New Perspectives on the Planning of Yuan Dadu: The Yuan Measurement System, Residential Space and Nomadic Life

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Abstract:

Recent studies on Dadu, one of the capital cities of the Mongol Yuan dynasty, were increasingly situated in a holistic Eurasian background, shedding new light on the influence of nomadic traditions in its city planning in addition to using Chinese urban models. Whereas most of the previous studies took physical remains as their point of departure, this paper aims to understand the nomadic characteristics of Yuan Dadu through elucidating its two fundamental yet under-studied planning features: Firstly, the planning of the city in accordance with the unique measurement system of Yuan chi, whose length is significantly different from the Chinese dynasties that ruled from the Central Plains; Secondly, the prescribed eight-mu plot for each household in the History of the Yuan Dynasty, which took the shape of a 32-by-60-step rectangle based on the space model of nomadic families. I argue that the above two points can provide new perspectives on the systematic influence of nomadic way of life seen in the planning of the Yuan Dadu as well as the planning principle established by the Mongol regime.

Keywords: Yuan Dadu, Nomadic tradition, Yuan *chi*（尺）, Homestead area

Introduction

Yuan Dadu was an international capital city of the Mongol Yuan dynasty. Its construction was ordered by the ruler of Mongolia, Kublai, in the 1267 at the location of today's Beijing. This is where the northern border of the Central Plains Dynasty separated the farming civilization from the nomadic civilization. The city was also referred to as "Khanbaliq" by the Western Europeans during the Middle Ages. From the day when the Dadu was established, the urban structure of Beijing in the Ming and Qing Dynasties had been laid, and even the capital of the People's Republic of China, Beijing, 700 years later. Therefore, whether we study Yuan Dadu or Beijing city of Ming and Qing Dynasties, and even contemporary Beijing, we cannot ignore Mongolian rulers' planning ideas for this capital because of their nomadic way of life. In the early twentieth century study of Yuan Dadu, most Chinese scholars in the history of planning were influenced by the ideas of a western modern nation-state or bound by the orthodox values of the Central Plains Dynasty, believed the culture of the nomadic people, who were not fixed in a city without a unified State Administration and migrating on the steppe and Gobi, did not play a decisive role in planning and construction of Dadu. Most of their studies did not reasonably and effectively evaluate the role of the Mongolian Yuan nomadic life in the planning of Dadu. They tried to interpret the image of Dadu's urban spatial form by using the planning concept of the traditional Central Plains Dynasty. The concept assumed that the regime and the culture of the Yuan dynasty was greatly influenced by the civilization of the Central Plains Dynasty. From that perspective, the analysis of materials and the research results will lead to a wrong direction. They will not be able to explore the planning ideas and methods of the Dadu comprehensively.

