

Journal of Geography, Politics and Society

2024, 14(1), 1–13

<https://doi.org/10.26881/jpgs.2024.1.01>



THE (IN)EFFECTIVENESS OF SANCTIONS: AN ATTEMPT AT THE SPACE-TIME EVOLUTION OF STREET NAMES IN A CHINESE HISTORIC CITY: A THEORETICAL EXPLORATION FROM SOCIAL MEMORY

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Citation

Ji X., 2024, The (in)effectiveness of sanctions: an attempt at the space-time evolution of street names in a Chinese historic city: a theoretical exploration from social memory, *Journal of Geography, Politics and Society*, 14(1), 1–13.

Abstract

Applying GIS spatial analysis and social memory theory, this paper explores the space-time evolution in street names in the main urban districts of Nanjing, a typical Chinese historic city. Findings are as following. Newly-added street names layout around the perimeter of old districts and disappeared ones agglomerate within there. The southern of old districts owned existent and extinct ones of the highest density. During 1950s~1980s, newly-added ones were concentrated along the Yangtze River, from the 1990s they came to cluster outside the old districts. Since 1911, the government came to occupy the naming right, but its dominant role was weakened and enterprises' spontaneity increased. Existing streets are mainly named after settlements, blessings, exotic culture or natural landscape, inheriting the convention of old districts and depicting the vision of new districts. Ones named after religious beliefs, historical figures, economic activities, municipal facilities or geographic orientations are easily disappeared due to changes in social ideology and physical space. The driving mechanism of social memory is summarized as next. The involvement of power and capital produce many modern-style street names. The transitivity and continuity of social memory postpone the demise of old ones. The constructivity and selectivity of social memory propel toponymic evolution.

Key words street-names, space-time evolution, social memory, main urban districts in Nanjing.

Received: 08 December 2023

Accepted: 06 February 2024

Published: 30 June 2024

1. Introduction

Since the reform and opening up started in 1978 in China featured with the rapid urbanization and the tide of market economy, the toponymic landscape in the whole country has undergone a drastic change. According to an incomplete statistics, the toponyms of nearly 50,000 towns and 460,000 villages in China have been discarded, and more than 20,000 toponyms of various geographic entities are produced in every year. The 24th Meeting of the United Nations Expert

Group held in 2007 listed formally toponyms as an intangible cultural heritage, and asserted that toponyms were of important cultural and historical significance, to change arbitrarily them would cause countless loss in cultural inheritance and historical tradition. The research of I.B. Muhammad et al. (2020) on an African community affirmed that a toponym would be used to evoke the community's tangible and intangible cultural heritage. Since the 21st century, the Chinese government has also praised active response to the protection of

toponymic cultural heritage and issued statements for many times that the official department of toponymic administration should pay sufficient attention to protect toponymic cultural heritage to meet the requirement of new-style urbanization construction, where a common man is able to see mountains and waters, and to arouse his feeling of homesickness. However, throughout the history, the stability of a toponym is relative, but its change is inevitable. Under the current wave of urban renewal and renovation across the whole country, it is greatly significant to grasp the mechanisms of social choice, to comprehend the public usage habit and cultural appeal to social groups, namely, to inherit historical toponyms scientifically and promote modern ones harmoniously.

Since the 1980s, the introduction of critical theory by the Western human geographers, which is originated from the realm of humanities and social sciences, gives birth to the burgeoning critical toponymy. Critical toponymy pays little attention to a toponym itself, but emphasizes the cultural and political aspects of a toponym (Rose-Redwood et al., 2010). The essence of the critical toponymy can be reduced as next. Toponyms are deemed to be the instrument of symbolic resistance, different social classes are engaged in the struggles for capital, power or identity inherent in a toponym. The issues pertinent to power relationship, place or regional identification, spatial politics, symbolic resistance and toponymic commercialization (Azaryahu, 2012; Shoal, 2013; Light, Young, 2015; Rose-Redwood et al., 2019a, 2019b; Stelian, 2020; Golomidova, 2020; Karki et al. 2020; Gutierrez-Mora, Oto-Peralias, 2022) are placed at the heart of critical toponymy. The critical theory, social identity, symbolic capital, hegemony theory and spatial production have been widely applied (Guyot, Seethal, 2007; Jordan, 2012; Rose-Redwood, 2008; Zhang et al., 2015; Feng et al., 2019). Multiple stakeholders as authorities, investors, elites, civilian and others with diverse religious sects and political stances have been the study objects. City, district, block, street, subway station and tourism destination have been the major concerned scales to critical toponymists. The critical turn of toponymic research will cast beneficial enlightenment for Chinese toponymic scholars to better explain the enormous changes in the toponymic landscape in modern China from the 1980s, an era characterized by the unprecedented market economy and rapid urbanization. So far, some Chinese scholars have referred to the critical paradigm to explore power relations, cultural implications and social responses toward (re)naming geographic spaces such as scenic spots, streets, cities

and islands (Liu, Zhu, 2014; Li, Feng, 2015; Chen et al., 2016). Their attention is no longer limited to these toponymies themselves, but is to highlight the process of (re)naming practice from perspectives of power awareness, social function, territorial scope, cultural connotation and nomenclator(or naming subject) (Ji et al., 2015; Ji, 2018, 2020; Zhang et al., 2015; Wei, 2016). The fact that toponyms serve as an evidence or recorder are no longer static and passive but dynamic and active, come to be a consensus for an increasing number of Chinese toponymists.

