

## Article

# Measuring the Feature of “The Global”: A Framework for Analyzing the Global City Ranking

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**Abstract:** This study discusses the measurement of the global city with the primary aim to uncover the logical grounds to measure the features of “the global” in the study of ranking and comparing the cities. The study sets up a three-dimensional analysis framework with infrastructure (economy), fluidity (openness), and reputation (influence) for the basic dimensions of measurement for the global cities. Using this framework, the studies of top-10 Chinese cities in the global city comparison have been conducted with the data of cities’ scores from various ranking systems. The resources used include the index of Globalization and World Cities, global urban economic competitiveness index, Economic daily and United Nations global urban sustainable competitiveness rankings. The study tests the effectiveness of this framework by illustrating the coherence and dissimilarity of this analysis with other city ranking systems, and further discloses the advantage of this indicator system. This study exposes the existing problems in the logic and rationale of the urban studies and establishes the basis of global city ranking, thus offering policymakers new perspective on the strategy of city development.

**Keywords:** city ranking; social indicators; global city; urban development; globalization



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## 1. Introduction

In the globalized world, urban life is reshaped according to the changing circumstances of human settlement, in which the interconnection between cities is fundamental for the world development. Studies on this mutual connection among cities formulate a view on the global cities or the “global network of cities” [1], or addressed as the “global urban network” [2]. These studies became popular in the 1990s when the influence of globalization started to become more visible. Accordingly, previous discussions on “world cities” [3], “world cities formation” [4], and “world city hierarchy” [5], found the basis for further discussion about the logic of global city. To be evident, the old term ‘world city’ seems not enough for grounding the theoretical basis of studies, as this concept invokes a set of more theorized propositions, and raises the stakes for the conceptual clarity, consistency and empirical verification [6].

In the literature, the conception of world cities is considered as the consequence of the extended world economy [4,5]. The logic relied on the city’s function of agglomeration in the network of the world economy. For instance, Fujita et al. [7] elaborated on the significance of spatial agglomeration of social activities in promoting regional economic development and cities play an important function of pooling the labor force and reflect the flow of international business [8]. In the past, the studies on city development regarded the world cities as the world business centers but now elaborated the same issue in the context of global economy or the power of transnational production [9]. However, recently, the discussion on the topic of world cities is shifted towards the key concepts like the “global cities” [10–13].

To understand this change, we need to consider features of “the global” as the central theme of global cities as we compare these cities, not only in the context of world cities. To

establish the theoretical grounding of this study, the first issue to discuss is the construction of a definition of the concept of global cities. According to Sassen [14], global cities around the world are the places where a variety of globalization processes take place in localized forms. This notion is also emphasized by Derudder and Witlox [15] who argues that the concept of the global city puts a strong emphasis on the networked economy. However, the global city concept remains unclear which can be understood in various contexts, such as the ideas of the city, megacity, city network, group city, and even region. This diversity enriches the context of discussions to extend in multiple dimensions, thus creating a significant amount of room for vagueness. As McCarney articulates, no consensus yet exists for measuring the level to which “the global has been developed” [16].

Therefore, we need to examine the features of global cities, focusing not only on the manner in which the concept of global cities has been captured, glorified and reimagined but also consider indicatory measurements of the “global” nature of world cities or international cities. Developing the indicators for measurement of global city thus becomes the second key issue of this discussion. In this context various scholars have proposed different indicators, for instance some studies used the levels of urbanization as the key indicator [17], whereas some scholars followed the quality of life approach [18], other groups of scholars considered the city’s capacity of economic development, or the GDP per capita and economic growth [19], while some employed the indicators for “smart cities” and for “resilient cities” [20]. As a result of these efforts, many indicator systems including the UN’s City Development Index (1990s), the UN’s City Prosperity Index (2012) and the Global City Indicators Facility (2008), as well as the Indicators for City Services and Quality of Life (2014) have been developed. Most of these indicators are appropriate within the context of urban development, but are unable to reflect the ideal of “global”. Therefore, we need to explore the indicators that could reflect the demand of globalization in the study of the global cities. For this purpose, we should adopt a number of indicators to measure the degree of the internationalization of cities, and make the cases for comparison in the international world.

