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Theoretical, empirical, and operational models in hotel location research

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ABSTRACT

This paper aims to review past literature on hotel location models and evaluate the state of the art, as well as set out future directions. This study divides hotel location models into three major categories: theoretical models, empirical models, and operational models. Four theoretical hotel location models are reviewed and discussed, including the tourist-historic city model, the mono-centric model, the agglomeration model, and the multi-dimensional model. Based on previous literature, six empirical models and three operational models of hotel location are elaborated. Furthermore, some challenges related to hotel location studies are discussed, and future research directions are provided. In particular, we advocate the development of more sophisticated hotel location models and the use of Geographic Information System (GIS) in hotel location analysis.

1. Introduction

Successful investment in the hotel industry hinges greatly on location factors (Kim and Okamoto, 2006) because ideal location is always associated with larger accommodation demand (Lockyer, 2005), higher revenue per available room (Sainaghi, 2011), higher customer satisfaction (Sim et al., 2006), better performance (Chung and Kalnins, 2001), and lower failure rate (Baum and Mezias, 1992). More importantly, since hotel location is a long-term fixed investment, a flawed location strategy can be very difficult to rectify. As a result, there is a huge demand for the analysis of hotel location and the identification of factors contributing to a superior location. For private hotel investors, the pattern of hotel location and its evolution provide valuable information on market access to potential guests and can be further used to understand market competition and equilibrium: whether the hotel industry is over-supplied within a certain area.

The study of hotel location also facilitates the understanding of urban tourism space and structure because hotels are the basic facilities that support urban tourism (Rogerson, 2012a) and their locations influence tourists' movement within a city (Shoval et al., 2011). Therefore, hotel location research helps governments and authorities understand the geography of accommodation supplies and contributes to industrial policies for urban tourism development (Adam, 2013). Moreover, as a major element of "regional life" and basic urban infrastructure, hotels function in conjunction with other infrastructures in the city, like convention centers, central business districts (CBDs), transport gateways, and major tourist attractions. Hence, further knowledge of hotel location provides vital information to urban and regional planning efforts, especially those planning projects for service infrastructure and urban renewal (McNeill, 2008).

The multi-disciplinary nature of hotel location research has resulted in a relatively separate body of literature that is scattered throughout a diverse mix of academic disciplines, such as tourism and hospitality management, geography, economics, marketing, finance, and urban planning. Researchers with different backgrounds tend to over-emphasize the theories and models of their own disciplines. Therefore, methodological differences and variations can be observed, albeit somewhat loosely, in different streams of hotel location research. To fill this research gap, we present a comprehensive retrospective analysis of past research on hotel location in different disciplines and present recent developments on hotel location modeling as a unified body of knowledge. The results highlight the advantages and disadvantages of different theoretical, empirical, and operational models. They also provide valuable guidance on how to choose the appropriate model or use a combined one to understand specific hotel location problems for both scholars and practitioners. Moreover, we discuss several previously overlooked issues with various hotel location models and set out a future research agenda in this research area.

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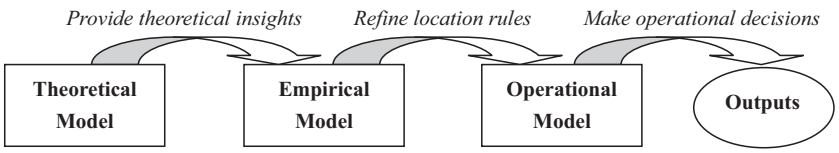

Fig. 1. Research models in hotel location analysis.

This study divides previously documented hotel location models into three major categories: theoretical models, empirical models, and operational models (Fig. 1). Theoretical models explain the hotel location process under certain conditions with particular theories and are generally able to predict future hotel locations. Empirical models employ a strategy that explains the hotel location mechanism/pattern based on empirical observations and summarizes the refined hotel location rule. Finally, operational models indicate how to apply the pre-existing hotel location rule to make operational hotel location decisions. In the following part of the paper, different model sub-categories within each of these three models will be reviewed and discussed.

We also examine different spatial scales of various hotel location models because these scales lead to different decision-making processes. Basically, we consider three spatial scales of hotel location analysis, namely, inter-regional, intra-regional, and intra-metropolitan. For inter-regional studies, the attractiveness of each region to new hotel entries is assessed and these studies facilitate market entry decision making for hotel investors. For intra-regional studies, specific locations within a region (like a county, a state, or even a country) are considered, and city structure factors can be partly overlooked in this broader scale. Finally, for intra-metropolitan studies, the major task is to select an appropriate site within a town, city, or metropolitan area. As a result, city structure, such as CBD location and urban sprawl, tends to play a crucial role.

