Status Poles and Status Zoning to Model Residential Land Prices: Status-Quality Trade off Theory

Thuy Phuong Le[1] ✉ 🄳
VNU University of Science, Hanoi, Vietnam

Alexis Comber ✉ 🄳
School of Geography, University of Leeds, UK

Binh Quoc Tran ✉ 🄳
VNU University of Science, Hanoi, Vietnam

Phe Huu Hoang ✉
R & D Consultants, Hanoi, Vietnam

Huy Quang Man ✉
VNU University of Science, Hanoi, Vietnam

Linh Xuan Nguyen ✉
VNU University of Science, Hanoi, Vietnam

Tuan Le Pham ✉
VNU University of Science, Hanoi, Vietnam

Tu Ngoc Bui ✉
VNU University of Science, Hanoi, Vietnam

───── **Abstract** ─────

This study describes an approach for augmenting urban residential preference and hedonic house price models by incorporating Status-Quality Trade Off theory (SQTO). SQTO seeks explain the dynamic of urban structure using a multipolar, in which the location and strength of poles is driven by notions of residential status and dwelling quality. This paper presents in outline an approach for identifying status poles and for quantifying their effect on land and residential property prices. The results show how the incorporation of SQTO results in an enhanced understanding of variations in land / property process with increased spatial nuance. A number of future research areas are identified related to the status pole weights and the development of status pole index.

1 Introduction

The importance of location in land valuation has been confirmed in many studies[9]. The increasing use of explicitly spatial methods in land valuation is an emergent trend[6]. In urban areas, land value is closely related to spatial structure, such as proximity to central business districts (CBDs)[10]. However, it is difficult to quantify the spatial variation of drivers[6]. Status – Quality Trade Off theory (SQTO) explains the dynamic structure of

---

residential areas using a multipolar model of two components: housing status and dwelling quality[4]. Each pole or center represents the highest degree of attractiveness about a certain type of social status. Housing status is the value of the non-physical (or intangible) factors, including cultural, economic, environmental political, etc., which distinguish different levels of housing desirability. Dwelling quality relates to the physical, measurable elements relating to the normal use of a dwelling[4]. The benefits of applying SQTO have important implications for housing and real estate policies including:

- Refinement of statistical methods and models for analysing the housing market and value forecasting, by including housing status and dwelling quality[1, 2].
- The identification of housing status pole locations, capturing frequently intangible qualities that are inherently associated with the evolving spatial structure of cities.
- The opportunity to captures, explanation and predict future housing bubbles.

Most studies , including in Vietnam, focus on the first of these[7]. This short research paper examines the second and third in land valuation.

2   Background

SQTO defines a status pole as "the highest point of certain kinds of social status, recognized by a given proportion of the population"[4]. They capture qualitative neighbourhood perceptions such as wealth, political power, business, culture, ethnicity, education, etc, and play an important role in land valuation. Urban residential areas have distinct morphological patterns around status poles[4] and are geographically stratified, providing a potential basis for analysis and modelling. Properties can be grouped into homogenous areas based on factors such as use, physical characteristics with different status poles pulling value in positive or negative directions. For example, areas around the CBDs typically have a higher house price [2, 5] and negative pulls have found around landfill [3]. There are enhanced opportunities to support development policy, planning and real estate regulation by better understanding the location and nature of different status poles and importantly, their effect on value and price. In Vietnam, land acquired for development is subject to a state determined compensatory value. In this, land use change is related to a change in value. A further regulatory aspect is that "rumors" can form virtual status poles, leading to real estate bubbles. In order to explain the mechanism of the bubble, a number of recent studies started to look more closely at the components of land value over temporal and geographic dimensions [6].

This paper identifies the areas around different status poles, as the basis for understanding variations in land value. The status pole is the location with the highest point. "status value" that pulls value in the surrounding area (in a positive or negative direction). This can cause land prices in the surrounding area to increase or decrease. One aspect of the status poles are their ability to represent aspirations of different social groups when they choose their residential location. This suggests the need for different factors to be weighted relative to location in any spatial analysis to identify stats poles. Here a classic multi-criteria analysis is used to synthesize, evaluate and understand the relative strengths of emergent status poles.

