Design with informality: a study of spatial informality in Wuhan

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Abstract

The intriguing topic on urban informality has been studied by researchers for decades. This research begins with a comprehensive review of multiple approaches to urban informality research worldwide while trying to understand problems of informality research in a Chinese context. It was found that current research on urban informality occured mainly through social and political sciences approaches while an integrated understanding of informal urban form is rare; and the current understanding of urban informality in China is particularly poor. Therefore, this research attempts to understand informality in China while introducing a more spatially rooted methodology. Wuhan city is the study area.

The research tries to explore – spatially – informal patterns, and relate them to urban growth pattern and urban design approaches. Through an exploratory spatial data analysis of 510 informal urban places, several characteristics of informal patterns in terms of geometry and distribution are identified and discussed. Three major typologies of spatial informality are found and studied with reference to their formation dynamics. The exploration went on to evaluate the design approaches that gave rise to them.

It was found that there are certain relationships of informal pattern, urban development pattern, and their locations. Therefore, a constructive network of these relationships was generated drawing from the analysis. More possibilities for urban informality research are provided; and a suggestion for 'design with informality' – based on better understanding the form and spatial dynamics of urban informality and better integrating informality with urban design – is envisioned.

Methodology

Exploratory spatial data analysis (ESDA) which contains mapping, data manipulation and visualization was applied to analyze informal patterns. Urban form, urban growth and urban design–as the external references of informal patterns – were studied through literature review (Figure 1).

Some indicators of patterns included:

- shape compactness = $\sqrt{a_1/[a_2(\frac{p_1}{p_2})^2]}$
- kernal density estimation $\hat{f}(x) = \frac{1}{nh^2}\sum_{i=1}^{n} K\{\frac{1}{h}(x - x_i)\}$
- pattens of urban growth: incremental (infill/branching); radical (leapfrogging)
- types of locations: city periphery; inner city/historical area; under-developed areas