The "Great Mongol Empire" (Yeke Mongghul Ulus) in the period of the first four Khans, was a huge empire that spanned across the Eurasian continent. Contemporary historians have pointed out that based on its nomadic civilization, the Mongol Empire had its own political and cultural tradition instead of completely following the Han tradition. After conquering the Central Plains, the imperial power in the Yuan Dynasty had the dual rulership of the "emperor and the great Khan." The nations of Mongolia and Han symbolize the legitimacy of the Mongol Empire ruling rights.[1] As Mr. Sugiyama Masaaki pointed out after analyzing the elements of Kublai's construction of the great empire in *Kublai's challenge* (2013), the Han's (Han Zu 汉族) culture is only a "coat" required by Kublai to build an unprecedented empire. Its characteristics are obvious only in the middle and lower level administrative organizations in Han's (Han Zu 汉族) land.[2] However, there is no such understanding in the research of Yuan Dadu planning as historical records about Dadu's planning principle are unclear. Studies usually focus on surface phenomena and their symbolic meanings. They inadvertently tend to ignore specific planning methods. With regard to the study of Yuan Dadu planning, the earliest understanding of the city in the view of the nomadic life of Mongolia was Murata Jiro's, a Japanese scholar from 1934. His paper titled "Argument of Yuan Dadu's Plan [LuanYuan Dadu De Ping Mian Gui Hua (论元大都的城市规划)]" put forward that the practice of the palace in Dadu, which was built nearby Taiye Pond [Tai Ye chi(太液池)], was an imitation of Batu Khan's palace, which is located in the Volga River as recorded in missionary notes[3], in order to remind the successor of the rising place with plenty of water and grasslands. But the judgment made in the missionary notes has not been recognized by the academic community. In the late 90s of the past century, Pan Guxi, a Chinese scholar, made amendments to the understanding of the former Yuan Dadu's planning research in the text of "Yuan Dadu's Planning Not to Return to the Ancients: Re Understanding of the Construction Model of the Yuan Dadu [元大都规划并非复古之作——对元大都建城模式的再认识]". The reason why the palace is located in the southern part of Dadu is not to conform to the statement that "palace should behind the court, in front of the market" which was the requirement of the capital layout in *Kao Gong Ji*（考工记）. Just because Kublai and others were very fond of this pond [Tai Ye chi(太液池)].[4] In recent years, Chinese scholars have explored the planning of Dadu from the perspective of nomadic life in works such as Bao Muping, "Reexplored the planning of Dadu from the Perspective of Nomadic Life: From Karakorum to the Yuan Dadu"; and Mr. Li Dongnan, "The Nomadic Ethnic Characteristics of the Capital of the Mongol Regime: Focus on the Yuan Dadu." The exploration of the planning of Yuan Dadu from the perspective of nomadic life has become an important perspective nowadays.

However, it is not sufficient that researches simply focus on certain specific phenomena after the completion of Yuan Dadu by speculating on cultural considerations, or mutual proof among three capitals of the Yuan Dynasty. Such a study may be enlightening and in a reasonable interpretation range of the nomadic life characteristics on Dadu planing. But on the other hand, we cannot discuss the systematic influence of nomadic life on the planning of Yuan Dadu without fully understanding the fundamental principles of the absolute length of *chi* and division mothed of homestead. Therefore, based on the extant historical record, this article will explore the basic elements in planning – such as the unit length of construction and land use index – to reveal the nomadic life elements in the planning principles of Yuan Dadu.

1. Re-recognition of the *chi* used in planning of Dadu from the nomadic civilization

Before discussing the planning of Yuan Dadu, we must point out that in ancient China, the absolute value of the length units —— *chi*（尺）—— of urban planning and architectural design were changing throughout history. Therefore, determining the absolute length of the research object's *chi* is a necessary step for the conversion of the length dates obtained from archaeological investigation and recorded in ancient documents.

Early studies suggested that the Yuan Dynasty measurement system was inherited from the Song Dynasty.[5] Thus in the study of the planning of Yuan Dadu, the length of one *chi* as 0.308 meters to 0.315 meters has been commonly used by researchers. However, an obvious problem here is that this length range of *chi* to convert 28600 meters perimeter of Dadu obtained by archaeology[6] with 1 *bu*（步）= 5 *chi*（尺）[7],1 *li*（里）= 240 *bu* （步）[8], to the measurement of Yuan Dynasty is 75.66 *li*（里）to 77.38 *li*（里）cannot meet the "60 *li*（里）" [9] the perimeter of Dadu city recorded in *Jinshi Dadian [经世大典]* (1330) an official ordinance of Yuan dynasty excerpted in *Farming in Nan Village [Nancun Chuogeng Lu (南村辍耕录)]*(1366). Most studies adhere to the correctness of the length range of *chi*（尺）and assume that the document records were incorrect. But if the difference of created background and used measure objects between nomadic and farming life is seriously considered, then studying Yuan Dadu with the *chi*（尺）of the Song Dynasty has to be reexamined.