3   Methodology

To identify status poles revealed preferences and stated preferences are combined. Revealed preference methods involve the quantification of people's preference through market land value (objective). Stated preference are captured through a set of questions with varying degrees of strength (subjective). The combination of the two approaches is the basis for identifying status poles (Figure 1) and the full method is in Le et al. [8]
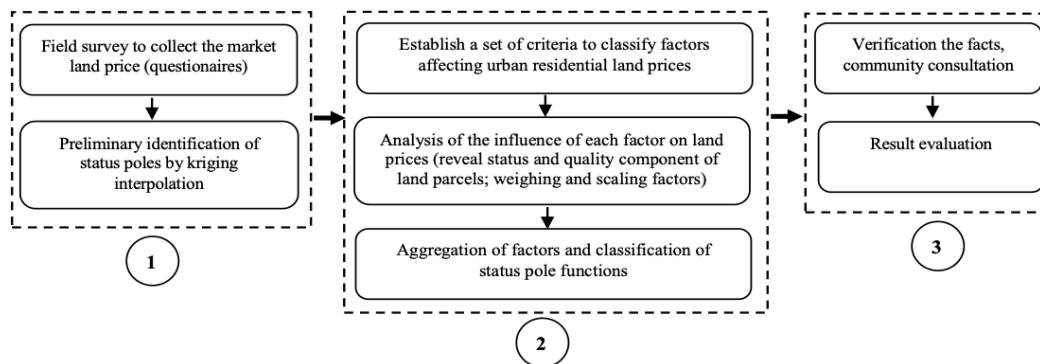
Figure 1 The process of identifying status poles through 3 stages.

The first stage is to delineate areas based areas with the highest and lowest land price, as potential status poles. Questionnaires were used to capture information about residential land parcels sales. These had sections with a total of 46 questions: land owner information (occupation, number of family members, incomes, etc.); land parcel and transaction information (location, area, shape, transfer price, date of transaction, etc.); house information (house type, number of floors, house price, etc.); neighborhood characteristics (water and electricity utilities, security environment, accessibility, etc.). Sample data of land transactions was collected in surrounding areas under normal trading conditions. The minimum required number of samples (N) was estimated as $N > 50 + 8m$ where m is the number of predictors. The samples were interpolated using Kriging to give a spatial distribution of land prices.

The second stage determines the spatial location and function of status poles from analysis of the influence of factors on land prices. These change over time, space and with people's perspective. Criteria were proposed to select locally appropriate factors. In overview, criteria were established for classifying factors affecting urban residential land prices were based on urban quality of life approach with six dimensions (including environmental, physical, mobility, social, psychological, and economic dimensions). A key task of this stage was to determine the weights and scales of influence on land prices of each factor. A variety of methods were explored including network analysis, space syntax, Analytic Network Process, Fuzzy logic, and, for each dimension a composite index (the urban quality of life index - UQoL) is calculated for each land parcel. This provides the basis for determining the function of status poles that were preliminary identified in the first stage.

The third stage is to capture the opinions of people living around the status pole as a form of to verification through questionnaires. A total of 15 questions related to the indicators of urban quality of life, and the attractiveness of status poles were scored on a Likert scale with 5 levels from very dissatisfied to very satisfied. Thus, the three criteria for identifying the status poles are addressed in the three stages of the process.

The case study area is Cau Giay District. This is among the most well-developed districts in Hanoi. It has eight wards and is bordered by old inner districts and new districts. Cadastral maps were collocated with 427 standardized survey samples of real estate transactions from 2017 to 2019. Attribute data was obtained from both field surveys and spatial analyses resulting in each land parcel having 36 attribute fields (such as land market price, shape, frontage, relative position of a parcel to streets, distance from a land parcel to the closest hospital, school, police station, etc.).
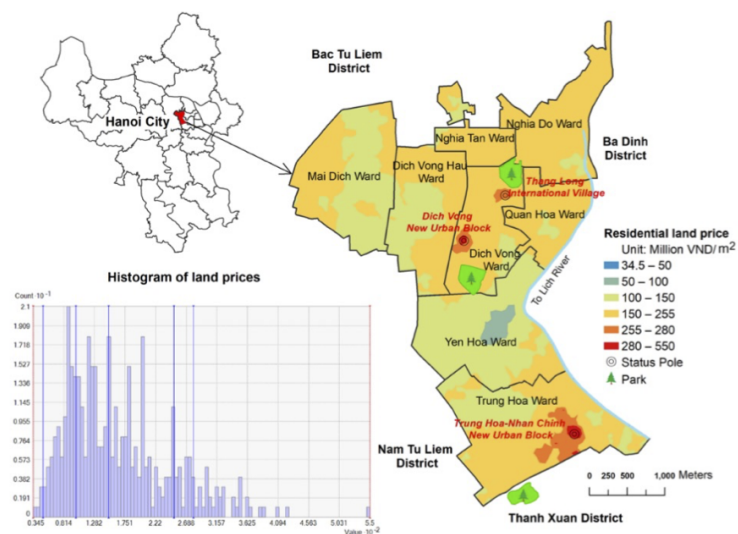
Figure 2 Preliminary identification of status poles.

