely reposted, forcing the district government to respond on the Weibo platform. The collaborative network created by this message is shown in Fig. 5. Numerous professionals and citizens participated in it. It had two main nodes: the expert (A40) and a new mass media account set up by a newspaper (A4251).

The Doncheng District Government account (B4), supported by the district government, responded to the critical and disputative statements expressed in the previous phase by posting multiple posts on social media to emphasize the positive purpose of the restart, the legality of the process, and the lack of connection with the previous project designer. The authorities' posts spawned a collaborative network (see Fig. 6), in which the main nodes (B4) were the district government and an expert whose views opposed those of the government. It is notable that government's official accounts rarely provide direct responses to criticism, which is related to the strict Internet censorship of official

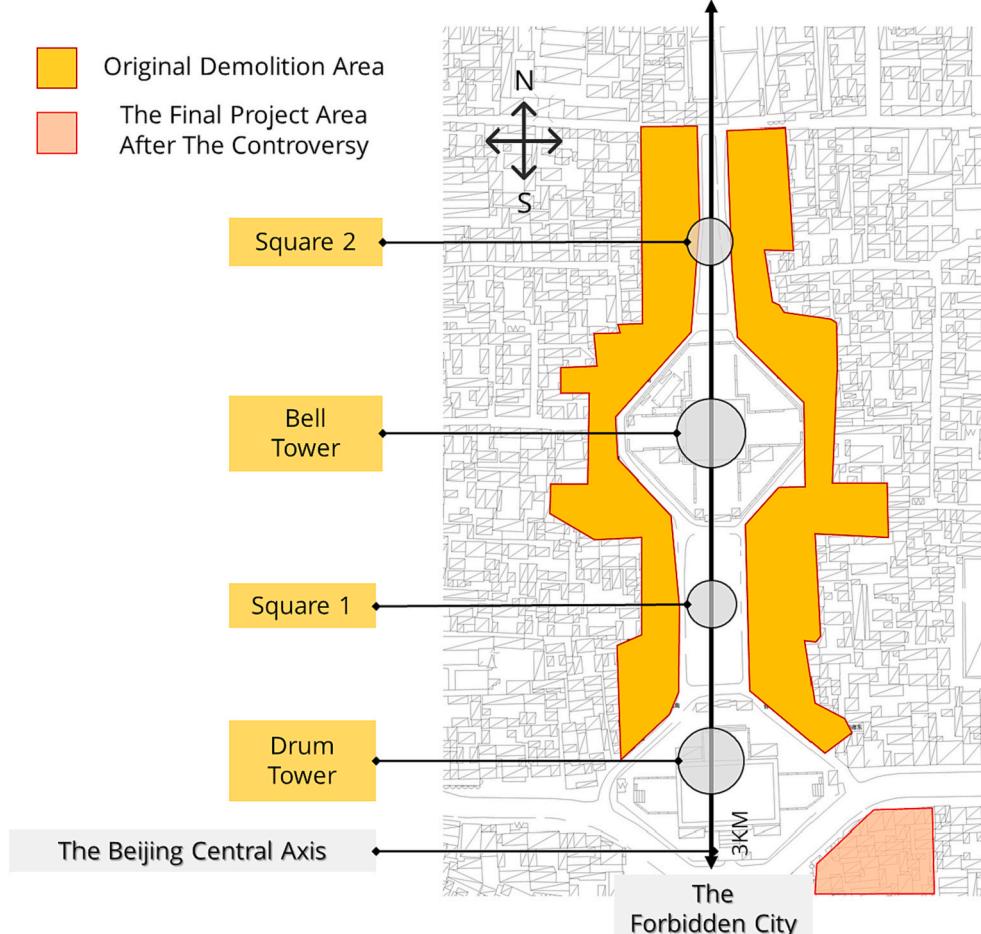


Fig. 3. The residential area initially involved in the BDTA regeneration project (drawn according to one interviewee's records).