After the 1990s, new progress has been made on the length of the Yuan Dynasty *chi* in the study of the history of Chinese metrology. Guo Zhengzhong and Qiu Guangming have shown that the length of *chi*'s daily use in the Yuan Dynasty was significantly longer than the Song's. These studies show that the length of *chi*'s daily use of the Yuan Dynasty was 0.395 meters / *chi*（尺）to 0.412 meters / *chi*（尺）.[10] By the converting method described above with the Yuan Dynasty's lengths of *chi*（尺）, the perimeter of Dadu can be achieved at 57.85 *li*（里）to 60.34 *li*（里）. This is more in accordance with the value recorded in *Jinshi Dadian [经世大典]*(1330) than the length of *chi*（尺）in the range of 0.308 meters/*chi* to 0.315 meters/*chi* used in previous research, for instance, Zhao Zhengzhi's use of 0.308 meters/*chi* [11], and Fu Xinian's use of 0.315 meters/ *chi* [12]. In addition to this argument, it is possible to verify the validity of this length range of *chi* on the planning of Dadu from converting the date of the ruins of Dadu like wall and road into the measurement system of Yuan Dynasty, and contrast the conversion results with the value recorded in *Rules for Construction [Yingzao Fashi （营造法式）]*(1103) and *Recorder on Xijing [Xi Jin Zhi (析津志)]*(1360s). Data on the size of walls and roads had been obtained from archaeological findings. The dates of wall ruins include their foundation depth at 2 meters[13] and width at 24 meters.[14] Converting these two measurements with 0.395 meters / *chi*（尺）to 0.412 meters/*chi*（尺）can show the foundation depth at about 5 *chi*（尺）and width at about 58 *chi*（尺）to 60 *chi* （尺）. Both of these measures are in accordance with the construction standards recorded in *Rules for Construction [Yingzao Fashi （营造法式）]* (1103)[15] a book about the rules and regulations for construction published in North-Song Dynasty. The archaeological data of one of the road's width is 25 meters. It can be converted to about 12 *bu* with 0.395 meters/*chi*（尺）to 0.412 meters / *chi*（尺）and 5 *chi*（尺）/*bu*（步）. The numerical value of 12 *bu*（步）is in accordance with the width of one of Dadu's four kinds of roads recorded in *Recorder on Xijing [Xi Jin Zhi (析津志)]* (1360s) and named "Xiao Jie（小街）."[16]

It must be noted that the length range of the *chi*（尺）belonging to the Yuan Dynasty is much longer than in any other Chinese dynasties.[17] What is the cause of that? I conjecture that this must be related to different lives with regard to their nomadic ways and farming. In *Measurement of China from Three Century to Fourteenth*

Century [三至十四世纪中国的权衡度量](1993) the author pointed out that there was a close relationship among the Yuan, Jin, and Liao Dynasty on the length of *chi*（尺）. The Yuan Dynasty inherited the measurement of the Jin Dynasty by comparing the length of the daily usage of *chi* in the Jin and Yuan Dynasty.[18] This can be supported by the fact that the calendar of Jin Dynasty had been adopted during the early Yuan Dynasty[19]. These three dynasties had a mutual origin by being established by nomadic people in the north of the Central Plains. In the long nomadic life, it is possible according to the daily needs of nomadic life to form a measurement that is different from the one used in farming. Although there is no clear evidence for the origin and development of the nomadic civilization's measures, the manner of nomadic production and life reveals that they did not need to divide the cultivated land as agricultural production. Therefore, judging from the influence of the measuring object on producing objective value, the measurement standard of nomadic life is likely to have two different systems from the Central Plains Dynasty. From this point of view, it is easy to understand that the length of *chi*（尺） used in the planning of Dadu is much longer than the one used by other dynasties.

