Evaluating cities' vitality and identifying ghost cities in China with emerging geographical data

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Extended Abstract

Urbanization in China has attracted much attention from around the world and is regarded as one of the most important events in human civilization. With the rapid urbanization of China, plenty of new urban lands have been developed with the great expectation to deal with all kinds of issues in old urban areas such as high population density, great demand on limited land resources, decaying environment, and etc. In recent years, real estate developments are the main form of urban spatial development in China and they generally cover over thirty percentage of total urban development in terms of area. The occurrence of these ghost cities has been widely criticized for debilitating the suitability of urban land as habitats, lowering the functioning effectiveness of urban system, hurdling the immigration trend of urban land, leading to disordered increase of urban land, messing up the whole plan of urbanization, and etc. Although there is unneglectable media coverage on ghost cites, which are supposed to be associated with wasting land resources and deteriorating healthy city development (Batty, 2016), the understanding on ghost cities in China is rather limited by lacking of clear and effectively evaluation criterion. This has been emphasized during the Central City Work Conference of China which is held at the end of 2015.

Considering the fact of ghost cities, we borrow the theory of urban vitality to identify and evaluate ghost cities in this paper. We argue that ghost cities are associated with very low urban vitality. Kevin Lynch believes that the primary criterion in the quality assessment of urban space form is the vitality, which is defined as a settlement that supports the vital functions and the biological requirements and capabilities of human beings, and how to protect the continuation of the species (Kevin, 1984). It is usual to say that, under these circumstances, people have 'quality of life'. Urban vitality is then an essential element to achieve urban quality of life. Ian Bentley described the vitality as affecting a given place, the extent of receiving diverse

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characteristics of different functions(Bentley,1985). Jane Jacobs argued that human activity and life place intertwined constitute the diversity of city life, the vitality is the performance of the diversity in the city life (Jacobs, 1961).

In this paper, we profile ghost cities in China from the view of residential development vitality, which is the core issue contributing to ghost cities at the micro level. A residential project's vitality is associated with three components, ranging from morphological, functional to social aspects. In total, 535,523 residential land transactions from 2002-2013 with a total area of 7,770.2 km2 are collected from an official website in China. We use the national-wide road junctions, points of interest, and location based on service records of 2014/2015 for measuring the morphological, functional and social vitality of each residential project. We propose a vitality index considering three major components and suggest the vitality of a residential project is equal to the combined result of the three dimensions. This enable us the opportunity to calculate all residential projects' vitality values. We further distinguish all residential projects with the existing urban areas in the year 2000 (within or beyond) and these projects are then classified into two types, either they are in old urban areas (developed before or in 2000) or new ones (developed after 2000). We then aggregate the project level evaluation results into the city level. The ghost index G is proposed for identifying ghost cities, and it considers the vitality gap between the average residential project vitality of old urban areas and the vitality of the new urban areas (Figure 1). The larger the gap is and the lower the average residential projects' vitality in new areas in a city, the more the city tends to be a ghost city (a larger G for the city). The ghost cities are then identified by sorting all cities' ghost values, removing cities with small-scale residential developments in new urban areas and selecting the cities with the largest G values. Considering the straightforward nature of our proposed framework for identifying ghost cities, we do not include a serious validation step in this study. Rather, we benchmark our findings with existing studies and verify our results using other datasets.

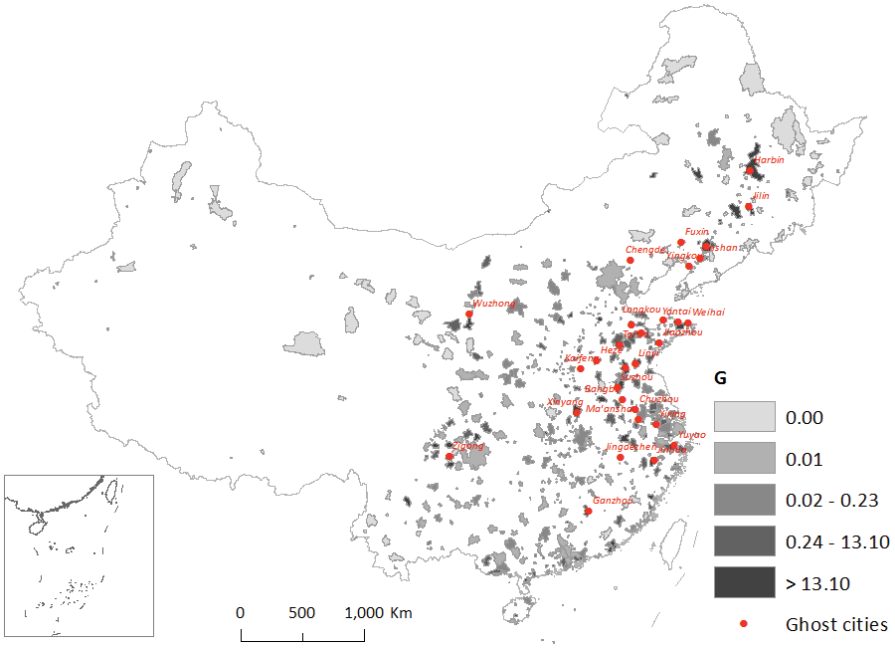

Figure 1 The ghost index (G) for all Chinese cities

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