Fig. 4. Uncluttered square (left) and utilitarian housing in a neighboring hutong (right) after the demolition of illegal structures (Photographed by Author in 2022)

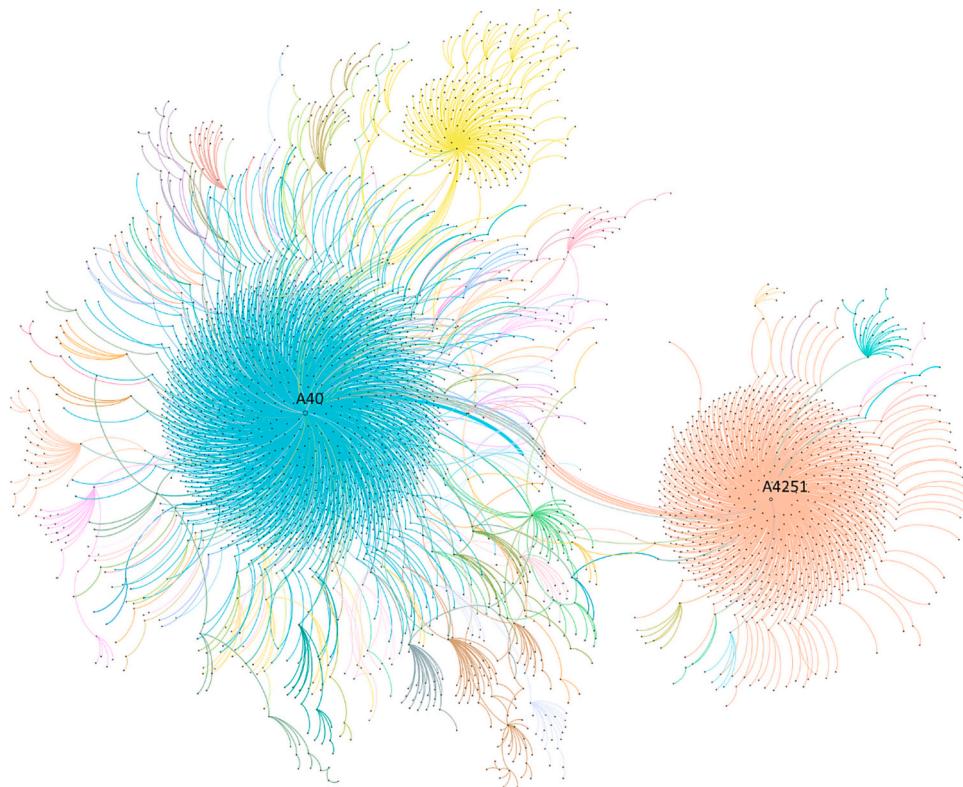


Fig. 5. Network I generated by a key expert's post-forward chain in Weibo.

accounts (Masterson, 2020). Despite attracting support from some residents who favored the project because they would be offered modern housing, the network was smaller than Network I and was criticized by elites for the lack of concrete evidence to back the claims made. Among the aspects questioned were the professionalism of the design company, the accuracy of the restoration of the Ming and Qing dynasties' style, the legality of the demolition, and compliance with the project approval. In December 2012, despite the temporary suspension of the demolition of "illegal buildings" in response to public debate, the district government issued an official land acquisition notification and began the process of relocating residents. The primary actors in this phase differ from those in the first phase, in which the initial actor was an expert who had been inspired by another expert's blog to question the demolition plans online after field research. The motivation behind the expert's participation was a "concern for the preservation of buildings". The challenge was amplified by the traditional media accounts in the Chinese-language *New Express* and became widespread, leading to debates between

experts and government authorities on social media in a non-direct dialogue. Reposting information via social mass media helped significantly expand the information network created by the experts without diffusing the information posted by the authorities.

In the third phase, the demolition of illegal buildings and relocation of residents began to be officially implemented. However, since the area involved exceeded what had been officially announced, a newly formed unregistered civil society organization (node C2 in Network III) monitored the heavy-handed demolition and posted its findings on social media platforms. The reposting on social media further amplified the criticism and resulted in the creation of a remarkable online collaborative network, led by the organization. This network (Fig. 7) was more diverse: the main node (node C2 in Network III) was the organization, and minor nodes (e.g., C5, C32, and C58) were formed by influential experts or citizens.