Having introduced the research objectives, the remaining parts of this paper are organized as follows: after the introduction, four types of theoretical hotel location models will be discussed in Section 2, while six empirical models will be reviewed in Section 3. For practitioners, three major operational hotel location models will be presented in Section 4. In Section 5, the general issues on hotel location modeling will be discussed and future research directions will be provided. Lastly, in Section 6, final conclusions will be drawn.

2. Theoretical model

Theoretical models establish the theoretical foundation for the spatial location choice of hotels. Theories from different disciplines have been used to explain different perspectives on hotel location. These theories include geographical (Egan and Nield, 2000; Shoval, 2006), economic (Kalnins and Chung, 2004) and marketing theories (Baum and Haveman, 1997; Urtasun and Gutiérrez, 2006). We categorize previously documented theoretical models into four types based on their disciplinary backgrounds, and they are the tourist-historic city model, the mono-centric model, the agglomeration model, and the multi-dimensional model.

2.1. Tourist-historic city model (THC model)

THC models date back to Ashworth and Tunbridge's (1990) comprehensive typology of hotel locations within medium-sized Western European provincial towns. In their work, six types of location zones were identified, including traditional city gates (A), railway station/approach roads (B), main access roads (C), "nice" locations (D), transition zones and urban periphery on motorway (E), and airport transport interchanges (F). These different zones are associated with different types of hotels. For example, large modern hotels can be found in type E and type F locations, whereas small and medium hotels dominate type D locations. They attributed these clusters to the influence of access, land values, environmental convenience, historical continuity, and land-use policy.

In tourism and hospitality studies, there is a long tradition of applying the THC model to investigate hotel location and spatial distribution in tourist-historic cities. Most tourist cities have been found to exhibit a hotel distribution pattern postulated by the THC model. Burtenshaw et al. (1991) applied the THC model to explain the typology of hotel distribution in several European cities. To interpret hotel evolution from a spatial perspective, Timothy and Wall (1995) studied the accommodation in Yogyakarta, Indonesia and discovered that the THC model can reasonably explain the location of hotels and predict the locational classification of accommodations. Furthermore, Oppermann et al. (1996) used this model to discuss the hotel distribution in Kuala Lumpur, Malaysia. In their study, seven types of location zones were recognized, and the most distinguished was the "new Central Business District location." This included large modern hotels and deluxe shopping centers, which are common in Southeast Asian countries. Rogerson (2012a) also highlighted the importance of CBD in attracting hotels in three cities of South Africa, and identified some "nice" locations for hotels as described in the THC model.

In another study by Bégin (2000), it was found that hotel locations in Xiamen, China, in general, coincided with those described in the THC model. A large number of cheap hotels were clustered in the historical center, and new hotels were constructed in the transition zone between the old downtown and the emerging CBD. Shoval and Cohen-Hattab (2001) investigated the location of tourism accommodations in Jerusalem, Israel over the past 150 years. Focusing on four periods of development, the study confirmed the predictions of the THC model. It also highlighted other important factors shaping hotel distribution, such as political upheavals and social and cultural differences between the population groups. Aliagaoglu and Ugur (2008) found that the results from Dökmeci and Balta (1999) on hotel location pattern in Istanbul, Turkey confirmed the THC model's prediction, and both type A and type E locations in the city were identified.

The value of the THC model lies in its simplicity and briefness to consider major location hotspots for hotels and the general spatial arrangement within a tourist city. Although it is very popular in the tourism literature, the THC model is subject to many limitations. First, as indicated by Ashworth and Tunbridge (2000), the model is taxonomic rather than explanatory. As such, even though the potential location for hotels within the city can be identified, we do not understand the exact reason why it is selected. Apart from that, while this model has been found to be applicable to tourist-historic cities, it may not be appropriate for non-tourist-historic cities (Aliagaoglu and Ugur, 2008; De Bres, 1994). If it is applicable, however, then, what improvements or modifications should be made to cater to this new situation?