The third issue under investigation is how to limit the number of indicators for comparison. There exist many indicator systems which cover a wide scope of indicators with comprehensive functions. Reed’s [21] work is an excellent example which refers nine items in financial variables and 40 items to compare the level of internationalization for 76 cities, covering the cultural, economic, geographic, and political variables from over 40 countries. Many similar works contribute the formulations of the Global Power City Index, including 70 indicators in six categories: economy, research and development, cultural interaction, livability, environment, and accessibility. Moreover, the Global Livable Cities Index also covers a broad spectrum of factors with respect to good governance, urban infrastructure, environmental friendliness and sustainability, quality of life, and economic vibrancy [22]. When the number of indicators increase, it creates difficulty in data comparing and may risk the target of comparison being meaningless. Therefore, it is important to carefully make the choice of key indicators from many alternatives.

The fourth issue relating to global city studies concerns patterns of urban life and sustainability of development of a city in the globalization era. Many tools have been proposed and developed to assess the sustainability of buildings, neighborhoods and cities [23,24]. Some urban sustainability indicators encourage sustainable solutions for urban development [25], and the development of a new style of urban life, along with cultural reservations that have become important issues. According to Yuen [26], as also discussed by other scholars [27–29], global cities are related to cultural heritage, or the culture of sustainability. Moreover, much research on global cities emphasizes the new features of the city network [30,31], and thus, smart city and city network perceptions provide a new framework to ensure the role of global cities. While taking those factors into consideration, the discussion of global cities includes a number of factors such as sustainability, cultural heritage and future cities.

With this overview, we discovered some key questions that should be further answered. First of all, these indicators refer to many aspects of urban development, however, the logical basis of indicator selection is weak. Secondly, most indicators are economic and development indicators, not specifically for global cities and do not differentiate the different rationale among the world city, urbanized city, and global city. Thirdly, we need to analyze the feature of “the global”, and set a special angle to approach global cities. Since the distance between the world city and global city should be identified, how to reflect this distance by social indicators should be the key task for this study. Fourth, the studies of global cities should include numerous factors in urban settlement, including quality of life, smart city, and elderly-friendly city, etc. [32,33]. Nevertheless, this study does not intend to adopt all these factors into the study but set up its setting on exploring the feature of the global city by the indicators to be used.

## 2. Literature Review and the Research Design

In order to search for the variables for measuring the global cities, the previous literature can provide a research guideline/outlook at the indicators of world city and global city. In the earlier studies, mostly economic and technological indicators are used, typically relating to value chain of production and consumption at international level. For instance, Friedmann [5] and Friedmann and Wolff [4] used the corporate management, banking, financial, legal services, accounting, technical consulting, telecommunications, international transportation indicators to discuss the issues of world cities. Sassen [34] used the “banks” and “multinational company headquarters” as the indicators to measure the status of international city and infrastructural networks. Beaver stock and Smith [35] highlighted the role of enterprises and organizations. Taylor et al. [36] used the advanced producer service firms to study contemporary intercity relations in the age of globalization. Sassen [14] explained the reasons why the word “global city” became popular by “a function of the power of transnational corporations and global communications”. Therefore, to conclude, the nature of global cities from the issue of the power of large corporations and the capacity of new technologies to neutralize distance and place become prevalent.

Apart from economic factors, some studies on cities also used sociopolitical and policy indicators as a reference point [37,38]. The UN’s City Development Index (1990s) and the Global City Indicators Facility (GCIF) use the services provided by the city and quality of life as dimensions of measurement, while other scholars such as Callois and Aubert [39] analyze the impact of social capital on regional development. Thus, local government authorities and communities have a key responsibility to promote sustainable development. Some Western scholars, such as Castells [40] from the United Kingdom, propose the “international city information flow” to measure “model cities” whereas Kwon et al. [41] presents a synopsis of indicators to measure urban competitiveness in six metropolitan cities in Korea. Since global cities and the network of these cities are spaces that are both place-centered and embedded in particular strategic locations, comprehensive sets of indicators are needed to assess cities on local governance and global city companions.