For a long time in China, toponymy has been located on the relatively marginal status of humanities and social sciences, which makes it an obscurity discipline. It is gratifying that some Chinese scholars are engaging in revitalizing it in nowadays. Scholars from multi-disciplinary backgrounds like history, geography, linguistics, folklore, information science, management and so on have taken each professional advantage to involve in the all aspects of toponymic researches. Although a few studies mentioned the influences of toponymic evolution or continuation on the rural social memory (Wei, 2016; Chen, 2008; Wu, 2013), it is still lack of sufficient attention to refer to and apply sociological theories and methodologies. Social memory plays a constructive role in the integration of pluralistic cultural identities as time goes, the construction avenue includes rituals, events, memorials and toponyms (Schwartz, 1996). Because of the toponymic function as a ubiquitous and indispensable director toward spatial practices in daily life, which is very beneficial for toponymic crucial roles in fashioning co-compliant social spatial orders and place identities. The fact that a toponym is the important product and component of social memory manifests the great significance of SMT for the in-depth theoretical probe on critical toponymy. (1) social memory is a mixture composed of transitivity, continuity, currency and selectivity (Halbwachs, 1992; Konnton, 2000), which determines that in (re)naming practices, using habitat and shared memory of local residents should not be ignored, nor the collective imagination for the future of varied social groups should be ignored (Borer, 2010). In other words, toponymic utilitarian, consistency and contemporaneity should be considered at the same time. (2) social memory is a process of negotiation, collusion or construction among multiple stakeholders (Liu, 2020). The second trait has been vividly embodied in the process of modern place-naming, in which the local, the authorities, enterprises and other like interest subjects and their multi-dimensional values have got involved. Hence, stakeholder analysis, ethnography and other

alike sociological methodologies are worthwhile to refer to.

As one of the selected historical and cultural cities in the first tier in China, the historic city Nanjing is rich in toponymic cultural deposits and also is the first city in the world to treat its historical toponyms as the protection target of intangible cultural heritage. Since 2008, the city has included 112 historical toponyms into the list of intangible cultural protection on the municipal level, and the authorities and experts have urged new projects in relation to urban construction to restart or follow many ancient toponyms. Since the 1980s, the Nanjing government has carried out three times of toponymic census aiming at getting a clear picture of all kinds of toponyms in its jurisdiction, and then gradually perfecting toponymic archives at the municipal and county levels. In light of the typicality, availability and relative integrity of data sources, the author took the street names of today Nanjing's main urban districts as the study object. Firstly, this paper introduces the data sources and research methods, followed by the application of GIS spatial analysis on the space-time evolution of street names in the

targeted districts. The third sector is on the heard of this paper applying the explanatory power of social memory theory to shed light on the changing mechanism of the street names. The last section ends up with further exploration on extensible areas of critical toponymy through referring to the methods and objects of the latest researches about social memory.

2. Data sources and research methods

The selected main urban districts in Nanjing, namely the the study region (see Figure 1), includes districts of Gulou, Xuanwu, Baixia, Jianye, Qinhuai, Xiaguan and Yuhuatai. The toponyms indicating streets, roads, alleys or lanes (hereinafter referred to as streets) in these districts are the study object. These districts are reclassified into 51 blocks, new towns on the West River Region, and the Yuhua Economic and Technological Development Zone (ETDZ). By referring to the digital map served for electronic navigation of Nanjing urban districts, and to the Online Public Query System of Nanjing Toponyms, the paper

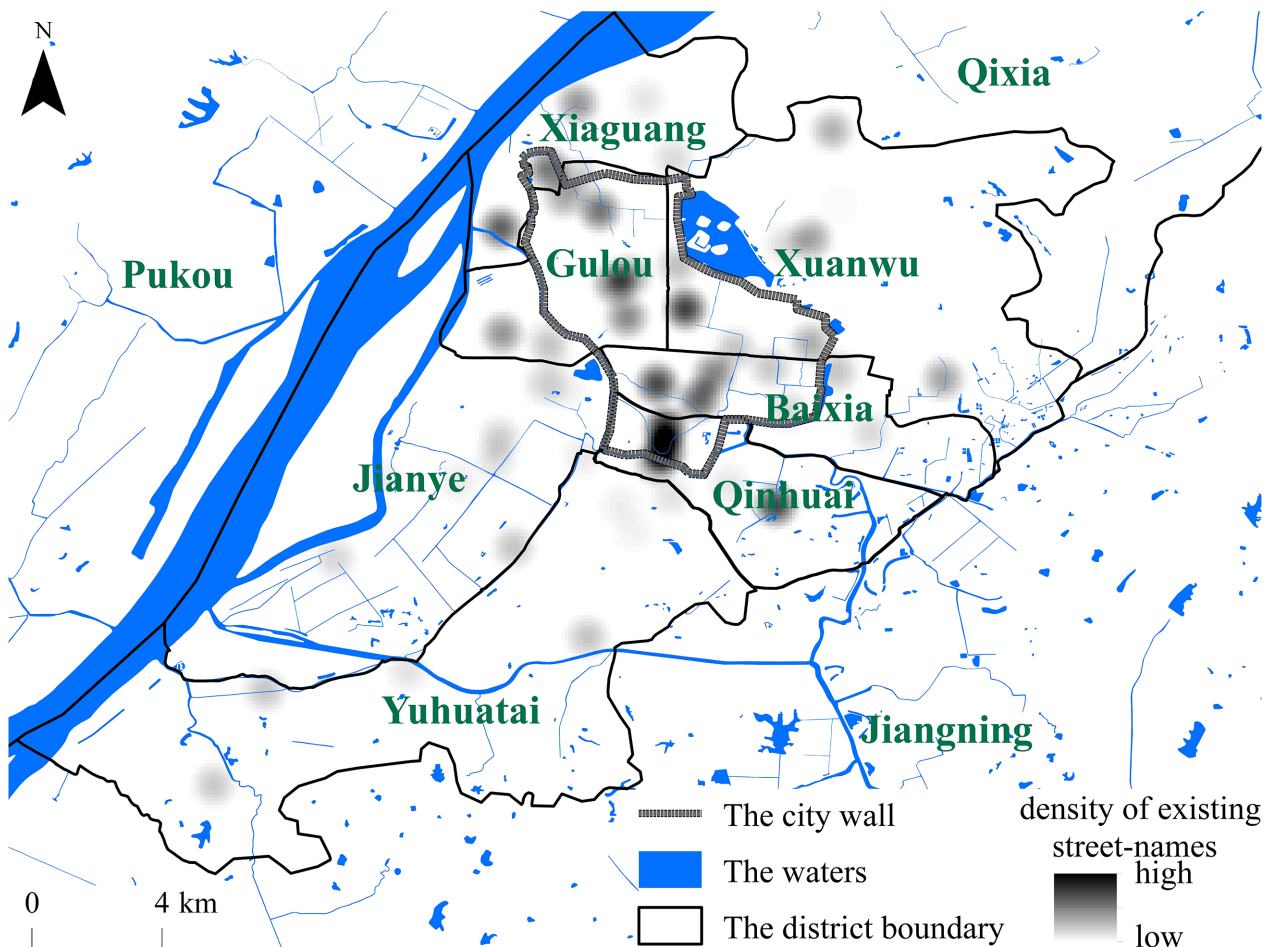


Fig. 1. The distributing pattern of existing street names. Source: Own study.

collected substantial data about nomenclature principles and historical changes in street names within these targeted districts. In next, spatial statistics and cartography module of professional software ArcGIS10.8 were applied to establish the spatial database for the selected toponymic data and to make thematic maps. Disappeared historical toponyms were collected and arranged from a body of historical maps, geographical chronicles, urban planning archives and other like data resources.