The formation of a collaborative network in the third phase of the controversy was influenced by the actors in the second phase. A key

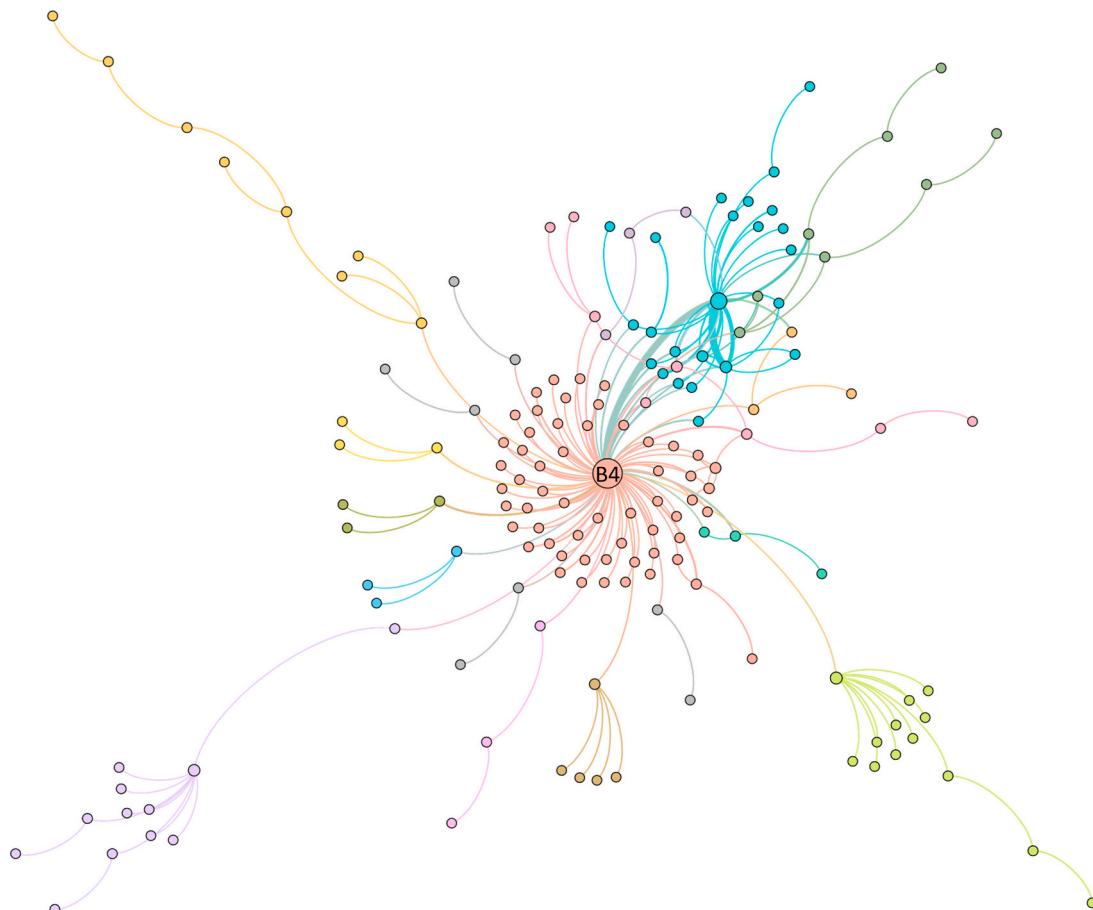


Fig. 6. Network II generated by Doncheng District Government's post-forward chain in Weibo.

player in the network, a member of an unregistered organization, explained that the group formed through connections made on Weibo and that experts provided guidance, but the group operated independently. The organization used social media platforms to expand its information network and engage interested journalists, with the aim of influencing the implementation of the authorities' project. However, despite these efforts, the organization ultimately failed to achieve its aim.

