

Social Media and Big Data Evaluation of Think Tanks in Contemporary China

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ABSTRACT

Chinese think tanks have begun to embrace the media to expand their social influence. In this study, we use a big data method to capture think tank activity data for comprehensively assessing their influence on social media. We construct and utilize a database to search, capture, and gather three kinds of think tank activity data and build the two-level *think tank big data index* (TTBI). Our findings reveal that different types of think tanks exhibit their social influence and patterns on various social media platforms. Army and research institute think tanks occupy a smaller proportion of the sample than do *university* think tanks but have larger influence. We conclude that the proposed big data method resolves the technical bottlenecks of objective evaluation and provides a new dimension for the analysis of think tanks.

Keywords: think tanks, social influence, big data evaluation, think tank big data index (TTBI)

Evaluación de redes sociales y Big Data de think tanks en la China contemporánea

RESUMEN

Los think tanks chinos han comenzado a adoptar los medios de comunicación para expandir su influencia social. En este estudio, utilizamos un método de big data para capturar datos de actividad de

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think tank para evaluar exhaustivamente su influencia en las redes sociales. Construimos y utilizamos una base de datos para buscar, capturar y recopilar tres tipos de datos de actividad de think tank y construir el índice de big data de dos niveles de think tank (TTBI). Nuestros hallazgos revelan que los diferentes tipos de think tanks exhiben su influencia y patrones sociales en varias plataformas de redes sociales. Los think tanks del ejército y los institutos de investigación ocupan una proporción menor de la muestra que los think tanks universitarios, pero tienen una mayor influencia. Concluimos que el método propuesto de big data resuelve los cuellos de botella técnicos de la evaluación objetiva y proporciona una nueva dimensión para el análisis de los think tanks.

Palabras Clave: think tanks, influencia social, evaluación de big data, índice de big data de think tank (TTBI)

当代中国社交媒体与智库大数据评价

摘要

中国智库已经开始利用媒体来扩大其社会影响力。本研究中，我们采用大数据方法来获取智库活动数据，从而全面评估其在社交媒体上的影响力。我们建构数据库，通过检索、抓取和收集等方式获取了三类智库活动数据，并建构了“智库大数据指数”（TTBI）。我们的发现表明，不同类型的智库在不同社交媒体平台上都积极展现其社会影响力，呈现出各自模式。相比高校智库，军队和科研院所智库在样本中所占的比例较小，但其影响力更大。结果表明，本文提出的大数据方法解决了智库客观评价的技术瓶颈问题，为智库分析提供了一个新的维度。

关键词：智库，社会影响，大数据评估，智库大数据指数 (TTBI)

1. Introduction

Unlike the number of think tanks outside China (McGann 2015), that in the country has grown explosively in the last five years (Li 2017; Menegazzi 2017). Chinese think tanks are prospering due to the Chinese government's need for intellectual support for scientific policymaking (Xue, Zhu, and Han 2018, 49–71) and democratization requirements. Despite the rise of Chinese think tanks, many critics still deride them, expressing statements such as “tanks without thinkers” and “plenty of tanks but little thinking” (Wang and Qu 2016). However, these criticisms are usually formed on the basis of observations and lack objective evidence. Thus, scientifically and accurately evaluating Chinese think tanks is a key practical and methodological issue for think tank research at present.

The Chinese government has initiated a national campaign to booster think tank development in the new administration led by President Xi Jinping. In November 2012, the 18th National Party Congress report called for “the improvement of decision-making mechanisms and procedures, thus assigning an enhanced role for think tanks.” In December 2012, Xi Jinping stated that China should establish high-quality think tanks engaged in forward-looking research and policy consultation at the Chinese Communist Party (CCP) Central Economic

Work Conference. In April 2013, Xi Jinping presented important guidelines for building “New-type think tanks with Chinese characteristics” (NTTTCC). NTTTCC has two elements. The first element is “new-type,” which means that Chinese leadership is eager to build think tanks that are different from traditional and ministry-affiliated ones in China; the other is “with Chinese characteristics,” which indicates that the developmental patterns of Chinese think tanks should not be copied from their Western counterparts and that one of the objectives is to “tell Chinese stories and spread Chinese voices” through public diplomacy (Xue, Zhu, and Han 2018). Several scholars supposed that the establishment of a national strategic priority and think tanks with Chinese characteristics requires the development of a think tank industry functioning in line with the government (Li 2017; Menegazzi 2017).

Think tanks in China have proliferated in the past five years, and some observers call the phenomenon “think tank fever” (Lin 2016). The prosperity of Chinese think tanks has been driven by heavy promotion and endorsement from the government (Li 2017) and actuated by considerable official recognition of their value due to the increasingly complex domestic and international development problems that stem from the fragmented decision-making system (Xue, Zhu, and Han 2018, 49–71). Governments, universities, and enterprises have actively joined the wave of establishing think tanks, and many such organizations have been created.

The energetic actions and behaviors of Chinese think tanks have attracted significant attention from the public and media, thereby accelerating the expansion of their social influence. In only a few years, the number of Chinese think tanks became the second largest in the world.³ However, China's think tank fever is also labeled a "great leap forward" for wasting resources (Huang 2015).

The rise of social media platforms should not be neglected in the analysis of the growth of think tanks in China, although the decline of the government's monopoly on information, the growth of state and nonstate actors, and the need for timely and concise information analysis have driven the growth of Chinese think tanks. Such organizations used different social media platforms to spread their ideas and attempt to influence decisions and public policies. Social media platforms, such as *Weibo* (by Sina) and *WeChat* (by Tencent), allow users to publicize and spread scholarly articles. A *Weibo* personal account and a *WeChat* official account show popular articles to followers, offer opportunities for think tanks to establish a self-publication platform, and increase their influence. Therefore, adapting to changes in mobile Internet usage and social media, capturing news and public opinions, and providing the government with considerable scientific and dynamic advice have become new challenges for China's think tanks.

