



The choice of residential layout in urban China: A comparison of transportation and land use in Changsha (China) and Leeds (UK)

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ABSTRACT

Gated communities with tall and dense residential buildings are common in China's cities due to the limited land resources and highly concentrated populations. Living in a gated community is comfortable, safe and removed from outside pollution and vehicles, but these large enclosed areas tend to block traffic and, therefore, increase drivers' travel distance. Comparing the residential layouts and transportation in Changsha, which is a provincial capital city in Central China, with those in Leeds, which is a city in the UK, this paper discusses the choice of residential layout in Chinese cities based on the characteristics of the residential buildings (tall and densely populated) and reveals that in Chinese cities, the size of the closed residential areas should be controlled to allow more route choices for vehicles. Controlled residential areas should not be open to outside vehicular traffic but can be designed to be semi-open, allowing entry only to pedestrians from outside, to improve the proportion of pedestrian traffic and separate pedestrians from vehicles on the roads. Enclosed areas can be designed to separate people from vehicles, and vehicles should be parked together by building car parks, parking structures or underground garages to reorder traffic, improve the quality of life of the people in the community and promote the efficient use of land.

1. Introduction

There are two forms of residential layout, namely, open communities (also called block systems) and gated communities. The block system is frequently used in countries with private ownership of land, and during the early period of Chinese reform, the block system was widely used (Moroni, 2014). In block systems, houses are built along the streets, and no walls are used. This system can increase the density of roads but decreases the quality of life because vehicles can disturb pedestrians; the elderly and children can be threatened by vehicle flows, and the noise and gas from vehicles can pollute the environment (He, 2003). Unlike block systems, a gated community is a residential area enclosed by fences or walls with entrances controlled by gates. Guards patrol these residential areas, and the roads, green belts and public facilities and spaces are under unified management and belong to all owners in the community (Atkinson & Blandy, 2005; Blakely & Snyder, 1997; Low, 2003; Roitman, 2010). Living in a gated community is comfortable and safe and offers an escape from outside pollution and vehicles (Atkinson & Flint, 2004; Le Goix, 2005; Shamsuddin, Zaini, & Sulaiman, 2014). Addington and Rennison (2015) indicated that gated communities experienced fewer burglaries than non-gated communities.

However, from a sociological perspective, gated communities may encourage segregation (Borsdorf & Hidalgo, 2008; Borsdorf, Hidalgo, & Vidal-Koppmann, 2016; Kovács & Hegedűs, 2014; Lai, 2016; Lemanski, 2006; Smigiel, 2013). Because there are few connections linking the inside to the outside of the residential area, the streets become cool and deserted (Pu, 2003), and public facilities in these communities cannot be enjoyed by those living outside of them (Caldeira, 2000; Soja, 2000). Certain people opposed to gated communities even call these communities “punitive cities,” “fitting exemplars of the segregative, security-oriented society” (Lynch, 2001), “cities of fear” (Low, 2003) or even “evil paradises” (Davis & Monk, 2007). Additionally, if the enclosed area of a gated community is large, the area may interrupt and decrease accessibility by traffic, thereby decreasing vehicles' route choices. Moreover, these communities force pedestrians to walk long and indirect paths because they are not allowed into the enclosed area without special permission. Traffic jams can also easily develop at the entrances due to their limited number.

Since the 1978 economic reform, residential areas in Chinese cities have increasingly walled themselves from their surroundings to improve security, and currently, gated communities are widely used in Chinese cities. Recently, the Central Committee of the Communist Party of China (CPC) and the State Council issued “Several opinions of the CPC

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Central Committee and the state council on further strengthening urban planning and construction management” (Feb 6, 2016, referred to hereinafter as “opinions”) (The CPC and the State Council, 2016); this document posits that no more closed residential areas will be permitted to be built in cities and that new residential areas should apply block systems. However, the quality of life will decrease because vehicles inevitably introduce noise and pollution and endanger people, even though block systems can increase the density of roads and offer people more route choices for their travel. In many countries, people recognize the problems associated with the block system, and in certain cities, moderately sized gated communities have been popularized to balance transportation and quality of life (Moroni, 2014).

Although most existing studies investigating residential systems have discussed the advantages and disadvantages of the two forms of residential layout, i.e., block systems and gated communities, no study has addressed the selection of residential system and the residential zone size from the perspective of the relationship between transportation and land use. Developing a system that can match buildings with transportation and balance comfort and security with traffic accessibility is key to realizing sustainable development. In contrast to cities in many other countries worldwide, China's cities have dense populations and limited land; therefore, residential buildings are tall and densely built. What residential system should be used in China's cities? Under what conditions and in what ways should residential systems be applied? Based on a comparison of Changsha, China and Leeds, UK, this paper considers traffic accessibility, safety and comfort in an investigation of the appropriate residential layout under different land use patterns and proposes residential system forms suitable for China's cities according to the land use patterns of China's cities (tall and densely distributed residential buildings).

2. Comparisons between Changsha in China and Leeds in the UK

2.1. Residential system in Changsha, China

Changsha is a provincial capital city in Central China. Similar to most other cities in China, most residential areas in Changsha are gated communities. Fig. 1 shows overall views and interior views of several

residential areas.

As shown in Fig. 1(a) and (b), high, dense buildings are beneficial because they accommodate the most residents with the least amount of land. As shown in Fig. 1(c) and (d), residents can share the greenbelt area and resting spaces between buildings, making the most use of such spaces. These public spaces are contiguous (no roads separate these spaces), and people who rest at the ground level can fully enjoy these green spaces at any time. However, if roads were built between these high buildings, they would have to be widely separated (decreasing the population density per unit of land) to ensure that residents have sufficient greenbelt area. However, the greenbelt areas at the base of each building could not be shared because the roads would separate them. Residents would not be able to fully use the greenbelt area at the ground level (although it would be empty) because they would not want to visit another building across the road due to the risk posed by traffic. Therefore, the authors believe that tall buildings must be constructed to accommodate as many residents as possible using the least amount of land, and the distance between buildings should be reduced if there are no roads between the buildings (but the area must meet a certain plot ratio to satisfy the residents' recreation needs). Prohibiting roads between buildings can allow the full use of the greenbelt area (people from different buildings can share the public greenbelt), reducing the total planning area for greenbelts and, therefore, increasing the utilization efficiency of the land.

As previously discussed, gated communities have obvious advantages in terms of comfortable living conditions. Because the community is not disturbed by outside vehicles, and vehicles within the communities can be separated from pedestrians (e.g., underground garages are built in many gated communities), the residents can walk through the community safely and freely without being bothered by exhaust and noise pollution. Safety is high because people do not have to cross a roadway in the community. However, gated communities (particularly those that cover a large area) may block traffic and reduce traffic accessibility (i.e., fewer route choices for vehicles traveling from one point to another). Pedestrian traffic must follow long detours even when the destination is nearby if gated communities block the direct route. For example, the walls and fences of the gated communities shown in Fig. 2 block pedestrian traffic, leading many people to drive



Fig. 1. Overall views and interior views of several closed residential areas in Changsha.

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