4   Results and Discussion

4.1   Identification of status poles

The kriging interpolation generated the spatial distribution of residential land prices, as the basis for preliminary identification of status poles (Figure 2). The results show that residential land prices vary from 34.5 to 550 million VND/m^2. Three areas with the highest land prices are considered as positive status poles, namely: (1) Thang Long International Village area, (2) Dich Vong New Urban Block (in Dich Vong Ward) and (3) Trung Hoa – Nhan Chinh New Urban Block (in Trung Hoa Ward). The area with the lowest land price is the residential area in Yen Hoa ward, which has a negative status pole.

A quality of life index was calculated for each residential land parcel as the basis for determining the function of the status poles. The results show that the area around Cau Giay Park (including Dich Vong New Urban Block) and Thang Long International Village have a high UQoL (0.950-0.995). The area around Trung Hoa – Nhan Chinh New Urban Block with an UQoL index (0.900-0.950) are areas near the park with convenient access to socio-economic locations such as schools, hospitals, offices, etc. Local interviews revealed that the attractiveness of the status poles was 86% in Cau Giay Park, 87.5% in Thang Long International Village, and 76% in Trung Hoa – Nhan Chinh Urban Block. In contrast, the residential area in Yen Hoa ward has a lower UQoL index (0.800) due to poor infrastructure, degraded roads and some locations prone to flooding and cemeteries in this residential area.

4.2   Status pole zones

The interaction between the status poles allows status pole areas to be delineated. According to SQTO are continuous and overlapping rings. In Cau Giay District, there are 3 positive status poles (X, Y, Z) and 1 negative status pole (P). The distance of each land parcel to each status poles was determined (x, y, z, p). Fuzzy logic was used to scale the distance values under the principle that the closer to the status poles, the higher scale (Sx, Sy, Sz, Sp). Figure 3 shows the membership function used for scaling, with the value of a and b depending on individual preferences or as derived from Government regulations. Here these were set as follows: a = 300m, b = 2000m.

Scale S(x)

$$S(x) = \begin{cases} 1 & 0 < x < a \\ \frac{b-x}{b-a} & a \leq x \leq b \\ 0 & x > b \end{cases}$$
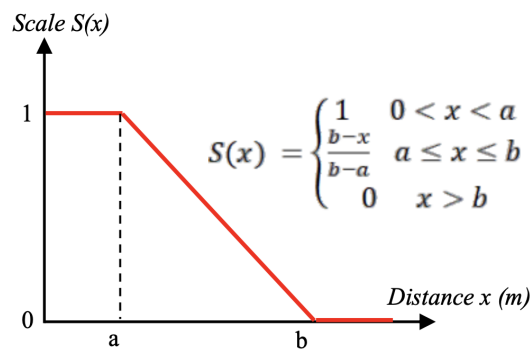
Figure 3 Membership function for scaling distance to status poles.
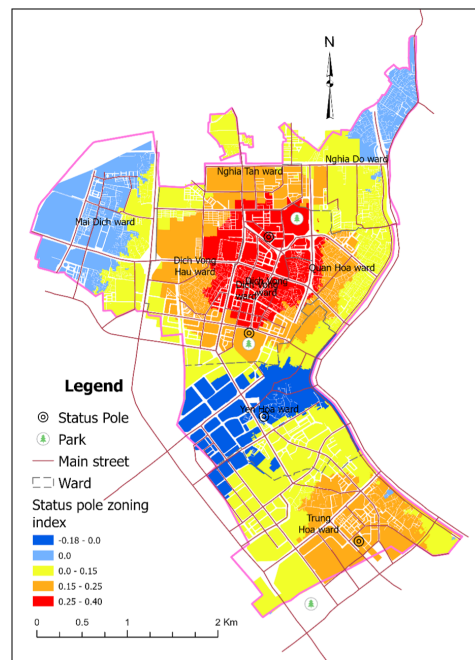
Figure 4 Result of status pole index zoning in Cau Giay District.