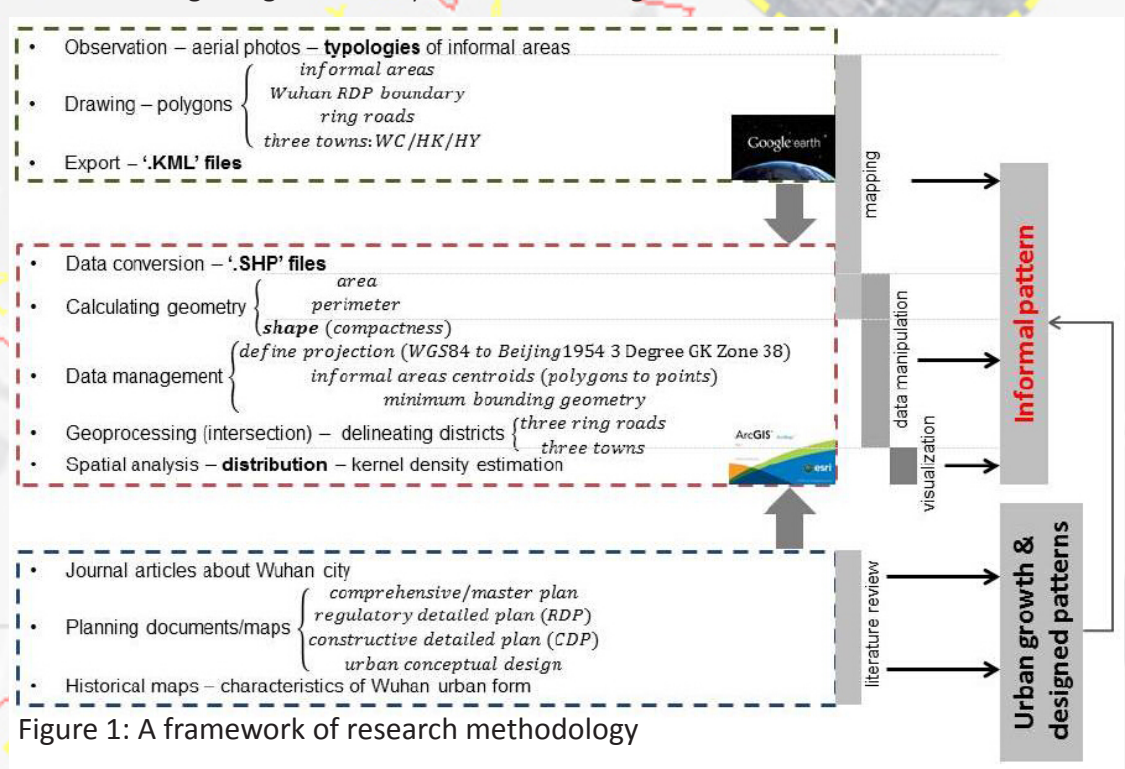


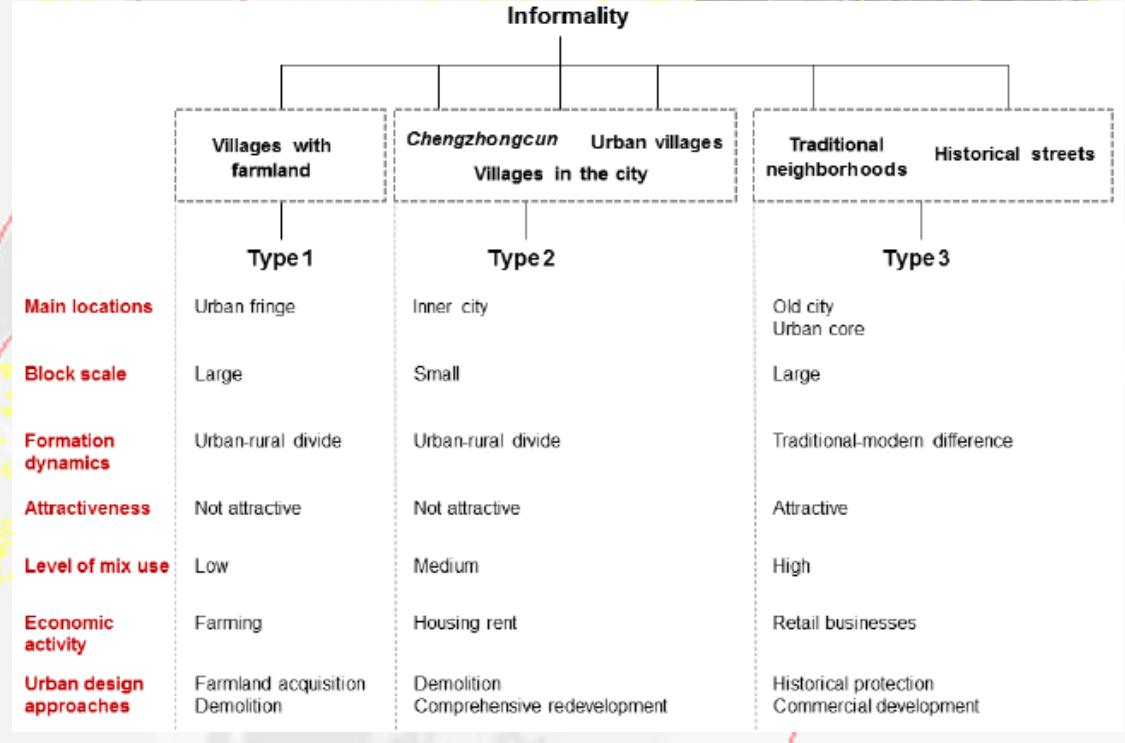
Figure 1: A framework of research methodology

Findings

- In terms of the shape indicators, the shapes of informal places are likely to be influenced by formal urban plans and incremental urban constructions.
- Informal places which have natural shapes tend to have large area values and small values of compactness; and locations of them are more likely to be outside the 2nd ring road.
- Informal places which have regular, or fragmented, shapes have relatively small area values and large values of compactnessand are more likely to appear in the inner city.
- There are two locations which have significant positive correlations with informal clusters: the historical districts and the under-developed urban fringe.
- Informal clusters are less likely to appear in urban districts which have undergone radical urban development –usually large scale industrial clusters or new zones of development –at the urban fringe.

Indicators	Characteristics	Values			Main related locations
		Area	Compactness	Kernel density	
Shape	Natural	Large	Small	-	Urban periphery Under-developed urban fringe
	Regular/ fragmented	Small	Large	-	Inner city
Distribution	Clustered	-	-	High	Historical districts Under-developed urban fringe
	Random	-	-	Low	Not significant

- There are three major types of spatial informality: villages with farmland; villages in the city (chengzhongcun); and unplanned places in historical neighborhoods. A comparison of three types of spatial informality in terms of main location, block scale, formation dynamic, attractiveness, land use mix, economic activities and urban design approaches is as below:



Conclusion

Methodologically, the data manipulation and spatial analysis methods in this research can be applied to study spatial informality in any city in the world. Due to the fact that this research involves a time-consuming process of mapping as all polygons representing informal places are drawn manually and identified from the Google Earth visually, some errors may not be avoided. This research thus invites remote sensing professionals and computer scientists to explore better ways of identifying informal places. This research also gives inspiration to geographical scientists or urban geographers to build other analytical models to study the patterns of spatial informality, or to analyze other spatial and social variables of urban informality. There are also a lot of possibilities for further study, including finding patterns in informal urban fabric at the scales of block, street and buildings, in order to inform better urban design interventions.