Due to the limitations of available data and research effort, other related data was inevitably missed. However, the collected data was sufficient and authoritative, it can ensure the highly credibility of research findings. The kernel density estimation was applied to illustrate the space-time evolution of street names. It needs to be pointed out that streets are linear features, but their names are usually marked as dotted ones. In order to highlight the spatial variation in toponymic quantity, some specific processing techniques were adopted as next. If a street is not out of the boundary of an area-shaped block, its central point is taken to mark its name. If a street crosses multiple area-shaped blocks, the street is divided into several line segments by the boundaries of these blocks, and then the central point of each section is taken to label the same toponym. By this means, this paper collected and sorted out 1,075 street names in totally, among which 18 toponyms are anonymous undated. A toponym would be defined as a historical toponym if it was named before 1949 and the remainder was defined as modern toponyms.

3. The space-time evolution of street names

3.1. Time dimension

When the historic city Nanjing once became the capital of the Republic of China (1912~1949), there was an obvious succession on the old and new street names. Since the 1990s, the upgradation of old districts and the emergence of new districts have promoted the more frequent and intensive replacement of street names. So far, there retains 457 historical street names. Of which 14 ones were appeared before the Ming Dynasty, 94 ones were born in the Ming Dynasty(1386~1644), 162 ones were produced in the Qing Dynasty (1644~1912) and 187 names came out in the Republic of China. 600 names of modern streets were newly-added, of which 133 ones were produced during the period of planned economy (1950~1978) and the remainder (467) came into being during the period of market economy (since1979). Among the remainder,

the appearance of 405 names since 1990s is very compelling. Of the 260 disappeared street names, two ones died out before the Ming Dynasty, 15 names vanished in Ming Dynasty as many as in the Qing Dynasty, 105 names were discarded in the Republic of China along with the two peaks periods of 1930~1938 and 1946, when the massive capital construction was carried out. During the period of planned economy, 29 names was deserted. The remaining 94 ones were abandoned during the period of market economy, of which, 81 ones died out after 1990.

3.2. Spatial dimension

By the end of 2022, the distributional pattern of existing streets in the study region is shown in Figure 1. The old districts embraced by the Ming Great Wall are of the highest density, both for existing and extinct street names, followed by the western part of Baixia District and Qinhuai District (see Figure1 & 2). The existing streets of high density extend from south to north. While the extinct ones are concentrated in the southern part of the old districts and their density declines with the increase in the distance from the central place, namely the Confucian Temple, where used to be the most densely populated region in the old districts. In the 1990s, the whole China drove into the fast lane of urbanization as soon as the socialist market economic system was formally established. The city Nanjing also has implemented multiple large-scale reconstruction for old districts since the 1990s, and almost every street has witnessed the demolished and relocated process of countless residential buildings (Song et al., 2013). In term of the extinct street names, the Baixia District had the greater share of 33.6%, of which, its blocks like Chaotian Palace and Hongwu Road contributed to the most. The Qinhuai District accounted for 31.6%, of which, its blocks such as Shuangtang and Confucius Temple made the greatest contribution. The remainder five old districts shared the proportion of 2%~13.5%. Historical toponyms were disappeared accompanied closely by the continual emergence of new ones. From 1950 to 1989 (see Figure 3) and after 1990 (see Figure 4), there existed an apparent gap in the quantity and structure of newly-added street names. They were vastly clustered along the Yangzi River within the Xiaguan District and other old districts in the former period, but came to agglomerate in the outskirts of old districts in the latter period. This change can be mainly attributed to the shift of gravity points of urban construction during the two distinctive periods.