The next step is to calculate status index as follows:

$$I_{status} = (Sx + Sy + Sz + Sp)/4$$

where Sx, Sy, Sz have positive values (+), and Sp has negative value (-). The value of the status index ranges from -1 to 1 to represent positive or negative status poles. The value 0 represents regions not affected by status poles. Figure 4 shows the result of status areas. It can be seen that the linking area between Thang Long International Village and Cau Giay Park (the red area) has the strongest influence in the positive direction. Because these two status poles are located relatively close to each other, they are considered to form a "dual" status pole, with a stronger influence. The blue color represents areas affected by the negative status pole of Yen Hoa Ward. Some areas with light blue color are not affected by all four status poles in Cau Giay District such as Mai Dich Ward, the north of Nghia Do Ward. However, these areas may be partially affected by other status poles in the neighboring areas.

5   Conclusions

This research provides an outline of an approach for identifying status poles related to urban residential land and their effect on price. These were identified as the locations where the influence of qualitative factors on the surrounding area are strongest, causing land prices to increase or decrease sharply and recognized by a given proportion of the population. These influences can be economic, political, environmental, etc., that affect the urban quality of life and their interaction with the status poles form the rings of status pole zones. Future research will to consider the weights of status pole and the application of status pole zoning index in land value. This paper also demonstrates how the concept of status poles SQTO, and the spatial in neighbourhood variation that it captures, can be used to underpin spatially non-stationary house price models. These quantify how the relationship between land value and house price with different factors related to neighbourhood perceptions and the property vary in different parts of the city. Being able to model how and where the processes vary spatially, supports a deeper, more spatially nuanced understanding of the impacts of developments and urban transformation. This is important in locations that are experiencing very rapid urban changes, to identify house price bubbles early, to ensure developments are socially mixed and critically to avoid the commodification of property. The emergence and presence of these of price bubbles can be identified and explained using the proposed Index.

─── **References** ───

1   TQ Bui, HN Do, and PH Hoang. House price estimation in hanoi using artificial neural network and support vector machine: in considering effects of status and house quality [paper presentation]. In *FIG Working Week*, 2017.

2   A Comber, P Harris, N Quan, K Chi, T Hung, and HH Phe. Local variation in hedonic house price, hanoi: a spatial analysis of sqto theory. In *International Conference on GIScience: Short paper proceedings*, volume 1, pages 54–59, 2016.

3   Diane Hite, Wen Chern, Fred Hitzhusen, and Alan Randall. Property-value impacts of an environmental disamenity: the case of landfills. *The Journal of Real Estate Finance and Economics*, 22:185–202, 2001.

4   Hoang Huu Phe and Patrick Wakely. Status, quality and the other trade-off: Towards a new theory of urban residential location. *Urban studies*, 37(1):7–35, 2000.

5   Hironori Kato and Le Hong Nguyen. Land policy and property price in hanoi, vietnam. *Journal of the Eastern Asia Society for Transportation Studies*, 8:1011–1026, 2010.

6   Andy L Krause and Christopher Bitter. Spatial econometrics, land values and sustainability: Trends in real estate valuation research. *Cities*, 29:S19–S25, 2012.

7   Thuy P Le. *Research on urban residential land valuation from viewpoint of Status – Quality Trade Off theory, case study in Cau Giay District, Hanoi City*. PhD thesis, VNU University of Science, Vietnam National University, Hanoi Vietnam, 2021.

8   Thuy P Le, Phe H Hoang, Linh X Nguyen, Tu N Bui, Tuan L Pham, and Binh Q Tran. Urban quality of life evaluation using land price with status-quality trade-off theory and ecosystem services. *International Journal of Strategic Property Management*, 27(2):92–104, 2023.

9   Andreas Ortner, Matthias Soot, and Alexandra Weitkamp. Determining land values by location: Supporting public valuation expert committees in the provision of market transparency. *The role of public sector in local economic and territorial development: Innovation in central, Eastern and South Eastern Europe*, pages 83–96, 2019.

10   Paul F Wendt. Theory of urban land values. *Land economics*, 33(3):228–240, 1957.