Meanwhile, in the discussion of global cities and the cultural and ecological sustainability issues in light of their cultural attributes, these cities are sites for new types of operations, along with social ecology in which a whole range of cultural factors play roles. The issues of ecosystems and sustainability are increasingly asserting their influence in global city studies, in which researchers study the topics of green cities, sponge cities, circular cities, and innovative cities [42,43]. For example, Anderson [44] highlights the importance of social and economic factors for sustainable use of ecosystem services, which is argued to be one aspect of global cities, whereas Checker et al. [45] provide ongoing discussion of urban sustainability by looking beyond the propaganda and policies associated with global cities. Some scholars such as Deng et al. [25] have composed urban sustainability indicators (USIs), which are used to measure and encourage sustainable solutions. Recently, Molinaro et al. [46] have presented a knowledge-based urban development

assessment model based on the value of social investment in infrastructure and the services of global cities to improve the quality of life of their populations.

Concerning social indicators, international institutions, like United Nations (UN) City Prosperity Initiative (CPI) used social indicators in six dimensions, which include both economic and social factors. These indicators include productivity, infrastructure development, quality of life, equity and social inclusion, environmental sustainability, urban governance, and legislation. The most widely used indicator system for comparison of cities is UN Istanbul indicator system developed in 1996, which employs five types of indicators for comparisons of cities. These include the level of economic growth, the structure of urban economy, the facilities and infrastructure, foreign trade, and openness to the international system (see Table 1). As the indicators cover many aspects of urban life, therefore it has some advantage in bridging different indicator areas with theoretical frameworks, despite its weak methodology and implication.

**Table 1.** Indicators systems for comparison of cities.

Dimension		Indicators
1	Urban economic development	GDP per capita
2		Per capita disposable income
3	Urban industrial structure	Proportion of added value of tertiary industry in GDP
4		the nonagricultural employment population
5	Urban infrastructure construction	Per capita household electricity consumption
6		Per capita public green areas
7		Vehicles per 10,000 population
8		Number of phones per 10,000 population
9		Metro operation mileage
10	Urban openness level	Proportion of overseas in local population
11		Proportion of inbound tourists in local population
12		The popularity of English communication among citizens
13		Exchange rate of major international currencies
14	Foreign exchange level	Proportion of exports of local products in GDP
15		Proportion of total imports in GDP
16		Trading volume of foreign exchange market
17		Proportion of foreign direct investment in local investment

Global city studies also have policy dimensions. In this regard, Barthel-Bouchier [47] consider that the global city approach should support the dimensions of global and urban sustainability. Daniel and Mila [48] argue that the global features of cities are not dependent on their national strength but rather on interconnection, compatibility and coordination to build up global and reputable cities in the global era. According to Hoyler et al. [49] a global city survives in the context of the world network, therefore mutual communication becomes an essential feature of a global city. In many places, global cities are not only involved in the degree of internationalization, but also in the coordination of cross-national boundaries of activities. Thus, discourse regarding global cities in policy analysis is conventionally linked with the global policy of Sustainable Development Goals (SDGs), since SDGs have a set policy goal for global development to “make cities and human settlements inclusive, safe, resilient and sustainable” (Goal 11). These policy ideas are incorporated in the actual performance of sustainable policies, such as by the UN-associated research group IAEG-SDG, with 231 indicators with respect to economic, social and environmental perspectives, corresponding to the 17 SDGs and their 169 associated targets.

Based on the abovementioned studies, this work endeavors to investigate the nature of global cities in the following aspects: first, to define the global city and measure the degree of “the global” for city comparison. Second, to lay down the dimensions of indicators as the measurement for the “global” and compose a unified framework for analysis, as it is observed that the selection of indicators in many comparisons have been done on

the basis of data availability, rather than on a strong scientific base. Third, to test the effectiveness of this designed framework for analysis for the indicator system on the basis of certain evidence. Finally, to suggest the policy implications of this indicator analysis for urban development, and what could be rationalized from the standards of chosen indicators for studying the global cities. With this analytical framework, we propose to construct a three-dimensional framework of analysis to test the global features of the global city. We also need to identify the role of cities in the global network, and influence of the factors including globalization, modernization, and the raising urban quality of life. For this purpose, we will classify the discussed indicators with new logic and newly constructed rationale.