2. **Redefining the flat form of eight-*mu* plot for each household**

The *History of the Yuan Dynasty [Yuan Shi（元史）]*(1370) recorded that the residents who moved from the old city to Dadu would be privileged and gaven a land at an area of 8 *mu*（亩）used to make homestead.[20] The area of "8 *mu*（亩）" was the basic land index used in the planning of Dadu. It determined the whole spatial pattern and road organization. But unfortunately, the area of the homestead is pointed out in the *History of the Yuan Dynasty [Yuan Shi（元史）]*(1370) without it's flat form. Scholars could only imagine the space it left. The first idea of the flat form for "8 *mu*（亩）" plot of homestead was put forward in 1960s as a 44 *bu*（步）-by-44 *bu*（步）square by Zhao Zhengzhi. The author converted the distance of 67.67 meters between two extant Hutons（胡同）of the Yuan Dynasty with 0.308 meters/*chi*（尺） belonging to the Song Dynasty into 44 *bu*（步） as the north-south length of a homestead. He then supposed the east-west length of the homestead is also 44 *bu*（步）long (see fig. 1). [21] It is worth noting that the length of east-west side was only an assumption. In this way, the homestead formed a square shape of about 8.07 *mu*（亩） through converting 1936 bu^2（步²）with 240 bu^2（步²）/*mu*（亩）, which is the traditional Chinese conversion method. During the next half century, many Chinese and foreign scholars adopted that size and shape. But it must to be pointed out that the flat mode as a square was an *a priori* hypothesis based on the traditional Chinese space model that was made up of different sizes of squares in various grades [22] (see fig. 2), just like the homestead's flat mode with the flat of Dadu. The triple-walled flat mode of Dadu is most noticeable whose concentric boundaries each had a perfect or near perfect geometric form followed Chinese tradition. [23]. (see fig. 3) The flat mode was such a fiction that made people forgot that 1）the east-west length of the flat mode is only the product of the author's imagination; 2）The flat of Dadu is never a square but a rectangle at 14 *li*（里）x16 *li*（里）[24]; 3） The area of "44 *bu*（步）x44 *bu*（步）" square is never 8 *mu*（亩） but about 8.07 *mu*（亩）.

Yao Dali in *The Yuan Dynasty's imperial power[蒙元制度与政治文化]*（2011）pointed out that when Kublai "Mongolia's political center moved to the south and Khan did not have the ability to direct control of Mongolia throughout the country. However, using the traditional Chinese political resources does not mean that the Mongolian regime will give up the symbol of political tradition originated in Mongolia."[25] Dadu as the capital of the empire shows the symbolic meaning of Kublai's adherence to the legitimacy of the Mongolian tradition. Therefore, considering tha t the replacement of the capital has been opposed by the Mongol nobility, in planning of Dadu, Kublai had to use the measures to construct the new capital with nomadic culture in order to win the support of the Mongolian people. In the nomadic Mongolian life, family was the most basic social organization unit. A family had formed a certain spatial organization mode to allocate yurt position according to
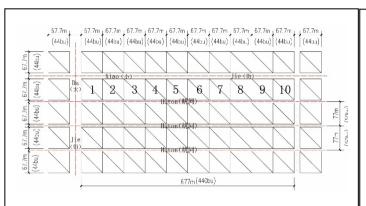

Figure 1. Diagram of the homesteads in Dadu.

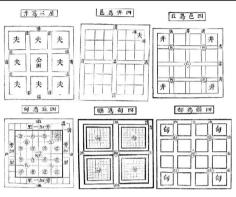Drawed by author based on Zhao Zhengzhi. 1979, 14-27.

Figure 2. Land division system under the "Jing Tian Zhi (井田制)".
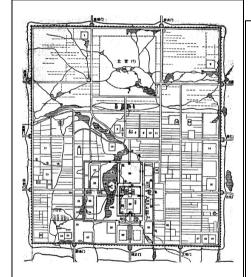
Source: Xu Guangqi, 1981,87.

Figure 3. Restoration drawing of Dadu.
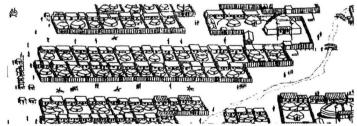
Source: Zhao Zhengzhi. 1979, 14-27.

Figure 4. Part of the bird's-eye view of the Great-Khorum (1912). Great-Khorum is the predecessor of Mongolian capital of Ulaanbaatar.