The use of social media as a strategic tool by various actors in the controversy highlights a typical process of mass self-communication. The gradual emergence of counter-power through social media use challenged the traditional planning authority. Despite its size, the network was unable to directly influence the planning progress. The mentioned three networks are virtually independent, though one expert and few citizens are included in different networks simultaneously. This implies an echo chamber effect, whereby the same opinion is constantly repeated in a closed online environment. To understand the differences between actors in terms of their influence on power, it is necessary to investigate more deeply the attributes and characteristics of each network and node.

4.3. Network analysis and unequal power

The expert, authority, and organization, respectively, sparked the three networks formed in the controversy. However, the composition, location, influence, and dominance of members in these networks differ significantly, depending on interactions. The different indicators in Table 2 suggest that there are significant differences in the networks formed by various types of actors.

Node size measures the number of actors in the network, and edge

size measures the number of pairwise interactions in the network. The size of the networks formed by the different actors in the controversy varied. Experts form the largest networks, followed by the unregistered civil society organizations. Government authorities form the smallest network. The network formed by government authorities displays a clear small-world effect. It is characterized by a high clustering coefficient and short average path, indicating an efficient flow of information and easier sharing of information among different actors. However, this network had limited influence. These findings indicate a contradictory phenomenon. While an official response may have a rapid impact, it was challenging to suppress public opinion through it. Experts and organizations were found to be more effective than government authorities in using social media tools to channel public opinion and promote their interests.”

In networked power structures, the central actors or nodes in the network that has arisen around them play an important role in controlling information flows. The direction of information flows in these networks is asymmetric, leading to an unequal distribution of power (Castells, 2007; Castells, 2011a, 2011b). To measure the degree of asymmetry in power, we used the RoWDC.

After excluding nodes with a degree centrality below 10, the top 10 nodes of type of RoWDC index in each network were counted. As Table 3 demonstrates, significant network power asymmetry can be observed. Among the top ten nodes with the strongest information broadcasting capacity in Network I, there are only two types of actors: media and expert. The higher RoWDC indicates that the node's opinions can be more frequently perceived by the general public rather than influenced by the public. The top three nodes with the strongest information broadcasting capability in Network II include only two types of actors: government authority and experts. In comparison, the top 10 nodes with

