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The development of urban underground space from the perspective of urban economy

Ziwei Zhao^{a*}, Qi Cao^b

^aPLA University of Sci&Tech, nanjing 210007, China

^bNanJing HeXi New City District Headquarters of develop construction, nanjing 210017, China

Abstract

Urban underground space is an important non-renewable resource, and its value has increased in recent decades. Economic change and development is the most fundamental motive of evolution of the urban space, it also affected urban underground spatial development in a large degree. The paper try to analysis the urban economic affection in mechanism of evolution of urban underground space. The only sustainable way that urban underground space physical pattern fit into the urban economic structure.

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1. Introduction

As the urbanization process advances rapidly all over the world, the requirement of more space in metropolis is a world-wide phenomena. It is self evident that as cities develop due to growing populations and economy, more space is required to accommodate these activities. Over the past years the urban underground space development offer intriguing possibilities as is demonstrated by projects all over the world, the use of underground space for subway, underground parking lots, underground shopping malls, lifelines has been increasing in Canada, Japan and EU. There are many causes for rapidly development of urban underground space, such as environment, disaster prevention, population, but as a part of urban space, it's formation and development was affected from urban economy all the time.

* Corresponding author.

E-mail addresses: ziiwiii@gmail.com

2. Transformation of urban space from the perspective of urban economy

The essence of the transformation of urban space is a reflection that human social economy on the ground, at the same time, urban economy dominates the produce and evolution of urban space. The effect of aggregation, transportation development, the evolution of industrial structure, these factors contribute to the transformation of urban space. However, they were part of urban economical operation.

The feature of urban economy is spatial and aggregate. In essence, city is a result that human economic behavior assembled in the space, and urban economy is gathering economy. If gathering economy is not existed, there is no need to assemble for social economic behavior, and city would not arise. Consequently, excepted for limitation from natural condition, gathering economy is the fundamental driving force to the evolution of structure of urban land use. The variation of gathering economy in different location should affect site selection of enterprise and inhabitant, and this affection may change urban spatial structure.

The formation of urban space is a procession that land resource reposition and assembled in urban economic activity by inhabitants and proprietors. The city's population distribution and economic behavior that formed in the past will affect site selection at present, most inhabitants and proprietors consider the elements about human resource, market, transportation, environment and public infrastructures in site selection. This land use pattern affect urban space structure. As a productive factor, land rent can be pay for its value. The transportation and public service infrastructures are different at each region in city, and the land rent is different. The urban land are used in different pattern at differ condition, land rent accelerate differentiation of land use function, and forming urban spatial structure.

Because of the mass effect, the proprietors can get differ profit at different location, good mass effect lead to high marginal productivity, vice versa. Gathering economy exist every urban location, it bring proprietors excess profit, and it save money and time for consumers. So gathering economy and land rent is close connection, differential rent base on diversity of mass effect. The super profit from gathering economy will lead to competition of location in market, the highest bidder will obtain right to use land. In other words, the land could be used in purpose to generate more profits, and urban land use structure is decided. It is consensus at space between urban mass effect profit distribution and land use structure. Therefore mass effect and land rent are counterweight in procession of urban space formation [1].

From the perspective of urban space, the reasons to utilize urban underground space is that there is no adequate urban space, the ground transportation space is not enough, so we adopt underground road, underground car parking and subway, surface architecture space is not enough, so we develop underground shopping mall, set the public infrastructure into underground space. But why urban space is not enough?

3. Third sector and urban underground space

Compare with construction above ground, urban underground space development is more difficult and complicate. The project cost of underground buildings is 2-4 times more than surface structures of same volume and type. The energy which consumed to keep the internal environment in underground building is 3 times more than surface structures when they at same level [2]. According to rent theory, high investment should be put in high value-added location.

Bobylev (2009) suggest the highest densities of underground structures can be found in city centers. The city center is a place where public facilities are located, as well as the main public transport transit areas. The reason for underground space congestion in downtown areas are: (1) high demand for infrastructure; and (2) the historical evolution of underground infrastructure, which includes accumulation of old and unused structures within the underground space [3].

The author thought city center is the aggregate area of third sector, the economic form is the real reason

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