Source: Bao Muping, 2014, 319-344. Line drawing based on polychrome painting in the collection of Mongolia Baogda Khan Winter Palace Museum.

the camping family members. Analyzing family spatial organization of the herdsmen in Mongolia, Victhorova in "The national cultural characteristics of residential sites and houses in Mongolia [蒙古的居民点和住宅的民族文化特点]" pointed out that according to the traditional customs of the Mongolian camp, the position in the first row of the West (South) is left for yurt of the oldest and most respected member of the collective. The other Mongolia yurt of the members are orderly arranged in the back of the first. Their entrance is always toward the south. The neighborhoods of each residential unit are not surrounded by walls, and they are rectangular in flat.[26] (see fig. 4). It can be seen that the traditional residence organization model of the Mongolian family forms a block space model with short distance of North-South side, and long distance of East-West side. Through the nomadic family space organization mode in Mongolia, a new understanding of the "8 *mu*（亩）" homestead plane mode should be taken, and a new plat form will be made based on the ancient land area calculation method.
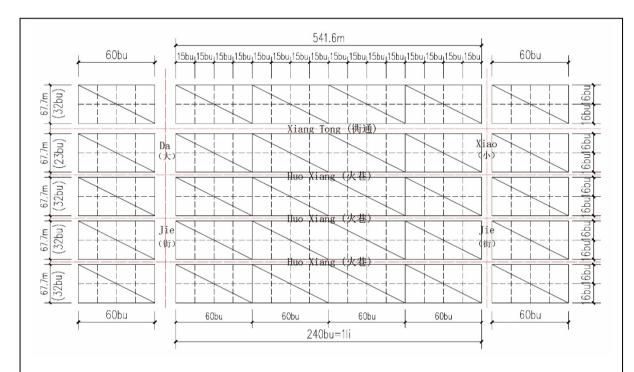

Figure 5. Diagram of the layout of homesteads in Dadu.

The types of road in this picture accord to "road system (街制)" of Dadu recorded in *Recorder on Xijing [Xi Jing Zhi (析津志)]*(1360s), and no kind of road named as Huton(胡同) mentioned in the book.

In *Nine Chapters of Arithmetic [Jiu Zhang Suan Shu（九章算术）]*(263 AD.), a book for mathematics originated in the Chinese Western Han Dynasty, the amount of 1 *mu* of land was 16 *bu*（步）x 15 *bu*（步）= 240 *bu²*（步²）.[27] This practice has been used so far and the folk have retained the proverb: "long sixteen, fifteen wide, neither more nor less than one *mu*（亩）." It is a method for taking a plot of area of 1 *mu*（亩）near a square with the length and width as integers. Therefore, the area of 8 *mu*（亩）can be obtained by the product of a side length of 2x16 *bu*（步）and another length of 4x15 *bu*（步）, as a rectangle of a 32 *bu*（步）x 60 *bu*（步）. Moreover, with the length of 0.395～0.412 meters / *chi*（尺）, had been verified above. the length of 67.76 meters the distance between extant tow Hutons(胡同) of Yuan dynasty, the north-South width of the homestead could be restored to about 32～34 *bu*（步）, which is very close to the length value 32 *bu*（步）of one side of a flat in 2

mu（亩）as above. Without the error caused by the sampling, measurement and conversion of the Huton（胡同）, the north-south length of the planned homestead can be assumed based on 32 *bu*（步）, and then another side length of the homestead on the 60 *bu*（步）.It is a the homestead as a rectangular of 32 *bu*（步） long in north-south and 60 *bu* （步） long in east-west (see fig. 5). From this flat we cannot only obtain an integer value area of the homestead conforming to the record in the *History of the Yuan Dynasty [Yuan Shi（元史）]*(1370), but we can also divide it into two parts : North and South, each one with the area of 4 *mu*（亩）, or eight units in eight integers acres of 1 *mu*(亩). Every unit could be utilized by family members to settle in Dadu just like the family organization spatial patterns of the Mongolian Nomadic traditions on steppe.

The above analysis indicates that as principal conditions for building structures, space form and scale of Yuan Dadu, the measure length for planning and homestead plane pattern all reflect the characteristics of nomadic life. Especially the homestead plane pattern directly reflects the mode of family space organization in nomadic life. Perhaps these were only parts of the important role of the nomadic culture in the planning of Yuan Dadu. Therefore, more cultural symbols in the planning of the Yuan Dadu have to be reviewed from a new perspective.