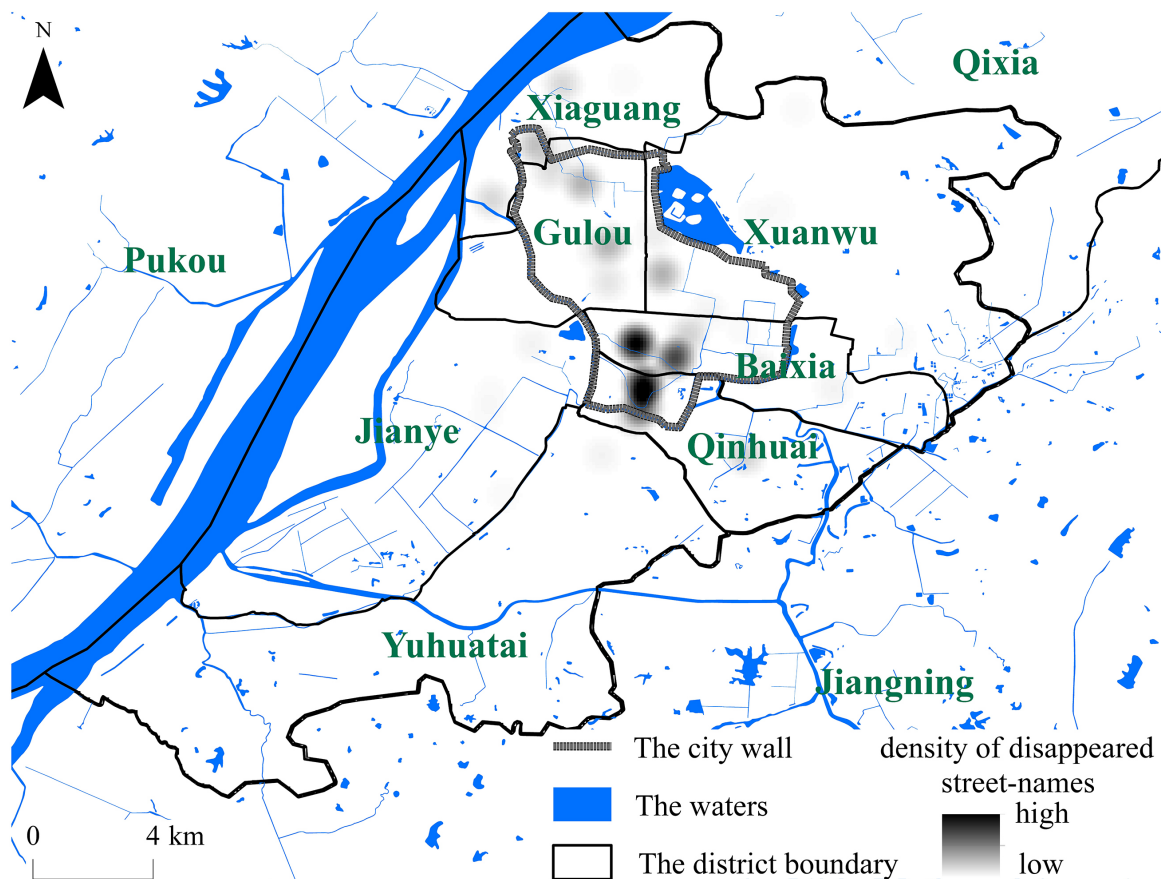


Fig. 2. The distributing pattern of disappeared street names.
Source: Own study.

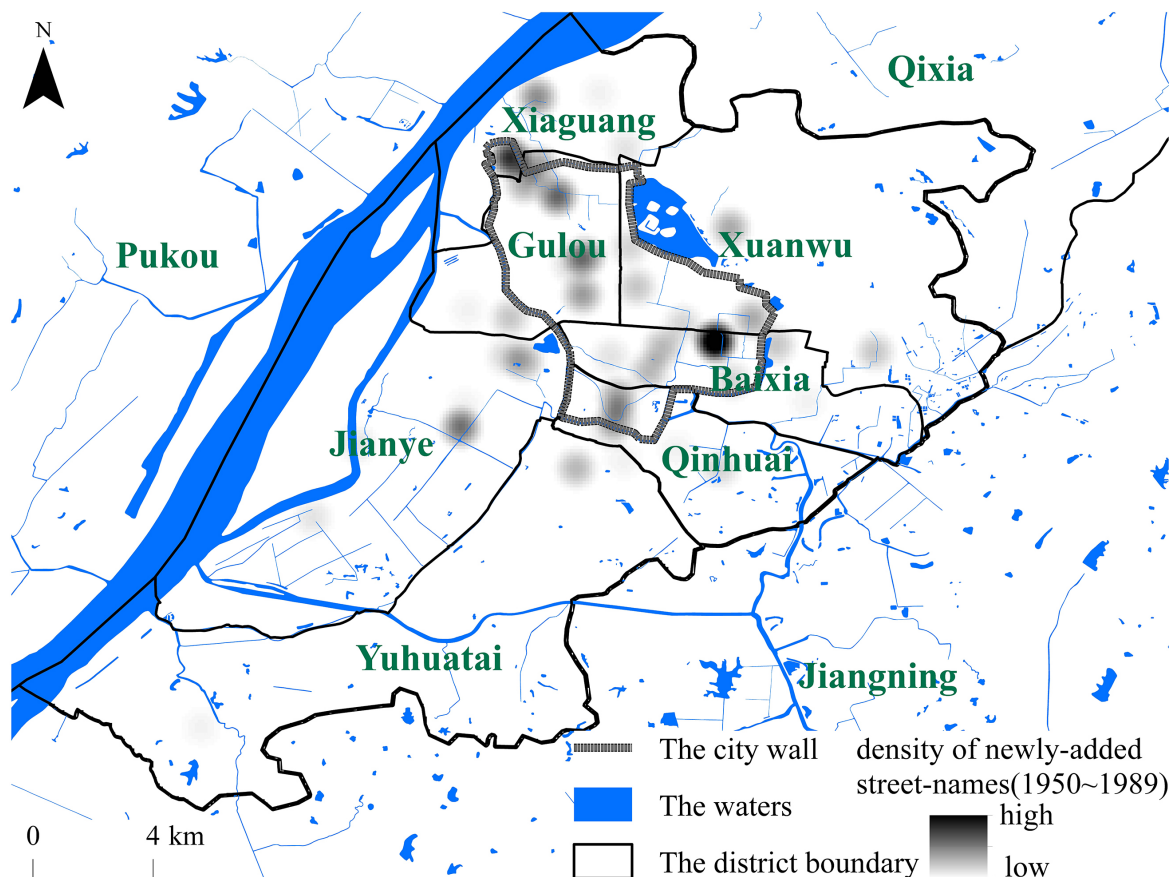


Fig.3. Distribution of newly-added street names,1950~1989.
Source: Own study.