Chinese think tanks actively

explore multiple channels to expand their influence in this era. The political ecology of the modern state has dramatically changed in correspondence with the sudden boom of social media. Think tanks embrace advancements in media and communication to expand their influence channels (McNutt and Marchildon 2009, 219–36; McGann 2015; Rich and Weaver 2000, 81–103). China's think tanks are no exceptions and are even highly connected with social media due to the development of *WeChat* and *Weibo*. Therefore, this study asks the following questions about emerging think tank trends. What features are characteristic of the behavior of China's think tanks at the time of this so-called think tank fever in the social media era, and do different think tanks follow varying patterns of behavior?

In this study, we document the activities of think tanks, evaluate their social influence, and determine relevant characteristics and patterns. We attempt to obtain several distinct features of the activities undertaken by China's think tanks on these social media platforms and compare the heterogeneity of the behavioral patterns of these organizations. A new method for capturing data on the activities of think tanks and for evaluating their influence is necessary. Thus, we use data mining and other big data analysis techniques with social big data resources to capture the activities of think tanks on social media platforms and comprehen-

3 For example, the 2008 Global Think Tank Report indicated that the total number of global think tanks was 5,465, while China only had 74 think tanks. However, in the 2017 Global Think Tank Report, the total number of global think tanks was 6,846,435 of which were in China.

sively evaluate their influence.

2. Think Tanks and Their Social Influence

Think tanks have become important and active policy actors in contemporary China (Tanner 2002, 559–74; Zhu 2013). They serve as important windows to a changing China by scholars who are interested in the Chinese policymaking system (Zhu 2011, 668–86). However, the concept of think tanks varies between China and western countries (Menegazzi 2017; Zhu and Xue 2007, 452–64). In western nations, scholars have emphasized independence from government, political parties, and interest groups and nonprofitability as the defining criteria of think tanks (Rich 2005; Stone 1996). These groups are often portrayed as civil society organizations and count as major contributors to the strengthening of a country's democratic development in traditional literature. However, no such purely independent organizations exist in the regime dominated by one party of contemporary China, and the "civil society" can have different connotations under the Chinese context. Consequently, scholars have had to construct unique theoretical explanations regarding think tanks that are suitable for a Chinese-type political system rather than for a free intellectual market (Zhu 2009, 333–57).

Zhu and Xue (2007) defined Chinese think tanks as stable, autonomous organizations that investigate policy issues to influence the policymaking

process. They adopt the basic feature of the conventional western scholars' definition, which states that think tanks should serve as external brains that are independent of the government. They use the criterion of autonomy to define the boundary of independence because several scholars believe that the main problem of Chinese think tanks is the lack of independence from the CPC and the government. Think tanks in China perform a wide range of functions and have been established as information gathering businesses, government consultants, academic research organizations, and policy advisors; they are neither wholly independent nor completely bounded by government's restrictions or control (Menegazzi 2017).

The influence of think tanks has been a debatable topic. Given that think tanks were introduced in China in the 1990s, the issue of think tank influence has attracted the interest of many scholars interested in policymaking, the dynamics of state–society relations, and the CPC's control over its ideological domains (Abb 2015, 531–53; Glaser and Saunders 2002, 597–616; Zhu 2009, 333–57, 2011, 668–86). Scholars have found that Chinese think tanks in different systems and policy fields have played increasingly important roles in the decision-making system (Glaser and Saunders 2002, 597–616; Zhu 2011, 668–86). An initial comprehensive analysis of the decisive factors for think tank influence was conducted by Zhu Xufeng. He conducted a nationwide survey of 301 of China's think tanks and found that expert knowledge, governmental linkage, and personal

ties are the factors that determine think tanks' influence in the Chinese policy-making process (Zhu 2009, 333–57). Expert knowledge is a basic resource for think tanks. Think tanks must use their expertise to create an impression on decision makers and other actors in the policymaking system and thus build influence. Think tank experts also need to advocate their policy ideas in academic publications, mass media, or even Internet blogs to influence policies indirectly because these activities help analysts build their public reputation and provide them with supplementary income.

In previous studies, think tanks in pursuit of influence must exploit multiple channels and marketing strategies (Abelson 2002). Most scholars tend to limit the function of think tanks to decision-making consulting services and influencing decision making. However, think tanks have additional functions; for example, they fulfill three roles, namely, exobrain for the Chinese government, representatives of marginal interests, and social supervisors (Zhu and Xue 2007, 452–64). Zhu (2009) classified all influential behaviors of think tanks into three levels, namely, “decision-maker influence,” “social elite influence,” and “public influence.” Think tanks that dare to debate publicly, monitor government behavior, and criticize policy will attract policymakers' attention. They can also set a good justice image to gain general public support and attention. Thus, social or public influence, which is often omitted, is another important angle for think tank evaluation.

In terms of motivation in the pursuit of influence, no essential difference is found between Chinese and western thinkers. However, from the perspective of behavior, the difference lies in the varying policy processes and institutional arrangements. Chinese think tanks were not always able to expand freely their influence through mass media, given the strong restrictions by the government (Bonnin and Chevrier 1991, 569–93; Eddy 2003, 100–21; Goldman 1981, 1996, 35–52; Gu 1999, 389–431). Think tanks relied on administrative linkages and personal ties with decision makers to influence policy (Zhu 2009, 333–57). With media marketization, Chinese experts have had a chance to express their idea in mass media recently (Stockmann 2013; Tanner 2002, 559–74), and wide-ranging policy communities have gradually emerged. Moreover, China's openness on the Internet and social media have enabled think tanks to find convenient, fast, low-cost channels to obtain attention; a growing number of think tanks is beginning to embrace social media channels to release their ideas for expanding their social influence.