### 3. Research Framework of the Three-Dimensions Indicators

This study employs the three-dimensional framework, where the first dimension pertains to infrastructural factors, which reflect the levels of urbanization, modernization and economic development in the cities. In the previous studies, the effectiveness of agglomeration economies in regional development has been criticized by scholars due to their adverse consequences on social stability. Some scholars suggest agglomeration of economies seriously affected the environment of human habitat [50]. With the increasing population, the per capita resources decrease substantially. On the other hand, Hoyler and Harrison [51], the main contributor to key assumption of global city theory, suggest that advanced producer service firms and the highly skilled labor they employ are important indicators for world city formation. These characteristics attract more capital inflow to facilitate commuting also distinguished by their capability to provide goods and services not merely for domestic consumption but for a global market [52].

Thus, a number of indicators reflecting economic growth and technological developments are used to reveal the material basis of city development, such as labor productivity [53], GDP per capita [18] and the input and output factors of urban competitiveness [54]. Subsequently, the environmental issues and the urban sustainability have also been included in this dimension, and the goal of environmental protection is also as important as the economic goals. Therefore, this study will focus on three types of indicators in the dimension of facilities, including economic, environmental, and infrastructural indicators (see Table 2). The economic basis of the cities has fundamental importance for maintaining a good urban life, so the economic capacity indicators and environmental indicators are necessary for examining urban competitiveness. The environmental and ecological factors are helpful to facilitate the development of the city policies, and these factors are complex and have a multidimensional effect on the globalization of city.

The mobility factors in the second dimension reflect the openness of the national system toward the international system. Sassen [55] considers a city to have assumed the functions of a global city as soon as a few major companies establish their corporate headquarters there. City is the meeting place for goods and services and transportation, thus, we need to think about the question raised in the past by Hall [3] on what characteristics can we distinguish world cities from other great centers of population and wealth. This question subsequently motivated some writers to discuss the division of “world city network” [56] and “polycentric urban region” [57]. As Neal [58] argued, most of the globalized cities are the most (externally) connected cities. In this context the features of a global city can be comprehended by its “global” features, the indicators which show these features refer to mobility of the goods, the population, and information and intercommunication through population flow and flow of goods.

The features of mobility can be taken as a fundamental dimension and it illustrates the degree of openness of the cities to the international visitors, global flow of finance and goods, and the wideness of the access to the foreign capitals and services. In globalized and rapidly evolving economies, cities and urban regions increasingly find themselves in relationships that are either cooperative or competitive. For instance, Abbott [59] considered the indicators of the foreign-born population, the number of foreign banks,



foreign tourists, new immigration numbers, the value of the imports, number of foreign consulates, and establishment of a friendly city relationship with foreign cities to reflect the status of the internationalization of the city. These indicators show how convenient the city is for the international visitors and foreign exchange of the goods and services. The global city particularly has emerged as a site for new claims: by global capital. This study sets three groups of indicators i.e., the population flow, capital flow and flow of goods. The first group relates to the international visitors and migrants, for which the tourism indicators are very useful for illustration. The foreign trade is also an important indicator to assess the flow of capital and goods to test this effect. These indicators jointly exhibit the extent of openness to the world system. The relevant indicators can also include the volume of cargo through ships as well as the transfer of goods through air and railway.

**Table 2.** The three-dimension frame of indicators.

Dimension	Feature	Indicators
Facilities	Economic factors	Per capital GDP, the weight of the third sector
	Environmental factors	Air quality, arable lands, garbage collection
	Infrastructural factors	Construction, electricity, water supply, transportation
Mobility	Population flow	Forging students, foreign labor, international visitors
	Capital flow	Foreign investment, foreign trade
	Good flow	Cargos, ports, international airlines
Reputation	Political influence	The international sister-cities, the embassy and consulates, international organizations
	Economic influence	Office of international corporation, headquarters of top international companies
	Cultural influence	The numbers of international cultural events, sport competitions, conference events
	Social influence	The popularity of English language, the community activities with foreign participants.

The third dimension of indicators is about the city's reputation. The global city status is linked with its connection with national power, particularly economic and financial power. The indicators used for measurement in the aspect of city reputation include the number of international organizations, foreign agents of politicians and diplomatic agents (political one), the number of international companies (economic one), international events of culture and sport, international conferences, international competitions and friendly city (cultural influence), as well as in livable city construction and the social welfare service indicators (social influence), etc. While applying this proposed framework of analysis, we can test whether or not this new indicator system is more useful and effective in measuring the global level of the cities than the existing one for international comparison.