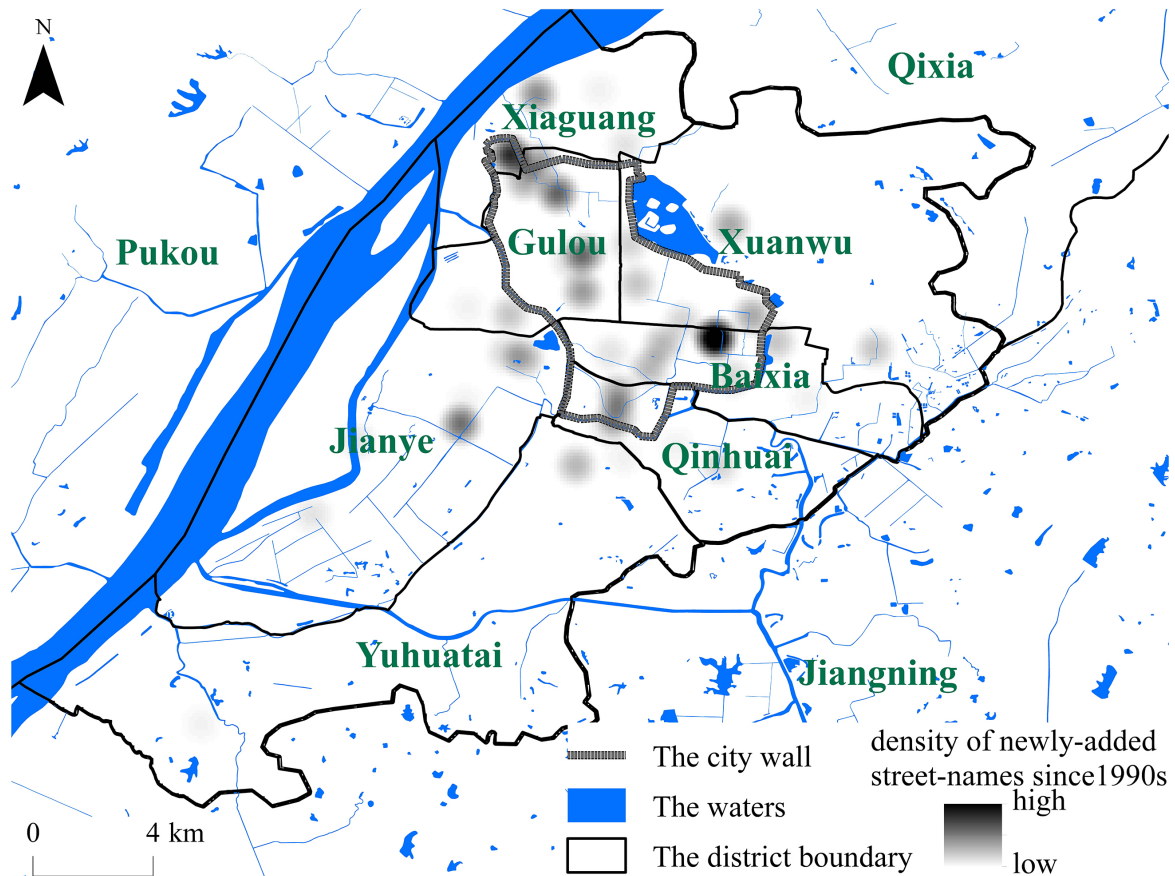


Fig. 4. Distribution of newly-added street names since 1990s.

Source: Own study.

3.3. Type structure dimension

The existing street names in the study region can be divided by nomenclator (naming subject) and represented object. Table 1 & 2 show the result of these classifications.

In the China's feudal period, the authentic administration under the state power only arrived at the county and higher levels. In generically speaking, toponyms below the county level were produced through this process, where they were firstly proposed by the folk by the convention, then recognized or reformed by country gentlemen, and finally reported to the government for authorization. In practice, the authorities paid very little attention to this folk trivia, similar to the conclusion drawn by

G.L. Luo (2016) that the authorities was unwilling and unable to intervene the emergence and usage of humble street names. Vividly illustrated by the findings portrayed in Table 1. Among the 272 historical street names produced in the Feudal Times, more than 99% were named by the folk and less than 1% by the official. There were 185 historical ones born in the period of the Republic of China, when the number of street named by the official began to exceed by the folk, and the phenomenon of autonomic naming by enterprises were seen at first. Parts of well-known old street names before the Republic of China were inherited. During the periods of planned economy and the early phase of market economy from 1950 to 1989, the official played the dominate role in street naming while the proportion of street named by the folk dropped

Tab. 1. Changes in the nomenclator of street names.

Nomenclator	The Feudal Times (before 1911)	The Republican Period (1912-1949)	1950~1989	Since 1990s
Folk	99.26%	45.08%	30.16%	17.07%
Official	0.74%	51.30%	54.60%	51.37%
Enterprise	0.00%	0.52%	3.70%	18.59%
Inheritance	0.00%	3.10%	11.64%	12.97%

Source: Own study.

sharply compared with the former periods. The increase in the density of urban road network gave rise to the serialization tendency of street naming. Bypasses inherited the names of trunk roads with the result of the more obvious increase in the usage rate of old street names than the previous periods. In the meantime, the autonomy of enterprises was further enhanced. Since the 1990s, the official once again becomes the most critical and influential naming subject coupled with the substantial growth in the enthusiasm of enterprises as for street naming. Shown as Table 2, among the existing street names, more than 10% are named after geographic orientation and adjacent dwellings, followed by more than 8% named after wishes, blessings, exotic cultures and municipal facilities.

Economic activities and natural landscape account for over 5%. The above seven types account for 70% of the total. On the one hand, these types inherits the traditional nomenclature of old districts, on the other hand, they also conform well to the new concept, which advocates that new districts would become high class mansions both on residential and vocational dimensions, and would become the leisure and sightseeing areas enjoying riverside landscape. Most of municipal facilities like bridges and gates are used to name streets. These nomenclatures are closely related to the city's natural and humanistic landscape. Historically, Nanjing was a typical water town on the Yangtze River Delta and was once a famous capital for six dynasties in the ancient China.

Tab. 2. Rates of existing and disappeared street names.

Object be represented	Existent	Extinct	Object be represented	Existent	Extinct
Religious belief	3.79	6.64	Family surnames	4.16	6.64
Official agencies	2.04	1.95	Praying & blessing	9.44	5.47
Natural landscape	6.48	4.25	Imperial examination system	1.30	1.95
Economic activities	7.96	18.48	Adjacent dwellings	16.47	1.56
Moralization	2.87	3.91	Geographic orientation	13.78	9.38
Historical figure	3.98	5.08	Misrepresentation	1.30	4.34
Military defence	2.96	3.13	Historical allusions	1.39	1.17
Municipal facilities	8.08	15.67	Topography&landform	0.83	1.56
Local characteristics	2.31	2.73	Former residences of celebrities	0.19	3.91
Exotic cultures	8.70	1.17	Landscape architecture	2.00	1.00

Source: Own study.

The number of old street names derived from economic activities and preserved since the Ming&Qing dynasty corresponds with the number of newly-added ones in modern times. The toponymic evidence vividly reproduces the picture of prosperous commerce and trade in these old districts in the Ming & Qing Dynasty, and reappears a typical folk-life culture in the ancient China. Street names reflecting landscape features such as waters and mountains generally have a strong positioning and a good stability, then the retention possibility of such street names is also greater because that these two merits are line with the practical criterion of a toponym.