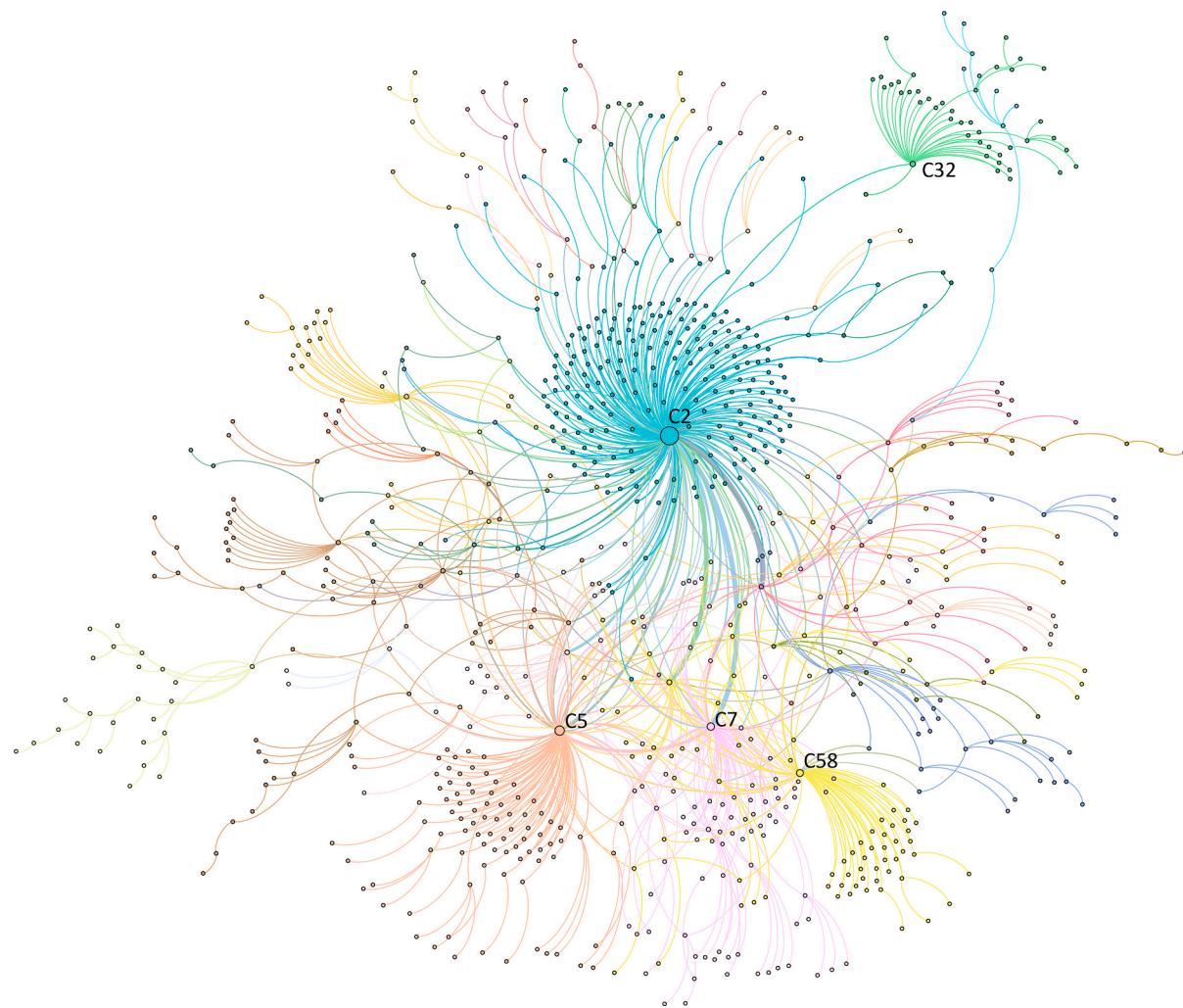


Fig. 7. Network III generated by an informal civil society organization's post-forward chain in Weibo.

Table 2

The three networks' structure index in the controversy. CSO = civil society organization.

	Size (node)	Size (edge)	Transitivity (average cluster coefficient)	Average path length
Network I (Expert)	4002	4154	0.005	2.991
Network II (Authority)	165	200	0.045	2.033
Network III (CSO)	846	1036	0.029	4.063

Table 3

Statistics on the key node types in each network. CSO = civil society organization.

	Network I: Expert	Network II: Authority*	Network III: CSO
Expert	4	1	5
Media	6	0	0
Authority	0	2	0
CSO	0	0	1
Citizen	0	0	4

* In Network II, only three nodes' degree centrality is higher than 10.

the strongest information broadcasting capability in Network III include experts, organizations, and citizens. Although experts, authorities, and organizations developed the three networks, respectively, the nodes with strong information export capability in each network are not just the core nodes.

To examine the extent to which the networked power of the main nodes varies, the types of nodes corresponding to the maximum values of CC, BC, and EC in each network were extracted (Table 4). The results indicate that experts hold stronger networked power in multiple networks. Interviewees from the expert network expressed their consciousness of raising public awareness of the heritage of the BDTA through such actions. An interviewee from a planning institute mentioned that most of the planning experts had similar ideal goals for cultural heritage preservation, so they were willing to collaborate on the event, such as sharing information about the status and key information of the project for each other in the social media platform. Government authorities can influence actors more directly in the network established

Table 4

The identity of nodes with maximum value in the three networks. CSO = civil society organization.