3. Methods of Evaluating Think Tank Social Influence

3.1 Comparison of Think Tank Evaluation Methods

Evaluation methods for think tanks have changed in three trends, from being small sample-based to big sample-based, from being subjective to objective, and from using small data

to big data. These changes have led to the formation of four major evaluation methodologies for think tanks, namely, interview, subjective questionnaire, objective questionnaire, and data search evaluations (Table 1). Interview evaluation is a representative method for small sample-based evaluation and assesses and ranks think tanks on the basis of individual experts' personal feedback. Subjective questionnaire evaluation obtains evaluations of a massive number of think tanks from individuals by designing subjective questions. This method is based on big samples and

more advanced than interview evaluation. Objective evaluation, which is big sample-based, collects information about think tanks by listing a number of quantitative questions, such as their budgets, personnel, and a number of achievements. Data search evaluation captures multidimensional information about think tanks through the Internet. Two types of information exist in practice. One type involves obtaining the publication and quotation data of a think tank and its affiliated experts through literature retrieval technology; the other type requires collecting the

Table 1: Various Dimensions and Types for Think Tank Evolution

	Interview	Subject questionnaires	Object questionnaires	Data search
Small sample→ Big sample	Small sample	Big sample	Big sample	Big sample
Subjective→Objective	Subjective	Subjective	Objective	Objective
Small data→Big data	Small data	Small data	Small data	Big data

cyberspace behavioral data of a think tank by Internet search and big data technology.

In 2008, James McGann published the *Global Go to Think Tank Index Report*, and the think tank rankings became a good way to evaluate think tanks and nourish them for influence expansion. The global ranking of think tanks pushes the Chinese government to begin to pay attention to the influence of these organizations. It exposes the shortcomings of Chinese think tanks and encourages scholars and practitioners to find ways to improve

their research capacity and broaden their influence (Table 2). For example, the 2008 Global Think Tank Report indicated that the total number of global think tanks was 5,465, of which only 74 belonged to China (McGann 2009). The 2009 Global Think Tank Report counted 425 Chinese think tanks and placed several Chinese think tank top rankings in different policy fields. According to these reports, China ranks the second in the world in terms of the total number of think tanks.

The evaluation of the influence of China's think tanks has rapidly devel-

oped in recent years. Several organizations have launched various index systems for the evaluation of think tanks and published relevant rankings. These evaluation reports enrich the existing body of knowledge on think tank activity and behavior from different perspectives and encourage competition and learning among the various think tanks in China.

The Shanghai Academy of Social Sciences released rankings for three consecutive years using expert scoring, questionnaire surveying, and field interviewing to evaluate the attractiveness, management capability, and influence of China's think tanks. They constructed six clusters of influence, which include policy impact, academic significance, media influence, public outreach, international reputation, and growth and market competitiveness. The Chinese Academy of Social Sciences introduced the first domestic international think tank evaluation report, the *Global Think Tank Report*, which could directly compete with the Global Think Tank Reports published by James McGann's group. The Academy of Social Sciences of Sichuan Province published think tank evaluation reports focused on the "think tanks' influence within Greater China," which includes Hong Kong, Macao, and Taiwan. The Zero Research Institute is an enterprise where think tanks launched a "Chinese Think Tank Influence Report." This report was based on objective data culled from the Internet rather than on the methodology of subjective evaluation used by the Shanghai Academy of Social Sciences and the University of Pennsyl-

vania. Nanjing University and Guangming Daily highlighted the Internet influence of think tanks. They used the network retrieval method to obtain related data, constructed an index system, and released the *China Think Tank Index* (CTTI).

3.2 Big Data Method for Think Tank Social Influence

Social media platforms, such as *WeChat*, *Weibo*, and *News Apps*, provide traces of the new activities of think tanks and experts (Khan, Yoon, and Park 2014, 60–78; Sullivan 2017, 218–28). However, capturing information on these platforms through traditional Internet search is difficult. Special methods must be used to capture, obtain, and analyze data on the activities of think tanks on social media. The big data method is a new influence evaluation method for think tanks in the so-called data revolution era (Chase 2013, 27). The big data method is capable of backtracking, extracting, and analyzing the digital footprint of think tank activities, thereby objectively evaluating all sample data. Big data influence evaluation is an unbiased, real-time, large sample-based method that allows overcoming the technical bottleneck and accurately assesses the influence of think tanks.

Think tank big data evaluation refers to the backtracking, tracking, extraction, and analysis of data from a large number of the disordered traces of think tanks and experts on social media to conduct an objective evaluation of the influence of think tanks. Big data evaluation is an objective, unbiased, real-time, and large sample-based

Table 2: Various Indices and Ranking Systems

Think tank report and indices	Indicators	Methods
McGann-University of Pennsylvania— <i>The Global Go to Think Tank Index Report</i> (2008–2017)	<ul style="list-style-type: none"> · Think tank awareness, performance, and impact resource indicators, utilization indicators, output indicators, and impact indicators 	<ul style="list-style-type: none"> · Subjective questionnaire—interview with experts, reporters, and officers
The Chinese Academy of Social Sciences— <i>Global Think Tank Report</i> (2015–2017)	<ul style="list-style-type: none"> · Think tanks performance attractiveness, management capability, and impact power 	<ul style="list-style-type: none"> · Subjective questionnaire—interview with experts · Objective questionnaires—mail, telephone, and interview
Shanghai Academy of Social Sciences— <i>Chinese Think Tank Report—Ranking of Influence and Policy Recommendations</i> (2013–2017)	<ul style="list-style-type: none"> · Influence and capacity academic influence, decision-making influence, media influence, international influence, and think tank development capacity 	<ul style="list-style-type: none"> · Subjective questionnaire—experts, reporters, and officers · Interview—subjective expert interviews and consumers rating · Data search—objective data culled from the CNKI
The Zero Research Institute— <i>Chinese Think Tank Influence Report</i> (2015–2017)	<ul style="list-style-type: none"> · Influence professional influence, government influence, social influence, and international influence 	<ul style="list-style-type: none"> · Data search—objective data culled from the CNKI · Subjective questionnaires—experts, reporters, and officers
The Academy of Social Sciences of Sichuan Province— <i>Think Tanks' Influence within Great China (including Hong Kong, Macao, and Taiwan)</i> (2015–2017)	<ul style="list-style-type: none"> · Influence public opinion influence, professional influence, decision-making influence, social influence, and international influence 	<ul style="list-style-type: none"> · Data search—objective data culled from the CNKI and ISI Web of Science · Subjective questionnaires—experts and institutes
Nanjing University—Guangming Daily— <i>CTTI</i> (2016–2017)	<ul style="list-style-type: none"> · Internet influence Resources, spread, and communication 	<ul style="list-style-type: none"> · Data search—objective data culled from the Internet