Relatively, street names representing economic activities, municipal facilities and geographic orientations, summing to account for 43.5% of the total, are the most likely to be died out. The share of religious belief, historical figure, blessing or family name was respectively over 5 percent. By the calculating the correlation coefficient (cc) between

the numbers of existing and extinct street names, cc is equal to 0.34. The significance test of 0.05 indicates that the extinction and emergence of street names in different types are synchronous to some extent. In general, the larger cardinal number of a street name in certain type has, the larger quantity it disappears in. Presumably, the social mainstream response to toponyms is to let it be.

The essential reason is that the variation in a spatial entity is the objective impetus driving toponymic change. As to the particularity of a street name, in the process of urbanization, the traditional means of transportation has been rapidly replaced by more faster and larger motor vehicles, making the original road indicator system, in which a toponym only signifies a street of hundreds even tens of meters long, less practical. The widening and extension of urban streets push some old street names to extinction as the result of spatial entities' dissolution. The author find out 141 scattered old street names eventually merged into 48 new ones.

4. The evolution mechanism illuminated by social memory

4.1. The intervention of power and capital give birth to numerous new street names

The SMT contends that power relation plays an important role in the construction, maintenance and inheritance of social memory. Foucault asserted that memory is one of the main weapons in struggles, to control people's memory is to master their behavioral logic. Therefore, the best way is to occupy memory, control and manage it (Jeffrey, Joyce, 1998). In the real world, the mainstream culture often controls the memory resource, while holds a repressive attitude towards other kinds of culture. Power without spatial foundation often fails to operate, and the ideology of a ruling class must also rely on space to regenerate and spread (Foucault, 1986). As the most permeable public social space in a city, no roads or streets would get rid of the control of state power, including tangible roads, road signs and intangible road names (Zhang et al., 2015). The difference in the spatial hierarchy or scale of a street name just is the representation of power space of its nomenclator. X.B. Hu's (2010) work is a good proof. To highlight the symbolism of Sun Yat-sen, the respected founder of the Republic of China, the Nanjing municipal government at that time set up many urban functional regions, serving for recreation, education and many others, named after the founder aimed at making Nanjing a really huge Sun Yat-sen's memorial space. Currently, there remaining five streets or roads named after Sun Yat-sen, who is also well known as Sun Zhongshan in Chinese. These toponyms includes Zhongshan Road, Zhongshan South Road, Zhongshan East Road, Zhongshan North Road and Zhongshan Gate Street, all of them are the main east-west arteries in the city.

On the wave of market economy and rapid urbanization, the changing landscape of street names not only reflects the spatial reconstruction through the governing technicalities, but also implies the dominant role of economically preferential development in the capital-driven way. Since the reform and opening up started in 1978, Nanjing has ushered in the rapid promotion. Both the renewal of old districts in the 1990s, and the key construction of the West-river New Region coupled with the ETDZ in the Yuhuatai District in the early 21st century, capital is the crucial means and impetus. By virtue of the real estate's prosperity and the ETDZ's construction, capital factors have greatly catalyzed urbanization instantiated by the following two aspects of street naming practices. On the one

hand, since the 1990s, there has been a great many of streets named by real estate, corporate brands and their founders of autonomous awareness, and named in the serialized and themed styles through the official planning. E.g. the Yurun Street is named after the Yurun Food Company, the Mengdu Avenue is named after the Mengdu Cigarette Factory, more than 50 streets are named after real estate scattered in the old districts. For another example, there came out a series of road names with the first Chinese character of Jin (means gold) in the Honghua Street of the Qinhuai District in 2011, such as Jinyuan Road, Jinmao Road and Jinpin Road, representing a prosperous economy and trade. The rosy name landscape creates a good investment atmosphere conducive to recruiting and attracting investment. On the other hand, it is reflected in the changes in the hierarchy of a street such as the transformation of traditional streets and rural lanes into modern commercial streets, pedestrian streets, expressways, etc. These conventions not only indicate the shifts of road function, but also symbolize the capital-driven urbanization of rural regions.

4.2. The inertia of memory delays the demise of old street names

Inertia, which also can be interpreted as transitivity or continuity, is one of the SMT's core concepts. Previous studies have overemphasized the influence of ideological factors on the public attitudes towards toponymic usage, but overlooked the important principle that habit or familiarity determines emotional expression and experience (Edensor, 2012) as well. R. Red-Wood (2008) and D. Light & C. Young (2014) observed that habit could make clear the local's continuous usage of old toponyms in New York in the end of the 19th Century and in the Romania during the socialist period.

To be specific, on the technical level, a toponym usually takes a spatial entity as a reference. If the spatial reconstruction of a street does not disagree with the geographic orientation or spatial configuration indicated by the original toponym, the old street name could be remained of high likeliness in the effect of memory inertia. On the value level, (1) the usage of an old toponym can reduce the social cost for the local to acclimatize themselves to new ones. streets and roads are the basic skeleton of a city, their names not only are of positioning significance, but also are a crucial reference for many other types of toponyms in a city, like transportation, firefighting, postal, industrial and commercial sectors, household registration, real estate and other

complex social operating systems. Hence, frequent changes in street names will inevitably induce the subsequent management difficulties, increase the social cost of adapting to new toponyms.

(2) the usage of an old street name can sustain their accumulated symbolic capital. Many street names are derived from folklore which is an important carrier to continue and reproduce the traditional value and moral concept of a local community by the means of oral inheritance. These names are of abundant social capital. (3) some old street names having been registered as trademarks are endowed with a certain economic value, coinciding with the viewpoint of SMT that the past has become a useful resource for groups to express their interests (Schwartz, 1996). Since the Republic period, although the authorities has dominated the naming right, it also followed the folk convention to a great degree. During the renewal of old districts, the Nanjing municipal government carried out zoning planning and protection for old road and street names. Many new roads in the old districts completely inherit the names of old streets or alleys, with a rate of over 10%. The old street names such as the Wuyi Lane and the Dingguan Camp appeared in The Three Kingdoms Period(220~280), the Shuizhai Nunnery appeared in the Tang Dynasty (618~907), the Nima Lane, the Changle Street and the Diaoyu Platform appeared in the Song Dynasty (960~1279) are continuously used, and the primordial distributional pattern of the old streets is basically maintained (Yue, Tian, 2012), which makes the old toponyms been of higher practicability and longer vitality.