However, the reputation of a city depends not only on its economic success but also on its competitive advantage in political and cultural development, which have certain implications for global development [51]. Cultural resources, attractiveness to visitors and living environments have important roles as cultural heritage creates a wider space for global cities to earn good reputations. In this context, some scholars argue that, considering the functions of the cities, London, Paris and Tokyo have limited functionality in international production but they have competitive advantages in cultural capital and tourist services, and thus they are considered important global cities. Changes in the reputation of a city also indicate the fading or booming of a global city that is losing or increasing its vitality. Due to its power in the fabric of the city network, city reputation is the key indicator to test the sustainability of city vitality and its competitive status in international power.

In the next section, some cases for comparison will be presented under this new framework of analysis. The city ranking information is selected from the ranking of other indicator systems to establish the data base for this study, and thus, an overall score to reflect the status of global cities is obtained. Subsequently these data were rearranged in the designed framework of the three-dimensions examination, with respect to facility, mobility and reputation. We were interested to know the outcome, whether or not the new profiles of these cities are coherent with the city profiles from other indicator systems after

rearrangement, and inquiring whether or not the features of this new system were more sound and identical for these cities in terms of global city, or reveal some additional value for enriching the understanding about the features of the global cities.

#### 4. Materials and Methods

In order to test this framework, first of all the research samples for evaluation were selected. For this purpose, the index of Globalization and World Cities was taken (GaWC) into reference, which is the most popular indicator system in city comparison. This system was designed by a research group based in the Loughborough University, UK, and they present the ranking of the world cities every year, and the significance/system value of this research work has been acknowledged by many scholars in the field. In this evaluation system, the ranking is awarded to all examined cities under four categories of Alpha, Beta, Gamma, and Sufficiency (+/−). In 2018 data of GaWC, 361 cities in the world were given the scores, however, in this study, we selected only the top 10 Chinese cities for comparisons as the research subject.

The GaWC data (2018) ranks the top 10 Chinese cities: Beijing, Shanghai, Guangzhou, Shenzhen, Chengdu, Hangzhou, Tianjin, Nanjing, Suzhou, and Changsha. Among these cities, two are located in the Zhujiang delta, four in the Yangze delta, two in the Haihe river region, and two cities are situated in the inner lands. The GaWC lists four of them in the international cities category (indicated by a star symbol on the Figure 1), while six cities are awarded category B (indicated by a triangle). For the purpose of this ranking, a score is given to each listed city. The scores of these cities, which GaWC uses to rank them from the highest (assigned a score of 10) to the lowest (assigned a score of 1), are presented in Table 3. We used the method of ranking according to the assigned scores to study the changes in the order of ranking among these Chinese cities, and to test the validity of the proposed three-dimensional framework of indicators for measurement applied to the ranking of global cities.



**Figure 1.** The location of the referred ten cities in China. Source: <https://www.travelchinaguide.com/map/index.htm>, accessed on 25 March 2021.

In order to further improve the authenticity and authoritativeness of this ranking, the other two resources were also adopted to rank data into this comparison to avoid the bias. One of the resources adopted is a report about global urban economic competitiveness index in 2018–2019 prepared by the Chinese Academy of Social Sciences along with the Economic Daily, and another is the report about global urban sustainable competitiveness

rankings (2017–2018) drafted by the UN human settlements programme. The ranking order in both of these indicator systems was checked and assigned the correspondent scores in accordance to their ranking position (from the first one assigned score 10 to the last one assigned score 1). The scores obtained from these three indicator systems were put together to get a total score. According to these new scores, we got a new ranking among these ten cities, with the highest scores as number one and the lowest score as number 10. In this way, we got a list of cities ranking in the end, and its eventual outcome seems basically coherent with GaWC with slight difference.