method. Massive amounts of data can provide relatively objective and unbiased information, and constantly updated data sources can offer real-time, large-sample data resources. This preliminary exploration of think tank big data evaluation allows us to identify a means to conduct a comprehensive dynamic analysis of think tank behavior, achieve a frequent release of big data evaluation indices that are based on think tank products, encourage think tanks to provide high-quality reports, and contribute to the government's public decision making.

In this study, we used data mining and other big data analysis techniques with social big data resources to capture the activities of think tanks on social media platforms and comprehensively evaluated their influence. In the empirical study, we selected 510 think tank samples that belonged to the seven types of think tanks in China from worldwide think tank databases. We then attempted to find, capture, and gather three types of activity data, which included the think tanks' WeChat official accounts, their citations in WeChat public opinion, and their verified experts in Weibo from the basic database of over 110,000 websites, 18 million active WeChat official accounts, and 150 million active Weibo accounts. The entire data set covered the period of January 1, 2017, to June 30, 2017.

4. Big Data Evaluation Process and Data

4.1 Data and Database Description

To explore the features of the activities that China's think tanks pursue on social media platforms and compare the heterogeneity of the behavioral patterns of these organizations, we used information from the worldwide think tank list to build a sublist for our studies, which selected 510 well-known think tanks that belonged to the seven major categories of think tanks in China. Most of these 510 think tanks are officially recognized and engage mainly in policy research, and the minority comprises semi-official or social organizations that play certain roles.

The 510 think tank samples were selected from the *Global Go to Think Tank Index* published by the University of Pennsylvania, the *Global Think Tank Evaluation Report* (2015) released by the Chinese Academy of Social Sciences, CTTI built by Nanjing University and Guangming Daily, and the *Chinese Think Tank Directory* (2016) edited by Xie Shuguang and Cai Jihui. Following the advice of the two general offices (see Footnote 2), we divided these 510 think tanks from China into seven major categories. Figure 1 depicts that 218 *university think tanks* (42.7%), 102 *enterprise and social think tanks* (20.0%), 101 *party and government agency think tanks* (19.8%), 46 *academy of social sciences think tanks* (9.0%), 36 *party or administration school think tanks* (7.1%), five *research institute think tanks* (0.4%), and two *army think tanks* were covered.

We decided on the list of research samples for the think tanks, used the basic big data platform, and searched, captured, and gathered three types of data on the think tanks' activi-

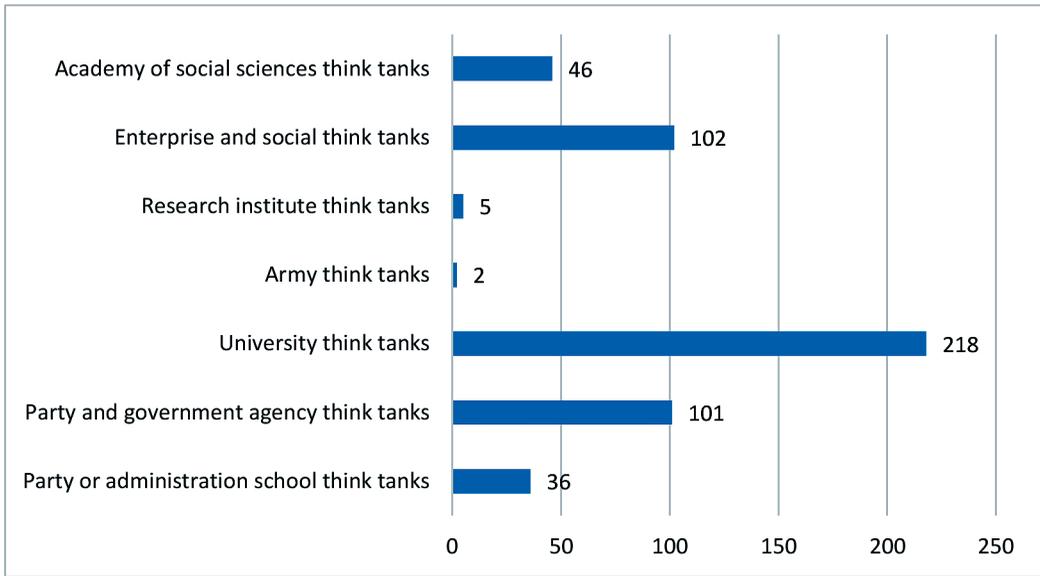


Figure 1: Types and Numbers of the 510 Chinese Think Tanks

ties, which included their *WeChat* official accounts, their citations in *WeChat* public opinion, and their verified experts in *Weibo*.

The big data platform is supported by 500 Alibaba cloud servers and is updated in real time. The platform contains 110,000 *websites*, 18 million active *WeChat* official accounts, 150 million active *Weibo* accounts, 6,155 *online forums*, and 930,000 *news apps*. The database records and stores a total of 300–600 GB of data daily. Thus, the research team initially gathered data from these platforms and worked on exact matching and data selection.

4.2 Data Collection

Data collection was conducted through the following steps. First, we used the full names, abbreviations, and the common names used by the 510 think tanks as keywords (1,331 in total) to capture the think tanks’ accounts, experts, and

citation articles from the basic database. Second, we gathered the activity data of these selected think tanks on *WeChat* and *Weibo* by applying data mining techniques to big data and extracted three types of activities. After manual cleaning (deletion of duplicate data and abnormal values), activity data were precisely matched with the 510 think tanks from China.