	Node of CC_{max}	Node of BC_{max}	Node of EC_{max}
Network I: Expert	Expert & Media	Expert	Expert
Network II: Authority	Authority	Expert	Expert
Network III: CSO	Expert	CSO	Expert

by authorities, but experts control the main information bridges and have more capacity to communicate with important actors. Even when some residents expressed support for the government and opted to move out, experts tried to dissuade them. Although the civil society organization can hold the main information bridges in networks it has established, some experts still have a strong potential influence on them. One of the interviewees from the unregistered civil society organization noted that despite having different goals, the organization frequently exchanged information with an expert and acknowledged that the expert's actions could be more productive. The expert often delivered some positive information of BDTA's regeneration from high-level authorities. The interviewee also shows that the expert had a personal connection with high-level public authorities and influenced the decision-making process.

Using Network I, the largest online collaborative network in the controversy, we calculated four indices for each node (see Table 5). The result reveals that networked power inequality in large-scale collaborative networks is prevalent, but there are significant differences in power intensity under different dimensions.

The results for the DC index reveal that experts and the actors from media have a general influence on the network. Although the online collaborative network was constructed and led by an expert, several media actors still had great general influence. An obvious example was the Weibo account of the *New Express* (Code 4251 in Table 5), which was a media account, almost as influential as the experts. An interviewee from CSO stated that there was a team member from journalism. The team member shared information about mass media restriction policy from government and contributed to CSO's broadcasting strategy. The CC index suggests that active citizens like 4213 and 0226 could also significantly influence the entire network. It can be observed that the higher CC indices of these two citizens result partly from the extensive, short-path connections to all other possible nodes. Although there is no evidence that these citizens were intentionally seeking prominence in the network, their content was more easily found by all actors in the network. From the BC index it can be seen that experts and media the Bell and Drum Tower planning practice in Beijing. This aligns with their offline power relating to the expression of opinion. They were selective in the information they delivered, although experts reinforced their views by doing so, whereas the media sought the public's attention. Meantime, a citizen like 0458 also had the opportunity to achieve similar impact, which implies that experts and the media have more power to decide which information can be passed down or up. The EC index indicates that despite lacking expertise on the topic, individual

citizens like 0642, 0266, and 0458 could influence other actors in the network by having strong ties to important nodes.

5. Discussion and conclusion

The results of this study show that asymmetric power relations exist in the networked public sphere. Although some scholars argue that social media platforms reinforce symmetric information communication (Alizadeh et al., 2019), our findings align with the argument of Sun et al. (2018) that the Habermasian imagination of equal power is not actualized in the networked public sphere. The emergence of social networks has reshaped power relations in online and offline networks, but it has also established new asymmetric patterns of power. Power inequality still exists, but its forms differ from those in the offline world. The level of power is related to the network position of a node (an actor). Although a wider range of actors can now participate through social media platforms and challenge existing power relations, some key actors become the center or sub-center (as the detected communities in graphs) of the networks and have a strong influence. The case study shows that specific elites, journalists, and members of a civil society organization have dominated the discourse around the Bell and Drum Towers controversy. Critical actors include planning professionals who have expertise, and journalists who have massive media resources; it is easier for them to build large networks, strategically spread the discourse, and establish a dominant position. Among them, the role of the journalism should be highlighted, because this actor had an significant influence on public debates and the development of the communicative networks. Citizens can also become important nodes in large networks, but they largely depend on their existing social connections. Public authorities in local government can build smaller networks but struggle to attract public attention. Such differences in the power positions of different actors also reveal three different ways of empowerment. First, actors become more influential by building a large network and becoming the primary voice in it, e.g., an expert's call for action. Second, actors control the flow of information by becoming an important bridge between crucial nodes, e.g., a journalist with a large following. Third, actors bridge new social relationships by integrating potential critical actors into the network, such as citizens with important personal connections.

This research reveals that the impact of the online networks that arose in the Beijing Bell and Drum Tower controversy depended on the stage of the planning process rather than on the network's size. Lin (2022) argues that the different support functions of social media can be employed to assist different stages of the planning process. In our case study, we observed that online networks played distinct roles in different phases, and the impacts of the networks varied throughout the process. Initially, the networks attracted public attention and forced local governments to respond on social media and revise the planning project. In the planning revision phase, they attracted key actors to pressure the cultural preservation authorities by using relevant national heritage conservation policies. However, during the implementation phase, the influence of network power was not significant. In short, it is much easier to utilize social media to force authorities to abandon draft plans at the initial planning stage than at the implementation stage.