4.3. The social construction of memory drives the evolution in street names

The evolution in toponyms is historically necessary. Natural and humanistic factors propel toponyms to keep the interweaving movement of stability and instability. A cite not only is required to inherit a certain regional history and culture, but also is supposed to play the leading role in regional prospects. The social construction of memory indicates that although memory is a construction of the past, it is rooted in interests of the present or the future (Halbwachs, 1992), namely, it is a process mixing constant selection. The government layouts its jurisdiction according to its supportive local image and wields its power of resource allocation to shape new urban image and local identity. Led by the social mainstream values, an ordinary does remember or forget toponyms through toponymic spatial practices in the daily life. The paper regards

the social construction of memory for street names as the three simultaneous processes of absorbing, selection and refinement.

The toponymic culture of a modern city absorbs multiple exotic culture, Chinese ancient cities are not no exception. The most vividly exemplification is the system of street names in Shanghai in the late Qing Dynasty, which is the first city referring to the placenames of many other Chinese administrative regions and their distributional pattern. Since the reform and opening up started in 1978, this toponymic character has been imitated by other Chinese cities. From a positive viewpoint, this nomenclature well demonstrates the inclusiveness and openness of a modern city. As can be seen from the Table 2, 8.7% of the existing street names in the old districts are absorbed from exotic culture. The Nanjing municipal government tried to portray the place image as a metropolis of inclusiveness, openness and orderliness. Taking these newly-added street names in 2005, when the 10th National Games was held in the Nanjing's West-river Region, e.g. In order to welcome the grand event, the names of the 53 newly-built urban roads and streets there were all originated from the names of several well-known great rivers in China, which symbolized that welcome friends from all over the world just as all rivers run into sea.

Memory is known for its selectivity (Bowman, Ouyang, 2002). Place naming is a memory-selected process in which places are endowed with new meanings, and toponyms also become local symbolic capital. Cities are constantly reinvented along with old memories ceaselessly replaced by the new ones. The toponymic selection by social development is objectively motivated by the historical variation in toponymic practicability. Impractical toponyms would be gradually discarded in people's daily spatial practice. Shown as Figure 2, old street names representing economic activities, geographical orientations and family surnames dies out at the largest scale, because traditional business activities used to be concentrated in the southern part of the old districts, where is also the core region of urban renewal. Besides, propelled by the law of differential land rent, urban economic forms and regional structures have been updated. The majority of old street names derived from economic activities in ancient times fail to make their names matched the real geographical entities and then are destined to die out in nowadays. The transition of functional space of a modern city makes the direct contribution to the vanishing of an old street name indicating ancient municipal facilities, especially the ones reflecting geographical orientations should be timely changed in order to

better indicate the regenerative urban traffic layout. Owing to the feudal patriarchal system linked by blood ties, a considerable part of settlements are named by family surnames (Zhang, 1995) in the ancient China. But in the tide of commodity economy and rapid urbanization, the original social organization structure has been gradually dissolved, instead, the cohabitation of diverse surnames linked by geographical or industrial ties has become the mainstream formation of urban social organization, which decreases street names originated from family surnames sharply.

The toponymic selection by social promotion is subjectively encouraged by the sociocultural psychology of pursuing beauty and elegance, economic interests and social prestige, brought by the exploitation of toponymic symbolic capital. A toponym is merely a neutral landmark for indicating geographic location, but it also actively participates in the practice of local creation with positive social initiative (Azaryahu, 2011). E.g, these campaigns about the Removing Religious Idols and the Eliminating Four Olds held respectively in the Republic Period and in the early period of Chinese Liberation exerted a huge impact on folk religious belief by destroying or reshaping religious space at large scale, and then caused the extinction of street names relative to religious venues or phenomena.

Since the reform and opening up, with the deepening of market economy, social groups have new requirements for the toponymic connotation. Municipal managers demand to improve regional popularity and promote urban economy by virtue of toponymic information transmission. They hope to use words that can reflect urban construction achievements, development prospects and investment environment as toponyms. In this way, toponyms can be closely linked with economic construction by beautifying cultural connotation of investment environment. With the arrival of the era of housing commercialization and marketization, real estate developers, driven by the law of value and in need of survival and development, have increasingly enhanced their awareness of market, competition and crisis. In order to open up the market and gain benefits, they tend to regard toponyms as a means to gain profit, and to consider toponyms of good wishes and high cultural tastes as one of the most important image packaging of their products. In the meantime, consumers also have a growing need on the dwelling environment both physically and culturally. Residents want to use words of blessing, elegance, goodness and high cultural aesthetic to name their settlements. Toponyms come in to being the vital part of their living environment.

A large number of existing streets, whose names are originated from modern commercial housing regions, praying & blessing, natural landscape, are the powerful demonstration of this mainstream sociocultural psychology.

5. Conclusion and discussion

This article took the main urban districts of Nanjing, a typical China's historic city and the first city in the world to treat its historical toponyms as an intangible cultural heritage, for example. From a space-time perspective, it applied GIS spatial analysis and toponymic historical data to make up thematic maps divided by newly-added and extinct street names. And it drew tables to display the time changes in street names categorized by nomenclators and represented objects. Then, the article employed the theoretically explanatory of social memory to shed light on the changing mechanism of street names. Next, it got the following main conclusions. Finally, it pointed out some extensible and furthering areas addressed by the future research to improve practical signification of Chinese critical toponymy with reference to the research approaches and focused objects of the latest studies on social memory

5.1. The main findings

Conclusions, which are of a certain universality for many other Chinese historic cities, have been put forward as follows. Since the Republic of China (1911~1949), the new and old street names in the study region keep the coexistence of massive increase and decrease. The newly-added and extinct street names layout in a complementary spatial pattern. The former is mainly clustered around in the exterior zone of old districts, while the latter is mainly concentrated in the interior zone of ones. The distributional pattern is determined by the construction of new districts and the upgradation of old districts. The southern part in the old districts, where population density is the highest, has both existing and extinct street names of the highest density. The newly-added street names are not only widely distributed and but also are obviously different over times. During the period of 1950s~1980s, they were clustered along the Yangzi River and centered in the old districts, but since the 1990s, they have been agglomerated outside the ones.