Table 3 illustrates that the think tanks’ *WeChat* official account data included the articles released by the think tanks, the number of times they released articles, the number of views and likes these articles garnered, and the number of views and likes their headlines received. The citation of think tanks in *WeChat* public opinion encompassed all the aspects of article citations, which included the number of articles cited, the originality of the articles, the number of views and likes received by the articles, and the positions of these articles. The

verified experts the think tanks had in *Weibo* referred to all the relevant information regarding the experts' accounts. The information included history fans; *Weibo* posts; and the number of shares, likes, and comments received.

(1) Identification of Official Accounts on WeChat

We identified 268 valid *WeChat* official accounts that belonged to 233 think tanks from the 18 million *WeChat* official accounts on record. We acquired all the information and articles relevant to the accounts and recovered over 32,806 released articles with 200,896,335 views and 1,759,791 "likes." We identified information about release times, headline views, headline "likes," the maximum duration of reading, maximum number of "likes," and first-published articles.

(2) Collection of Data on WeChat-Based Accounts of Think Tanks

We gathered 0.54 million articles that cited the selected 510 think tanks from all the articles released by the 18 million accounts in the database and extracted fields from the data. These citation articles garnered 1,297,642,615 views and 11,553,499 "likes." We subsequently identified information about these citation articles, such as position, original articles, times read, and the number of "likes."

(3) Identification of WeChat-Based Think Tank Experts

First, we extracted 35,798 real-name users from the 150 million *Weibo* accounts monitored in real time via fuzzy recognition. Similar to *Twitter*, *Weibo* has a verified status in its account in-

formation. Thus, we could match the verified status information of the *Weibo* accounts with our 510 think tank keywords (1,331) to obtain the *Weibo* experts' accounts. Second, we accurately matched these with the 1,286 experts from the 212 think tanks on *Weibo* by artificial selection. These think tank experts had 113,420,272 fans and 155,322 *Weibo* posts, which garnered an aggregated 2,978,578 shares, 3,310,814 "likes," and 1,216,489 comments.

4.3 Data Analysis and Index System Construction

We used logarithms and standardized processing to deal with the data and designed a ranking system on the basis of analyzing big data on the activities and influences of think tanks and their social media experts. We constructed the *think tank big data index* (TTBI), a two-level indicator system with three first-level and 16 second-level indicators, to evaluate comprehensively the influence of the think tanks and acquire the TTBI for each think tank. Table 4 illustrates the weightings of the indicators.

The *WeChat*-based think tank account influence indicator had the following secondary indicators: all articles published in a year ("Released articles" total), the number of times all the articles were read in a year ("Views" total), the number of likes received by all the articles in a year ("Likes" total), the frequency of publishing articles ("Released articles" frequency), the capacity of the articles published by the official accounts ("Released articles" volume, which is the number of articles/8; eight articles per group at most), and the pro-

Table 3: Basic Statistics of 510 Think Tank Samples

Data types	Data information	Data numbers
<i>Think tanks' WeChat official accounts (233)</i>	<i>Official accounts</i>	268
	Released articles	32,806
	Views	200,896,335
	Likes	1,759,791
	Release times	11,474
	Headline views	87,677,410
	Headline likes	823,333
<i>Think tanks' citation in WeChat (510)</i>	<i>Citation articles</i>	539,795
	Original articles	32,861
	Views	1,297,642,615
	Likes	11,553,499
	Position	—
<i>Think tanks' verified experts in Weibo (212)</i>	<i>Experts accounts</i>	1,286
	Fans	113,420,272
	Weibo posts	155,322
	Shares	2,978,578
	Likes	3,310,814
	Comments	1,216,489

portion of likes for the articles' headlines ("Headline likes" ratio: the number of likes for the headline article/time of reading for the headline article).

The *Weibo*-based think tank expert influence indicator had the following secondary indicators: the number of fans, number of posts released by an expert in a year ("Weibo posts" total), number of times an article released by an expert was reposted in a year ("Share" total), number of comments on all articles released by an expert in a year ("Comments" ratio), number of "likes" all articles released by an expert

received in a year ("Likes" ratio), and number of times all articles released by an expert were reposted in a year ("Share" ratio).

The *WeChat*-based think tank citation influence indicator, which indicated the number of times *WeChat* articles referenced think tanks and the impact of these articles, had the following secondary indicators: the total number of articles that referred to the think tank from active official accounts on *WeChat* ("Citation article" total), the times the articles that refer to the think tanks from active official accounts on *WeChat*

that have been read (“Views” total), the total number of “likes” garnered by articles that referred to the think tank from active official accounts on *WeChat*

Table 4: TTBI System

First-level indicators	Second-level indicators	Weight	Logarithm	Standardized
<i>WeChat-based think tank account influence index</i> 33.33%	“Released articles” total	0.1	√	√
	“Views” total	0.2	√	√
	“Likes” total	0.2	√	√
	“Released articles” frequency	0.1		√
	“Released articles” volume	0.1	√	√
	“Headline likes” ratio	0.3		√
<i>Weibo-based think tank expert influence index</i> 33.33%	History fans numbers	0.4	√	√
	“Weibo posts” total	0.1	√	√
	“Share” total	0.2	√	√
	“Comments” ratio	0.1		√
	“Likes” ratio	0.1		√
	“Share” ratio	0.1		√
<i>WeChat-based think tank citation influence index</i> 33.33%	“Citation article” total	0.4	√	√
	“Views” total	0.2	√	√
	“Likes” total	0.2	√	√
	“Position” importance	0.2		√

Notes:

1. “Released articles” frequency = Released articles/days (each think tank could release only one article or volume article a day).
2. “Released articles” volume = Released articles/8 (one volume article with eight articles maximum).
3. “Headline likes” ratio = “Headline likes”/“Headline views.”
4. “Comments” ratio = “Comments”/“Weibo posts,” “Likes” ratio = “likes”/“Weibo posts,” and “Share” ratio = Share”/“Weibo posts”
5. “Position” importance = 1/ “Position” weighted average

(“Likes” total), and the importance of the location of the articles that referred to the think tanks from active official accounts on *WeChat* (“position” importance: location in the eight articles).