Investigating the research objectives of these 10 Chinese cities will enable us to understand that these rankings are mostly based on the economic indicators. We would also be interested to know whether the situation would be changed or not as if we applied this new framework of analysis with facility factors, mobility factors, and reputation factors, and why it happens. If the result shows that the analysis applying new framework is totally different from the city ranking in Table 3, this will reflect the failure of this test as it does not fit with the profiles of people's common opinions. On the other hand, if the outcome is the same with this profile, then it would also be treated as failure as there would be no special value and it would not improve the situation to reflect the feature of "the global". Therefore, it is re-emphasized that economic indicators-based measurement is effective for the study of global cities. Keeping in view that the indicators of facilities also have importance, therefore, an examination of indicators of facilities will be made. In this dimension, we obtained the ranking data from two sources of indicators, one from a report about China's urban comprehensive economic competitiveness ranking (2018) written by the Chinese Academy of Social Sciences along with the Economic Daily, and another is a report about China's urban sustainable competitiveness ranking (2018) prepared by the UN human settlements programme. The first source included 293 Chinese cities while the second source included 288 cities. We checked the ranking order in both of these indicator systems and assigned the correspondent scores to the examined ten cities in accordance with their ranking position (from the first one assigned score 10 to the last one assigned score 1).

In the second, mobility dimension, we used the top tourist cities resource of China for ranking of cities for tourism (population flow), and another is the city ranking of China's foreign trade (the capital and goods flow). The significance of the tourism indicator should not be underestimated in the study of global cities, as many researchers, Derudder and Witlox [15] used the numbers of air travelers as a basic indicator to evaluate international status of cities. In this study, the data of tourist cities were collected in September 2018 by the interface of press releases, and the indicators of the number of tourists, tourist income and other indicators which make up a total six indicators, dimensions of Chinese cities, and the top 50 were selected to display, sponsored by the China customs and released by the Chinese customs magazine rankings. Moreover, another important measure of a global city in the respect of mobility is the city ranking of international trade. For this purpose the data employed from a magazine namely "China Customs" published by the General Administration of Customs of China, which listed the the ranking of China's top 100 foreign trade cities.

The international reputation of the Chinese cities, in the third dimension, is also checked by the data from two resources, China's urban international popularity ranking and the reputation of Chinese cities in the overseas mass media in 2018. The first is authenticated by the US Performance Review Institute (PRI). The second is authenticated by the US Performance Review Institute (PRI) in 2018 with more than 338 cities in the world including 17 Chinese cities, and its data were collected through searching Google News, Twitter and YouTube. Based on this information, we calculated the scores of each city in these three aspects, and thus got a total number. According to these numbers, we got the top 10 Chinese cities, and then ranked these cities in order. Table 4 shows the results of this ranking.



Table 3. International development index ranking.

	2017–2018 the Index of Globalization and World Cities (GaWC)			2017–2018 Global Urban Economic Competitiveness Index			2017–2018 the Global Urban Sustainable Competitiveness Rankings			The Sum of Three Scores	New Rankings Based on the Total Scores
	Original Rank	Rank	Score	Original Rank	Rank	Score	Original Rank	Rank	Score		
Beijing	Alpha+	1	10	20	4	7	11	1	10	27	1
Shanghai	Alpha+	2	9	14	2	9	27	2	9	27	1
Guangzhou	Alpha	3	8	15	3	8	36	4	7	23	4
Shenzhen	Alpha–	4	7	6	1	10	35	3	8	25	3
Chengdu	Beta+	5	6	62	8	3	148	8	3	17	5
Hangzhou	Beta+	6	5	74	10	1	101	7	4	12	6
Tianjin	Beta	7	4	23	5	6	93	6	5	10	8
Nanjing	Beta	8	3	44	7	4	79	5	6	8	9
Suzhou	Beta–	9	2	28	6	5	160	9	2	12	6
Changsha	Beta–	10	1	71	9	2	173	10	1	4	10

Table 4. Domestic development index ranking.