The research by Williamson and Ruming (2019) on Sydney showed that online participants used social media strategically to expand their networks, motivate public debate, and influence decision-making in an urban renewal project. Similarly, our study indicates that social media was used as a strategic tool by informal civil society organizations and experts to motivate and connect a wide range of actors online. Some experts as the key nodes of the network exerted great pressure on public authorities on behalf of the public, but their impacts were mainly achieved through their offline actions. This confirms the contention of Kleinhans et al. (2015) that wider engagement only "materializes" if virtual connections manifest themselves in real space and offline actions. However, it should be highlighted that not all topics can be freely

Table 5

Network I key nodes: actor type and centrality. DC = Degree Centrality, CC = Closeness Centrality, BC=Betweenness Centrality, EC = Eigenvector Centrality.

Actor code	Actor type	DC	CC	BC	EC
0040	Expert	1536	0.667	0.005508	1.000
4251	Media	809	0.800	0.000028	0.002
4914	Media	174	0.315	0.000588	0.209
0027	Expert	43	0.564	0.000128	0.343
3084	Expert	27	0.842	0.000071	0.209
4213	Citizen	25	0.848	0.000002	0.003
753	Expert	25	0.780	0.000076	0.209
1181	Media	22	0.857	0.000054	0.209
1925	Expert	19	0.426	0.000069	0.051
1002	Expert	19	0.950	0.000044	0.009
0458	Citizen	17	0.405	0.000344	0.240
5167	Media	16	1.000	0.000000	0.000
4873	Expert	16	0.818	0.000044	0.040
4750	Expert	15	1.000	0.000034	0.209
3219	Expert	14	0.933	0.000000	0.002
1153	Media	13	0.720	0.000044	0.209
0642	Citizen	12	0.606	0.000018	0.260
0465	Expert	12	0.452	0.000028	0.283
1100	Expert	12	0.404	0.000830	0.231
0266	citizen	10	0.722	0.000014	0.250

discussed on the Chinese Internet because of censorship and state control. To some extent, social media communication on cultural heritage is less censored by the central government, which uses it as a feedback loop to check that local governments are complying with national policies. The restrictions to online communication might reduce willingness to criticize, but our study reveals that activists regard the social media not as a new arena for debate but as a strategic tool to enhance discourse. Previous studies show that there were also similar bottom-up initiatives to use social media to challenge top-down planning approaches and government decisions in other Chinese cities such as Shanghai and Guangzhou (Huang, 2017; Zhao et al., 2017). More research is required to understand how different local political contexts influence power relations in various practices.

As well as yielding empirical insight into the role of social media in reshaping power relations in planning, our research also demonstrates the value of applying SNA to analyze power relations from the perspective of network power. It bridges the gaps between Castells' network power theory, quantitative network science, and the networked public sphere. It measures network power, which was originally a metaphorical concept, through a quantitative approach. The research also revealed avenues for future research. The conjunction of networked power theory with planning research has become increasingly valuable in the context of rapid ICT and social media development. Although few studies have recently explored networked power, other types of network power in planning practice remain to be explored. And given that the established power holders are trying to reassert their dominance in the process by more censorship, more research is required to understand the new power dynamics and the increasing impact of digital technologies on planning practice. Additionally, it would be useful to bring more network analysis methods (e.g., community detection analysis and modularity analysis) further into network power study, which would promote power discussions to evolve further towards empirical evidence.

CRediT authorship contribution statement

Junyao He: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Validation, Visualization, Writing – original draft. **Yanliu Lin:** Conceptualization, Formal analysis, Funding acquisition, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing. **Pieter Hooimeijer:** Supervision, Writing – review & editing. **Jochen Monstadt:** Supervision, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that has been used is confidential.

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