5. Ranking Information and Result Assessment

5.1 Big Data Ranking for Chinese Think Tanks

According to the overall ranking of the TTBI, the top 10 think tanks in terms of TTBI are as follows: China Association for Science and Technology, Chinese Academy of Social Science, Liaowang Institute, International Monetary Institution of Renmin University of China, Center for China and Globalization, Pangoal Institution, National School of Development at Peking University, Chongyang Institute for Financial Studies of Renmin University of China, China Finance 40 Forum, and CBN Research Institute.

Unlike *university think tanks*, *army* and *research institute think tanks* occupy a small proportion of the selected think tank samples but have a high TTBI mean (the average value of all think tank TTBI indicators) and a small square deviation (square deviation of all think tank TTBI indicators). Therefore, the *army* and *research institute think tanks* have more social influence in China. This may be because the Chinese public has a high level of trust and attention to them. The low social influence of *university think tanks* is explained by two reasons. The first is that the behaviors and products of the *university*

think tanks have not caused widespread concerns among the public. In the public subconscious, the university is still a place for educating talents. Another reason is that the universities are not good at expanding their social media channels to publish ideas. They rely more on internal channels instead (Table 5).

The *enterprise and social think tanks* have the highest TTBI indicators square deviation with varied influence. The *enterprise and social think tanks* have more social influence, but their performances are different. Compared with other kinds of think tanks, *enterprise and social think tanks* have less formal channels to sell their ideas. Thus, to survive, they often pay more attention and invest considerably in social media platforms to gain social influence. The biggest think tank influence (62.84) belongs to the *research institute think tanks* type, which also owns the biggest and the average influence (47.91) among all types of think tanks. This is relatively intuitive to the public. Thus, more attention is paid to what they consider to be a think tank type of organization.

The top 50 influential think tanks in TTBI are composed of 20 *enterprise and social think tanks*, 11 *party and government agency think tanks*, and 9 *academies of social sciences think tanks*, 6 *university think tanks*, 3 *research institute think tanks*, and 1 *party or administration school think tank*. Thus, most of the principal influential think tanks are *enterprise and social think tanks*, which account for 40% and double this type's proportion in all selected think tanks (20%). The *academy of social science*

and *research institute think tanks* also take more seats in principal influential think tanks at 18% and 6%, respectively, than they do among all selected think tanks, which account for 9% and 1%, respectively. *University* and *par-*

ty or administration school think tanks take fewer seats in the 50 top influential think tanks at 12% and 2%, respectively, compared with their seats in all selected think tanks, where they account for 42.7% and 7.1%, respectively. There-

Table 5: TTBI Ranking Information

Think tank type	Max	Min	Mean	SD	n	%	Rank in 50 (n)*	Rank in 50 (%)*
<i>Party or administration school think tanks</i>	47.34	2.11	26.71	11.31	36	7.1%	1	2.0%
<i>Party and government agency think tanks</i>	58.73	0.00	21.91	14.14	101	19.8%	11	22.0%
<i>University think tanks</i>	59.27	0.00	15.94	11.94	218	42.7%	6	12.0%
<i>Army think tanks</i>	42.04	39.15	40.60	1.45	2	0.4%	0	0.0%
<i>Research institute think tanks</i>	62.84	37.93	47.91	8.92	5	1.0%	3	6.0%
<i>Enterprise and social think tanks</i>	56.56	0.00	26.20	15.24	102	20.0%	20	40.0%
<i>Academy of social sciences think tanks</i>	59.98	0.00	29.36	12.41	46	9.0%	9	18.0%

Note:

* Rank in 50(n) is the number of top 50 influential think tanks in TTBI ranking. Rank in 50(%) is the percent of top 50 influential think tanks in TTBI ranking.

fore, China lacks influential *university* and *party or administration school think tanks*. Moreover, in the list of the top 50 think tanks, those that focus on economy and finance show considerable significant social influence.

5.2 Various Patterns in Different Social Media Platforms

TTBI has three first-level indicators, which include *WeChat*-based think tank account influence, think tank expert influence, and think tank citation influence, which represent three different influence channels for the think tanks.

We analyzed the three influence channels for the seven types of think

tanks and corroborated that the *university think tanks* show the smallest influence and that the *research institute think tanks* show the greatest influence in all channels (Figure 2). Compared with the influence of other types of think tanks, that of *university think tanks* relies more heavily on the influence of the think tanks' citations in *WeChat*. The reason is that university experts are not keen on running individual Weibo accounts, and *university think tanks* are also reluctant to spend money on official *WeChat* accounts. The influence of the *army think tanks* and the *research institute think tanks* rely more heavily on the influence of the think tanks' verified experts in *Weibo* and less on the influence

of the think tanks' citations in *WeChat*. They have attracted a lot of attention to *Weibo* and *WeChat*' citations because their posts or articles focus more on military reviews, national strategies, and science knowledge, which are popular with the public.