Conclusion

All of these aspects provide us with a historical perspective from planning principle on the idea of nomadic life of Dadu. We can observe that the capital's grid-like layout was not carried out according to the Chinese traditional idea but the way of Mongolian encampment.

The thought of "what is Asia and what is Mongol-Yuan" not only impel the historians to enrich their knowledge and exploration, but also explore the possibility of re-recognizing what "China" is, and at the same time acknowledge the possibility of re-recognizing "Asia" and "the world".[28] When the space of historical language transcends the boundaries of geography and administration, the capital Dadu of the "Great Mongol Empire" across the Eurasian continent in thirteenth Century opens up the space for further research. Therefore, the influence of the nomadic life of Mongol-Yuan, which is an important part of global civilization, on urban planning and the manifestation of the Dadu should not be ignored. The key issue for people failed to fundamentally realize the essential factors of Dadu during the past fifty years is not due to a lack of knowledge about the length of *chi*. They lacked the knowledge on the perspective of life. The main problem is that people do not fully realize the value of nomadic culture. Therefore, I take the display of nomadic life characteristics on the basic elements of Yuan Dadu as an opportunity to open a gap in the understanding of the Yuan Dadu with the perspective of the Central Plains Dynasty and shine the light on nomadic life. Hopefully, the paper identifies the great role of the Mongolian nomadic life in ancient China's capital planning. It also provides useful references for the perspective of study in the planning of Yuan Dadu by pointing towards an objective understanding of the topic.

Notes on contributor(s)

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Endnotes

1 Yao, 2011, 143. All quotations from the Chinese references in this paper have been translated by the author.

2 Sugiyama Masaaki, 2013, 131.

3 Hou based his argument on Tamura Jiro "*Lun Yuan Da Du De Ping Mian Gui Hua [Argument of Yuan Dadu's Plan]*". Man Zhou Xue Bao [Journal of Manchuria], No.3 (1934): 133-142., 103-104. Cited in Hou, 2014, 103-104. The author was not able to obtain Tamura Jiro's article.

4 Pan, 1997,17-21.

5 Wang, 1959, "*Record of the Extant Rule System*", 945 and Wu, 1984, 62-63, 241.

6 Yuan, 1972, 19-28.

7 The general acceptance of "*chi（尺）*" and "*bu（步）*" is 5 chi =1 bu since the Tang Dynasty. See Qiu, 2002, 50-51 and Wu,1984, 95. And this conversion method be used in other conversion in this article no longer special annotations.

8 "The city's circumference is sixty *li(里)*, and one *li（里）* is equal to two hundred and forty *bu（步）*.（城方六十里，里二百四十步）".See Tao, 2012, 229.

9 *Ibid*.

10 Guo,1993, 256-260 and Qiu, 2002, 471-473.

11 Zhao, 1979,14-12.

12 Fu Xinian confirmed that the value calculated by using 0.315meter/*chi* to convert Dadu's perimeter of 28600 meters obtained by archaeology would in line with "60 *li（里）*" the perimeter of Dadu recorded in *Jing Shi Da Dian*, but he did not give the "*li(里)*"-"*bu（步）*" conversion method. It can be evidence by using 1*li*=300*bu* an earlier conversion method used before the Tang Dynasty in China. See Fu, 2008,487.

13 Wang,1992, "*Yuan Dadu's wall*", 151.

14 Yuan, 1972, 19-28.

15 "Fortification system: the wall is fourty *bu* high, sixty *bu* thick...... The foundation of the wall is 5 *bu* deep （筑城之制：每高四十尺，则厚加高二十尺，其上斜收减高之半。……城基开地深五尺）". See Li, 2011, 21.

16 "roads system: thoroughfares [Da Jie] width of the 24 *bu*,　[Xiao Jie] width of 12 *bu*, there are 384 fire lanes [Huo Xiang], and 29 alleys [Xiang Tong]（街制，自南以至于北，谓之经，自东至西，谓之纬，大街二十四步阔，小街十二步阔，三百八十四火巷，二十九衔通）." It can be seen there are four kinds of road recorded in *Xi Ji Zhi*. See Xiong, 1983, 4.