	Infrastructure (and Economy)						Mobility (and Openness)						Reputation (and Influence)						“Global” City	
	2018 China’s Urban Comprehensive Economic Competitiveness Ranking			2018 China’s Urban Sustainable Competitiveness Ranking			2018 China’s Tourism Cities Ranking			2017 Top City Ranking of China’s Foreign Trade			2018 China’s Urban International Popularity Rankings			2018 Chinese Cities Overseas Propagation Force Ranking			Total Scores	Total Ranking
	Original rank	Rank	Score	Original rank	Rank	Score	Original rank	Rank	Score	Original rank	Rank	Score	Original rank	Rank	Score	Original rank	Rank	Score		
Beijing	5	4	7	2	1	10	1	1	10	11	7	4	1	1	10	2	2	9	50	2
Shanghai	3	2	9	3	2	9	3	2	9	2	2	9	3	2	9	1	1	10	55	1
Guangzhou	4	3	8	5	4	7	4	3	8	6	4	7	4	3	8	4	4	7	45	3
Shenzhen	1	1	10	4	3	8	19	10	1	1	1	10	8	6	5	3	3	8	42	4
Chengdu	13	7	4	9	7	4	7	6	5	21	9	2	9	7	4	12	8	3	22	9
Hangzhou	19	9	2	6	5	6	6	5	6	16	8	3	6	4	7	5	5	6	30	7
Tianjin	16	8	3	17	9	2	5	4	7	9	5	6	13	8	3	6	6	5	26	6
Nanjing	7	6	5	7	6	5	10	8	3	10	6	5	7	5	6	8	7	4	28	5
Suzhou	6	5	6	10	8	3	9	7	4	4	3	8	15	9	2	-	10	1	24	8
Changsha	20	10	1	22	10	1	16	9	2	47	10	1	-	10	1	20	9	2	8	10

## 5. Results and Discussion

While comparing the result of Table 3 (the popular order) and Table 4 (the new frame), we find that the features of this ranking are basically coherent. In Table 4, the ranking of the top four cities is correspondent with the ranking of the top four cities in Table 3. This means that the new style of ranking through three-dimensional scores is not contrary to the common perception of Chinese cities constructed by many valuable studies on indicator comparisons. However, for the rest of the cities, in the Table 3, the order of ranking is Chengdu, Hangzhou, Tianjin, Nanjing and Suzhou, whereas in Table 4, which emphasizes the values of mobility and reputation, the order of city ranking is Nanjing, Tianjin, Hangzhou, Suzhou, and Chengdu. Thus, Table 4 shows the new pattern which is not similar to Table 3 (the popular one). The Changsha city is given the last ranking in in Table 3 as well.

Moreover, this difference between Table 3 (the popular one) and Table 4 (the new one) can help us to analyze, in depth, the key strengths and weaknesses of each city to promote internationalization and to find out the problem and gap, for the design of development strategy. By comparing their positions or order in different indicator systems, we can assess the possibility of which dimension is more or less developed and the further need for strengthening of the city. For instance, Shenzhen has a strength in the infrastructure indicator but weakness in the reputation indicator, whereas Shanghai has a great international reputation. Urban international popularity and overseas propagation force data also provide the measure of network connectivity. While taking the example of Beijing, the reputation factor got the highest score whereas the mobility factor got the lowest score. This depicts the basic reasons why Beijing city got the high score among the Chinese cities as the global city, and at the same time, the weak aspects for further improvement. Beijing ranks lower, probably because its financial firm networks comprise of political economy of large state-owned banks and enterprises, rather than the private economy as the case of Shanghai and Shenzhen which have more private sector financial enterprises.

Thus, it might now answer whether this new indicator framework provides more help to capture the feature of “the global” for global cities. In Table 3, the Chinese cities that can be seen in the list of Alpha in GaWC’s evaluation are exclusively listed in the new table as the most internationalized “global cities”, also this new table presents a more clear picture about its components of internationalization. On the other hand, the cities at the bottom of the table are mostly weak in the influencing factors, as the figures of Changsha and Suzhou are not present i.e., not represented in this list due to very low position. Therefore, raising the international influence should be the key task for these cities in this direction to promote the standard of global cities in the global context. This analysis provides some reasons for policy analysis and to discuss the strategy of urban development in the context of global city.

However, this study has its limitation to carry out an in-depth study of the relationship between the world city and global city, adopting Sassen’s [9] perception that the world city refers to a type of city which may have historical significance [60], while the global city might be big or small not necessarily fulfilling the standards of world cities. Currently, the indicators included in this system are oriented towards the international influence, and they avoid including more social indicators into the study as many city comparisons studies have tested the comprehensive indicators of economic efficiency and public services. Moreover, less attention is paid to the sustainability and environmental issues, as the study kept its focus on measurement of “the global”. Further, this study focused on the theme of ranking and credits calculation, not paying much attention to cultural and geographical features of the cities, which also have unique advantage and the historical treasures of these cities.