Enterprise and social think tanks use three channels proportionately to exhibit their influence, unlike the *research institute think tanks*. This is in line with the *enterprise and social think tanks*' pursuit of expanding influence in all directions. Other findings are noted. The amount of original articles produced by China's think tanks, most notably by the *party and government*

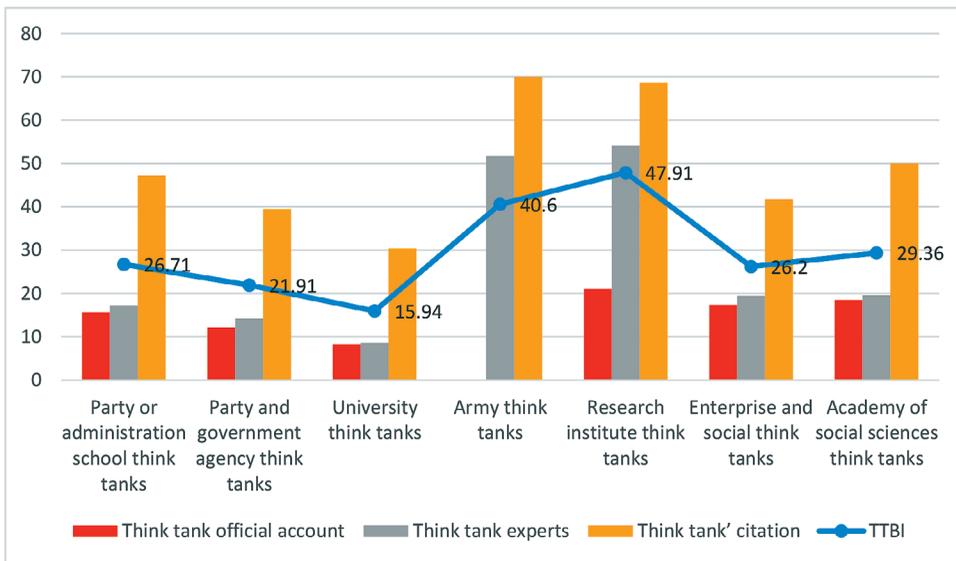


Figure 2: Various Patterns in Different Social Media Platforms for Heterogeneous Think Tanks

agency think tanks, remains relatively low. The *university think tanks* occupy a substantial proportion of the entire selection of think tanks but have few instances of article citations and low in-

fluence on the *WeChat* platform, which includes the opposite *party and government agency think tanks*.

(1) *WeChat*-Based Think Tank Account Influence

According to the TTBI-WeChat official account ranking, the top 10 think tanks in China include the Spring and Autumn Institute Development Strategy, Liaowang Institute, Chinese Cities and Small Towns' Reform and Development Center, Guizhou Academy of Social Sciences, China Association for Science and Technology, Phoenix International Institute, Party School of Jiangxi Provincial Party Committee of China, Center for China and Globalization, and the Development Research

Center of Guizhou.

Being a relatively new information communication platform, WeChat official accounts are less developed than Weibo. Nearly half of China's think tanks did not open or build WeChat official accounts because operating an official WeChat account requires a certain amount of manpower and resources. However, all types of think tanks take full advantage of this new platform to widen their influence, given that the average values of WeChat official accounts for all

Table 6: TTBI-WeChat Accounts Ranking Information

Think tank type	Max	Min	Mean	SD	Rank in 50 (n)	Rank in 50 (%)
<i>Party or administration school think tanks</i>	49.25	0.00	15.66	17.49	5	0.10
<i>Party and government agency think tanks</i>	60.87	0.00	12.17	11.16	13	0.26
<i>University think tanks</i>	44.55	0.00	8.34	13.75	6	0.12
<i>Army think tanks</i>	0.00	0.00	0.00	0.00	0	0.00
<i>Research institute think tanks</i>	49.47	0.00	21.03	18.93	1	0.02
<i>Enterprise and social think tanks</i>	72.05	0.00	17.38	18.74	19	0.34
<i>Academy of social sciences think tanks</i>	49.48	0.00	18.49	17.07	6	0.12

seven types of think tanks have similar relationships with the two other indices. The average influence of the *university think tanks* (8.34) in TBBI-WeChat official accounts is lower than in TTBI

(15.94), which indicates that *university think tanks* have paid attention to these communication platforms (Table 6).

In the top 50 influential think

tanks based on WeChat official accounts, 19 *enterprise and social think tanks*, 13 *party and government agency think tanks*, 6 *university think tanks*, 6 *academy of social sciences think tanks*, 5 *party or administration school think tanks*, and 1 *research institute think tank* are available. According to the TBBI-WeChat official account ranking, *enterprise and social think tanks* occupy good ranks with 19 seats or 34% in the top influential think tanks, which exhibit great influence. This scenario can be attributed to the willingness of these think tanks to invest in the maintenance of their WeChat official accounts. With a total of five seats, the *party or administration school think tanks* also take more seats than they do in the TBBI top 50, where they have only one seat.

(2) Weibo-Based Think Tank Expert Influence

According to the TBBI-Weibo experts ranking, the top 10 China's think tanks included the China Strategy Culture Promotion Association, International Monetary Institution of Renmin University of China, Institute of Public Policy of Zhejiang University, Chinese Academy of Social Science, Chinese Academy of Engineering, China Soft Science Research Association, China Association for Science and Technology, Pangoal Institution, and Chinese Academy of Sciences.

The *enterprise and social think tanks* exhibit the greatest influence at 83.98. The *army and research institute think tanks* display good average influence in the Weibo expert platform at 51.76 and 54.07, respectively. The *party or administration school think tanks*,

the *enterprise and social think tanks*, and the *academy of social sciences think tanks* exhibit similar average influence in the Weibo expert platform at 17.23, 19.48, and 19.62, respectively. Compared with the two other influential channels, varied types of think tanks have significant standard deviations in terms of the influence of Weibo experts, whereas the variety of *enterprise and social think tanks* is the biggest with a standard deviation of 23.14 (Table 7).

In the top 50 influential think tanks based on Weibo experts, 13 *university think tanks*, 13 *enterprise and social think tanks*, 8 *party and government agency think tanks*, 5 *academy of social sciences think tanks*, 3 *party or administration school think tanks*, 3 *research institute think tanks*, and 2 *army think tanks* are available. In terms of the influence of Weibo experts, *enterprise and social* and *university think tanks* occupy good ranks and show substantial influence. This scenario can be attributed to the key expert effect. Two *army think tanks* and three of the five *research institute think tanks* are included in the top 50 think tanks based on the influence of Weibo experts, which may be due to the experts' individual perspectives.