17 It can be seen that from the Tang to Qing Dynasty, the longest length of *chi* is 0.320 meters /*chi*（尺）, the shortest is 0.3072 meters / *chi*（尺）, and the difference of length is less than 1.28 centimeters. See Wu,1984, 65-66, "*Zhong Guo Li Dai Chi Zhi Chang Du Bian Qian Biao [The Table of Length of Chi of Chinese Dynasties]*".

18 "With some signs another possibility can be inferred that the measures of the Liao and Jin and Yuan dynasties belongs to another system". See Zen,1964, 163-182.

19 "The early Yuan Dynasty was using the '*Daming calendar*' in a respect way（元初承用金《大明历》）." See Song, 1998, 691.

20 "诏旧城居民之迁京城者,以货高及居职者为先,仍定制以地八亩为一分;其或地过八亩及力不能作室者,皆不得冒据,听民作室". *Ibid.*163.

21 Zhao, 1979,14-12.

22 Chinese ancient life space organization mode as "JingTian Zhi（井田制） [a system of the way to organizing wells and fields]". Generally speaking It is the "nine squares" system (of land ownership in China's slave society) with one large square divided into 9 small ones (like the Chinese character "井"), the 8 outer ones being allocated to serfs who had to cultivate the central one for the serf owner. From the perspective of space organization, it was an idea mode with a square of land in a certain area as a unit, then in a special area increasing way, the unit continues to expand to different size of squares from small to large, as figure 1. If it is be considered just the way of space organization for Dadu, the flat form of homestead of Dadu must be thought as a square.

23 Nancy Shatzman Steinhardt, 1999, 154.

24 The sides length of Dadu be explored by archeologist. They are 6680 meters in north，　6730 merters in south，7590 merters in east，　7600 meters in west. They can be converted to about 14 *li*（里）　in east-west and 16 *li*（里）　in south-north. See Yuan, 1972, 19-28.

25 Yao, 2011, 145.

26 Victhorova, 1993, 7-11, 48.

27 Jiu, 1990, 181.

28 Zhang, 2016, 7.

Bibliography

Bao Muping, 2014. "Yuan Dadu Cheng Shi Gui Hua Zai Kao: Huang Cheng Wei Zhi, Zhong Gu Lou, Hu Ton Zhi De Guan Lian [Re examination of Urban Planning of Dadu: The Association between Bell Tower, Drum Tower, Position of Imperial City and Huton]". *Zhong Guo Jian Zhu Shi Lun Hui Kan [Transactions of the history of Chinese building]*, no.10: 319-344.

Fu Xinian,2008. *Zhong Guo Ke Xue Ji Shu Shi, Jian Zhu Juan [History of Science and Technology in China, Building Volume]*. Beijing: Science Press.

Guo Zhengzhong,1993. *San Zhi Shi Si Shi Ji Zhong Guo Quan Hen Du Liang [Measurement of China from Three Century to Fourteenth Century]*. Beijing: China Social Science Press.

Hou Renzhi,2014. *Bei Ping Li Shi Di Li [An Historical Geography of Beiping]*. Beijing: Foreign Language Teaching and Research Press.

Jiu Zhang Suan Shu [The Nine Chapter Arithmetic].263BC. Guo Shuchun, ed. 1990. *Jiu Zhang Suan Shu [The Nine Chapter Arithmetic]*. Shenyang: Liaoning Education Press.

Li Dongnan, 2014. "Meng Yuan Zheng Quan Du Cheng De You Mu Ming Zu Te Se: Yi Yuan Da Du Wei Zhong Dian [The Nomadic Ethnic Characteristics of Capitals of The Mongol Regime: Focus on the Yuan Dadu]". *Bei Fang Ming Zu Kao Gu [The archaeology of the northern nationalities]*, vol.1. Beijing: Science Press.

Li Jie, 1103. *Ying Zao Fa Shi [Rules for Construction]*. Zou Qichang, ed. 2011.*Ying Zao Fa Shi [Rules for Construction]*. Beijing: People Press.

Nancy Shatzman Steinhardt, 1999. *Chinese Imperial City Planning*. Honolulu: University of Hawai'i Press.