The discussion in the context of globalization built logical grounds for measuring “the global” for comparison of city by the facility, mobility, and reputation factors (see Table 2). The study adopts mobility and reputation as the key factors to present new standards of comparison for the global cities. In the existing studies, often the indicators

are scattered, also individual indicators are adopted randomly, without the clear logic and their importance is not valued enough for the globalization studies of the cities. A few studies, for instance one on Hong Kong [61] and others on Singapore [62,63], use interviews of financiers to detail how they use their services to produce financial networks. However, this study enables to extend the comparison of global cities not only by their economic indicators but by using mobility and reputation factors to indicate the alternative concept of “overall strength”. With this framework of indicator system, we came up with new approach to examine the design and the effectiveness of global city conception.

## 6. Conclusions

By focusing on measurement, the study discussed the criteria of comparison for global cities and proposed a three-dimensional frame of facilities, mobility and reputation. The study included 10 Chinese cities for comparison with the data from different indicator systems by using the comparative studies method. The study illustrated the logic of classification about how to measure the global features of the cities, and the advantage of the proposed global city index. The rise of global cities does not necessarily mean the decline of the state [64]. Whereas, the global cities illustrate that the state and economy is no longer the only valid/legitimate unit of analysis and that the linkages and interactions among cities, especially global cities, have significant importance which cannot be ignored. This study does not pay attention only to the discussion of global city referring to internationalization, but it also constitutes a framework of global city index for international comparison. It is witnessed that many cities have a high degree of modernization, but their level of internationalization is low.

To explore the global features of these cities, some studies discuss the “transnational urban system” and “world city system” [60,65], as the “global city” theory presents critical analysis of the economic and social development of leading metropolitan cities in the contemporary urban system [33]. Among these studies, Sassen [14] emphasizes the complex articulation of capital flow and mobility in the determination of city status in a global economy. Urban development is indeed inseparable from economic development, since many economic indicators of urban development are often used in some existing research to reflect the degree to which cities are “global”. However, the urban development level is not commensurate with global cities. In current studies, the indicators used to measure global cities are adopted primarily with four dimensions: economic, social, environmental, and cultural. For example, Molinaro et al. [45] use 32 indicators in their comparative study of global cities within the categories of economic, social, environmental, and government indicators. However, these indicators basically reflect the urban life of those cities that can be applied to many cities, not necessarily to “global” cities.

This study used the comparative method to discuss the “global” nature of the cities by emphasizing the dimension of mobility (including the flow of capital, the goods and human resource, transportation and tourism), and the international reputation as the key measures. The comparative study provides the ground of studies made on measurement and indicators on internationalization and globalization, at the same time this comparison also displays the local variety of different cities. For instance, among 10 Chinese cities under comparison, first-tier cities tend to have better conditions, however many second-tier cities can have their unique advantages to improve the degree of “global”. For instance, in Shenzhen’s case, it is clear that Shenzhen has bigger economic scale and foreign trade, but the city’s weaknesses are exposed in the light of global tourism. Nanjing, Tianjin and Hangzhou are global cities in that they have obtained and accumulated global mobility and reputation capabilities, respectively, thus illustrating the comparative advantage and disadvantage of these cities.

The study has importance in terms of theoretical implications, i.e., the global city can survive in the context of the world network, so the mutual communication becomes a very essential feature of the global city. Analysis of the city network since the year 2000 provides empirical evidence of a distinct global shift in territorial connectivity to the world service

economy produced by cities [36,55]. This study assumes that the global level of cities depends on the access of exchange in goods and services/properties in the world system. Though these cities are often the national centers of banking and financial operations, however, disclosing the global features of cities is not dependent on their national strength, but on interconnection, compatibility and coordination, or even constructing the relation of competitiveness, for building up global cities and the reputable cities in the global era. Thus, this study establishes the basis of global city ranking. In its practical sense, this study offers (or advocates) policymakers new perspectives. This situation encourages us to consider and construct the definition of the ideal of global cities, and also look at the policy implications for the local policymakers.

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