2.2. Mono-centric model

The mono-centric model describes the distribution of land use patterns as several mono-centric rings according to the distance from the city center and emphasizes the paramount importance of

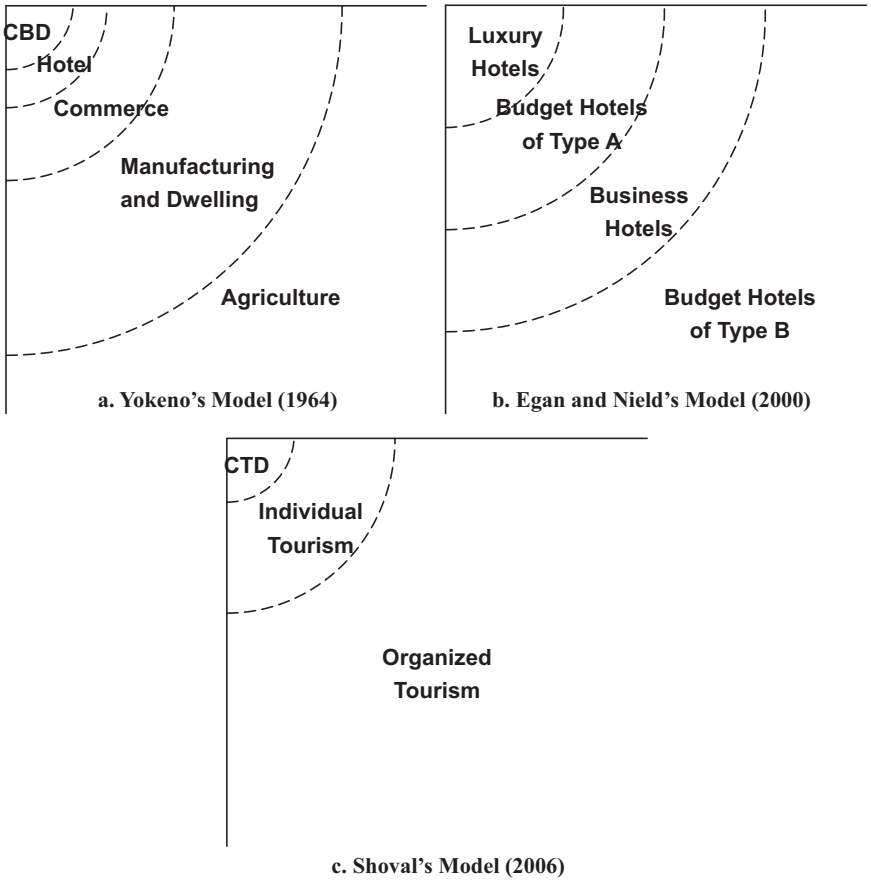

Fig. 2. Spatial arrangement of hotels in mono-centric models.

accessibility in shaping this pattern (Alonso, 1964; Von Thünen, 1826). In the model, it is assumed that an urban area is mono-centric with a single central point for sprawl, and the bid-rent curve is introduced to depict how much land users are willing to pay for locations with different proximities to the center. Based on the principle of bid-rent curves, and drawn from Von Thünen's (1826) land-use model, Yokeno (1968) proposed a mono-centric model to highlight the possible location of urban hotels. With an assumption that tourists are willing to pay more in return for easy access to the city center, the new model suggested that the hotel district is in the center of the city, located between the city's innermost CBD and commercial zones (Fig. 2a).

Egan and Nield (2000) derived another mono-centric model from the partial-equilibrium bid-rent approach, and explained the spatial hierarchy of hotels in terms of the distance to the city center. Land bid-rent curves highlight the revenue associated with locations, and it is assumed that hotels' revenue falls when they move to locations away from the center. In the model, the location preference of hotels of different levels could be predicted by the shape of the bid-rent curve associated with them. Luxury hotels (four-/five-star) are expected to have a very steep and high bid-rent curve and prefer a central location (Fig. 2b). This is because their higher room rates targeting affluent guests are likely to cover the higher land values associated with a central location. Conversely, due to insufficient revenue to pay for a central location, budget hotels choose to either locate at the edge of the city, or select converted buildings at the edge of the city center. To further validate the generality of Egan and Nield's (2000) model, Egan et al. (2006) tested hotels in three Chinese metropolises: Beijing, Shanghai, and Shenzhen. Their results suggested that the hotel location in these cities generally fit the model well, despite some minor flaws. Many other cities have been found to contain a spatial hierarchy and concentric arrangement of hotel distribution that is analogous to Egan and Nield's (2000) model, such as Cape Town, Durban, and Port Elizabeth in South Africa (Rogerson, 2012a) and the Kumasi Metropolis in Ghana (Adam, 2013).