Pan Guxi, 1997. "Yuan Da Du Gui Hua Bing Fei Fu Gu Zhi Zuo: Dui Yuan Da Du Jian Cheng Mo Shi De Zai Ren Shi [Yuan Dadu's Planning Not to Return to the Ancients: Re Understanding of the Construction Model of the Yuan Dadu]". *Zhong Guo Zi Jing Cheng Xue Hui Lun Wen Ji [Paper Collection of the Forbidden City Society of China]*, vol.2. Beijing: Forbidden City Press.

Qiu Guangming, 2002. *Ji Liang Shi [Measurement history]*. Changsha: Hunan Education Press.

Song Lian, et al. 1370. *Yuan Shi [History of Yuan Dynasty]*. Reprinted in 1998, Changchun: Jilin People's Publishing House.

Sugiyama Masaaki, Zhou Junyu, trans. 2013. *Hu Bi Lie De Tiao Zhan [Kublai's challenge]*. Beijing: Social Science Academic Press.

Tao Zongyi, 1366. *Nan Cun Chuo Geng Lu [Farming in Nan Village]*. Reprinted in 2012, Shanghai: Shanghai Guji Press.

Victhorova, Bai Yintai trans. 1993. "Meng Gu De Ju Min Dian He Zhu Zhai De Min Zu Wen Hua Te Dian [The National Culture Characteristics of Mongolia Residential]". *Meng Gu Xue Xin Xi [Mongolia Information Science]*, no.2.

Wang Guowei, 1959. "Xian Cun Li Dai Chi Du [Record of the Extant Rule System]". *Guan Tang Ji Ling*, vol.4. Beijing: Zhong Hua Book Company.

Wang Youquan, 1992. "Yuan Da Du Cheng Qiang [Yuan Dadu's wall]". *Zhong Guo Kao Gu Xue Nian Jian [Chinese Archaeology Yearbook]*, Beijing: Cultural Relics Publishing House.

Wu Chengluo, 1984. *Zhong Guo Du Liang Heng Shi [The History of Chinese Weights and Measures]*. Shanghai: Shanghai Book Store.

Xiong Mengxiang, ca.1360s. *Xi Jing Zhi [Recorder on Xijing]*. Reprinted as *Xi Jing Zhi Ji Yi [The collection of Recorder on Xijing]* in 1983. Beijing: Beijing Ancient Books Publishing House.

Xu Guangqi, ca. Ming Dynasty. *Nong Zheng Quan Shu [Summary of Agricultural Policies]*. Shi Shenghan annotated, 1981. Taipei: Civilized Bookstore.

Yao Dali, 2011. *Meng Yuan Zhi Du Yu Wen Hua [Political Institutions and Culture in Yuan China]*. Beijing: Peking University Press.

Yuan Da Du Kao Gu Dui [Yuan Dadu Archaeological Team], 1972. "Yuan Da Du De Kan Cha He Fa Jue [Exploration and Excavation of Dadu]". *Kao Gu [Archaeology]*, no.1:19-28.

Zhang Zhiqiang ed. 2016. *Chong Xin Jiang Shu Meng Yuang Shi [Reconstructing the Historical Narratives of the Mongol-Yuan Dynasty]*. Beijing: SDX Joint Publishing Company.

Zhao Zhengzhi, 1979. "Study of The Restored Plane Project of Dadu Capital, Yuan Dynasty". *Ke Ji Shi Wen Ji [Historical collection of science and technology]*, no.2: 14-27.

Zeng Wuxiu,1964. Zhong Guo Li Dai Chi Du Gai Shu [Overview of Ancient Chinese Scale]. *Li Shi Yan Jiu [Historical Research]*, no.3: 163-182.

Image sources

Figure 1: Drawed by author based on Zhao Zhengzhi. 1979, 14-27.

Figure 2: Xu Guangqi, 1981,87.

Figure 3: Zhao Zhengzhi. 1979, 14-27.

Figure 4: Bao Muping, 2014, 319-344. Line drawing based on polychrome painting in the collection of Mongolia Baogda Khan Winter Palace Museum.

Figure 5: Author painted.