(3) WeChat-Based Think Tank Citation Influence

According to the influence ranking of WeChat-based citations to the think tanks, the top 10 think tanks are the Chinese Academy of Sciences, Chinese Academy of Engineering, Chinese Academy of Social Science, Central Party School of the Communist Party of China, Development Research Center of the State Council, China Association

Table 7: TTBI-Weibo Experts Rank Information

Think tank type	Max	Min	Mean	SD	Rank in 50 (n)	Rank in 50 (%)
<i>Party or administration school think tanks</i>	60.68	0.00	17.23	20.61	3	0.06
<i>Party and government agency think tanks</i>	61.55	0.00	14.14	19.48	8	0.16
<i>University think tanks</i>	74.99	0.00	8.59	17.4	13	0.26
<i>Army think tanks</i>	52.30	51.21	51.76	0.54	2	0.04
<i>Research institute think tanks</i>	65.91	39.09	54.07	11.48	3	0.06
<i>Enterprise and social think tanks</i>	83.98	0.00	19.48	23.14	16	0.32
<i>Academy of social sciences think tanks</i>	64.61	0.00	19.62	22.14	5	0.10

Table 8: TTBI-WeChat Citation Rank Information

Think tank type	Max	Min	Mean	SD	Rank in 50 (n)	Rank in 50 (%)
<i>Party or administration school think tanks</i>	81.38	0.00	47.23	13.88	2	0.04
<i>Party and government agency think tanks</i>	76.09	0.00	39.46	20.73	15	0.30
<i>University think tanks</i>	71.28	0.00	30.44	18.23	6	0.12
<i>Army think tanks</i>	73.82	66.24	70.03	03.79	2	0.04
<i>Research institute think tanks</i>	88.20	47.88	68.63	17.17	3	0.06
<i>Enterprise and social think tanks</i>	72.00	0.00	41.76	17.48	15	0.30
<i>Academy of social sciences think tanks</i>	81.81	0.00	49.96	13.53	7	0.14

for Science and Technology, National Defense University of the People's Liberation Army, China National School of Administration, and the Chinese Academy of Agricultural Sciences, which are mostly national institutions.

In terms of the citation of think tanks in *WeChat* public opinions (Table 8), *army* and *research institute think tanks* display good average influence at 70.03 and 68.63, respectively. The average influence of *university think tanks* is the lowest among all types of think tanks at 30.44. A possible reason is that social media quotes general knowledge more than specialized knowledge in the early stage of the idea industry in China. Other types of think tanks have similar standard deviations, except *army think tanks*, which have an average influence of 3.79. Significant public trust in *research institute, army, and academy or social science think tanks* in China occurs, and less public trust in the *university think tanks* emerges.

In the top 50 think tanks based on the influence of *WeChat* citation, 15 *party and government agency think tanks*, 15 *enterprise and social think tanks*, 7 *academy of social sciences think tanks*, 6 *university think tanks*, 3 *research institute think tanks*, 2 *army think tanks*, and 2 *party or administration school think tanks* are available. The *party and government agency think tanks* are influential, whereas the *enterprise, social, and university think tanks* are less influential compared with *Weibo*-verified experts and *WeChat* official accounts.

6. Conclusions and Implications

China's think tanks have actively embraced new methods of communication to expand their influence channels in this era. Social media has quickly become a novel platform for China's think tanks to display information and attract the attention of the public and key decision makers. Social media has increased the potential ways through which scholars and think tanks cooperate and has widened their influence. This study used a new data capturing method and big data analysis techniques to capture the activities of think tanks on social media platforms and comprehensively evaluated their influence.

Our findings validated that although the *army* and *research institute think tanks* occupied a small proportion of all selected think tanks, they exhibited great influence (TTBI mean and smaller square deviation), unlike *university think tanks*. *Enterprise and social think tanks* had the highest TTBI mean square deviation with varied influences. A great number of *enterprise and social think tanks* and those that have focused on economy and finance emerged as top influential think tanks. Compared with that of other types of think tanks, the influence of *university think tanks* relied heavily on the influence of the think tanks' citations in *WeChat*. The influence of *army* and *research institute think tanks* relied more heavily on the influence of the think tanks' verified experts in *Weibo* and less on the influence of the think tanks' citations in *WeChat*. *Enterprise and social think tanks* proportionally used the three channels to exhibit their influence.

Nonetheless, due to the heterogeneous function of social media platforms, the different types of think tanks showed various influence and activities patterns. (1) Although *WeChat* official accounts are a new information communication platform, all types of think tanks took full advantage of *them* to enhance their influence. *Enterprise and social think tanks* showed considerable influence, which could be attributed to their willingness to invest in the maintenance of their *WeChat* official accounts. (2) In terms of *Weibo* experts, *army* and *research institute think tanks* displayed good average influence, and *enterprise and social think tanks* showed the greatest variety. Compared with the two other influence channels, varied types of think tanks had significant standard deviations in terms of the influence of *Weibo* experts. In the top influential think tanks, *enterprise and social* and *university think tanks* ranked well. (3) In terms of *WeChat* citations, the principal influential think tanks mostly carried recognition as national institutions. *Army* and *research institute think tanks* also displayed good average influence. The other types of think tanks had similar standard deviations, except for *army think tanks*. *Party and government agency think tanks* were highly influential, whereas *enterprise and social* and *university think tanks* were less influential in terms of *Weibo* experts and *WeChat* official accounts.

Utilizing big data when evaluating think tanks allows researchers to overcome the technical bottlenecks of objective evaluation and provides a new dimension through which the con-

struction and operation of think tanks can be recognized. This evaluation can also track public opinions in real time and serve as reference for government decision making. The influence of big data on think tanks does not necessarily equate to the overall policy influence of think tanks because the influence of think tanks can be evaluated accurately only within a transparent decision-making system. Therefore, the desire to establish an open and transparent government decision-making system fundamentally drives the exploration of a comprehensive evaluation of the influence of think tanks.

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