In the Feudal Period, the folk was the main body of street naming, stepped into the Republic Period,

the government replaced the folk and enterprise's awareness of autonomous naming dawned. In the phase of planned economy and the early stage of market economy, the government played the increasingly dominant role while the folk's role was unimpaired significantly. Since the 1990s, in the wave of large-scale reconstruction of old districts and construction of new ones, the leading position of the government has been established, and the naming-enthusiasm of an enterprise has been unprecedentedly high. The extant street names are mainly derived from adjacent dwellings, geographical orientations, praying and blessing, exotic cultures and natural landscape. The street name landscape not only inherits the traditional nomenclature of old districts, but also meets to the new concepts for new districts' development. Street names reflecting religious beliefs, historical figures, praying and blessing are susceptible to time changes in social ideology thereby being discarded with higher likeliness. Street names representing economic activities, municipal facilities and geographical orientations are easy to die out accompanied with the transformation of urban functional space. At the same time, street names indicating family surnames are hard to be immune to the replacement of urban social organization.

The intervention of power and capital gives birth to a great deal of new street names. These names are denominated by enterprises' spontaneity and are serialized and themed by government planning. Such nomenclature increasingly dominates the cultural landscape of urban toponymy. The inertia of memory is beneficial to delay the demise of old street names. It can be reified as the next three aspects. (1) Although the physical space changes, the indicative of old toponyms is still strong and their vitality is continuous. (2) The adaptation of a new toponym needs a relatively big social cost. (3) Nearly every old toponym contains a certain social and economic value, and to follow them can be conducive to maintain the toponymic symbolic capital and local identity. The social construction of memory propels the evolution of street names. The change in urban toponymic landscape is a process of constantly absorbing exotic culture and catering to people's appeals in varied times. The selection of social promotion on toponyms is objectively motivated by the time variation in the toponymic practicability. While the subjective incentive is the sociocultural psychology of pursuing beauty and elegance, economic interests and social prestige brought by the exploitation on toponymic symbolic capital.

5.2. Extensible and furthering areas

For one hand, in recent Chinese toponymic scholarship, the subject of place-naming practices has been limited to official administration at any level for a long time due to Chinese particular social context, in which a regional design is always inundated with the authorities' volition and aesthetic appreciation. Inversely, insufficient attention has been paid to an ordinary resident who is the most direct stakeholder and the daily practitioner of toponyms. For the other hand, the Chinese toponymic scholarship has put more emphasis on the role of reflection, text document and history in the research of social memory but attached less importance on qualitative techniques. The author suggested that sociological methodologies such as small-scale field survey, in-depth interview and participant observation should be highly valued by Chinese toponymic researchers who want to revitalize the Chinese Toponymy. Besides, memory is configured by the social framework, but it has impossibility of separating itself from the individual and ultimately it needs to be approved and accepted by the individual. Thereby, the first extensible aspect is to explore attitudes and responses of individual residents to place (re)naming practices, which are implemented by the government or private developers through the virtue of power or capital in the everyday life with the application of aforesaid qualitative techniques. This extensible area is not only useful to further comprehend the internal mechanism of toponymic evolution driven by social memory from the microcosmic perspective, but also can provide theoretical guidance for democratic management of toponyms and for interest coordination with the advance in social democratization.

In this paper, the author adopted GIS spatial analysis (kernel density) and percentage calculation to illuminate the space-time evolution of street names at the physical level. This relatively conspicuous quantitative methods have been popular and conversant for many other traditional toponymic researchers. But, at the cognitive level, most of new-emerging toponyms are very hard to be acknowledged and used by ordinary residents in a short time, on the contrary, some deprecated toponyms by the authorities are still accepted by the folk for a long time even though they are lack of practicability. Some places named by a certain nomenclature are easy for people to remember and other are more likely to be forgotten. There also is a great variance in the toponymic preference for people with different ages, genders, status and

education. Hence, there exists the second furthering area where more sophisticated quantitative techniques from environmental psychology should be considered. Of which, cognitive map is sensible and recommendable, it is a thinking model similar to a field map generated in a person's mind based on his past experience, shaped by individual or collective memory. It is a kind of cognition of spatial elements such as location and distance. Toponymic researchers can try to ask participants to draw a cognition map of street names with which they are familiar, and try to look upon the demographic attributes of interviewees as explanatory variable so as to quantitatively explore the memory preference on street names for multiple stakeholders, aimed at maintaining cultural diversity of toponymic landscape for an inclusive city.

To be honest, toponymic evolution is very hard to be explained only by SMT. Other theories like capitalist urbanization, social identity, space production, symbolic capital, cultural hegemony, scalar politics, techno-imperialism (Rose-Redwood et al., 2019) are necessary theoretical interpretation instruments. The third research domain worthy of being expanded is to configure a more inclusive and differentiated framework of mechanism analysis by blending the theoretically explanatory of social memory and other relevant theories. China in nowadays is featured with the profound impact of rapid urbanization, vigorous marketization and

cultural diversification on the all walks of life and has been almost entirely different from any other country in the world ever before, but Western critical toponymists have paid little attention to the particular country principally because of the language barrier and the lack of initiative communication from Chinese toponymists through publications or international forum.

Hence, in line with the China's unique social context and the core viewpoints of social memory, the authors conceive to configure seemingly more perfect frameworks of mechanism analysis and theoretically explanatory on toponymic evolution in order to promote Chinese critical toponymy of its own style. The framework of mechanism analysis consists of the three stakeholders (the authorities, folk and private enterprise), the three driving factors (power, capital and identity), the four contradictory relations (subjectivity v.s. negotiability, utilitarian v.s. emotion, construction v.s. continuity, tradition v.s. modernization) and the five appeals (normative, affection, interest, moralization and image). The framework of theoretically explanatory is dominated by social memory and assisted by the theories such as symbolic capital, place identity, man-land relationship with the overall consideration of economic, political, cultural and environmental dimensions. The framework is a fire-new attempt but it also is the crucial step for the formation of critical toponymy with Chinese characteristics.

Acknowledgements

The study was funded by the Chinese National Social Science Foundation according to the research project №22CSH022.

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