In addition, Shoval (2006) demonstrated that Yokeno's (1968) model was capable of predicting hotel location in Jerusalem, Israel. He proposed an extended model by recognizing two geographies of demand for hotels: the hotel area for individual tourism and for organized tourism (Fig. 2c). Different markets corresponded to different bid-rent curves. In a more comprehensive empirical study conducted by Yang et al. (2012), the mono-centric model was used to explain this spatial hierarchy of hotel distribution in Beijing, China. Based on the bid-rent analysis, the mono-centric model can also be generalized to study the city with dual centers, and an overlapped spatial hierarchy of hotel locations to each center has been identified (Egan et al., 2006; Lee and Jang, 2011).

In sum, mono-centric models provide a powerful analytical tool, bid-rent analysis, to look into hotel location and other activities within the scope of the whole city. In general, these models highlight a centripetal force on upscale hotel locations while a centrifugal force on downscale ones. Several empirical studies have supported the usefulness of this model in predicting the spatial arrangement of hotels within a city. However, because of the complexity of the hotel location problem, the mono-centric model investigates it under several oversimplified conditions (Shoval, 2006, p. 63), and some of them have been deemed too unrealistic for general hotel location cases. For example, it is inappropriate to assume that the city as a mono-centric one in most situations (Lee and Jang, 2011) and posit the central location as the major or even the sole preference of hotel guests. Moreover, the mono-centric

model does not adequately capture all aspects of hotel location patterns, and most importantly, it fails to explain micro-scale hotel agglomeration (Egan et al., 2006), which has been accepted as conventional wisdom.

2.3. Agglomeration model

Hotels are not randomly distributed through space. Instead, their locations are usually highly clustered with other heterogeneous or homogeneous hotels to achieve an agglomeration effect. Agglomeration effect refers to benefits that the hotel can receive from clustering. In hotel location research, there are another series of papers that mainly focused on the agglomeration process of hotel location by underlining hotel co-location (Ingram and Inman, 1996; Kalnins and Chung, 2004). Unlike the aforementioned models studying the absolute location of hotels within an area, the agglomeration model specifically sheds light on the relative location of new hotels and how to locate relative to other hotel incumbents. Canina et al. (2005) further discussed reasons for hotel agglomeration from both production and demand perspectives. Regarding production advantages, agglomeration allows individuals in the cluster to have exclusive access to resources, and provides greater access to leading suppliers, special services, or special relationships. Regarding demand advantages, agglomeration reduces consumers' cost of searching.

However, not all hotels can be benefited from agglomeration. Gains and losses from co-location hinge on the relative strength of agglomeration and competition effects. Some studies identified an inverted U relationship between the existing number of hotels and new hotel entrance (Baum and Haveman, 1997; Ingram and Inman, 1996). Ingram and Inman (1996) argued that the number of new hotels increases as the number of pre-existing hotels increases and then decreases after certain threshold values as agglomeration proceeds. This phenomenon can be explained by the fact that the intense competition between hotels pushes new entrants away (Baum and Haveman, 1997).

The agglomeration effect is heterogeneous to different types of new hotel entrants, and it has been found to depend on product heterogeneity between entrants and incumbents. Freedman and Kosová (2012) revealed that the agglomeration benefits vary across hotels in different product segments, and new hotels are more likely to choose an area with a higher concentration of hotels in other segments to seek greater product differentiation. However, this result is inconsistent with Kalnins and Chung's (2004) findings, which showed that although economy and unbranded hotels choose to co-locate with upscale ones, upscale hotels avoid areas with a large number of other types of hotels. This is because upscale hotels are more likely to generate spillovers to their neighbors based on their affluent resource stocks. Canina et al. (2005) also found that lower-end hotels are more likely to receive positive spillover effects by co-locating in a cluster with upscale hotels. Enz et al. (2008) pointed out that a price premium is associated with locations close to more upscale and luxury hotels. On the other hand, high-end hotels undergo substantial price erosion by locating proximate to low-end ones. In another paper co-authored by Tsang and Yip (2009), they determined that hotels receive benefits by locating close to upscale joint-venture hotels.

Hotel size and ownership play important roles in determining hotels' relative location as well (McCann and Vroom, 2010; Yang et al., 2012). Chung and Kalnins (2001) maintained that by locating surrounded by larger hotels, the revenue performance of small hotels increases. In terms of ownership related agglomeration, Helmers (2010) found that independent and franchised new hotels are more likely to cluster with other hotels, while company-owned hotels are not. This result concurs with the findings of Chung and Kalnins (2001), which discovered that independent hotels in rural markets tend to obtain agglomeration benefits from co-locating with chain affiliated hotels. Kalnins (2004) explained why new hotel entrants are less likely to choose to locate nearby properties of the same brand. This is because entrants could cannibalize the revenues of pre-existing ones. Moreover, Kalnins and Chung (2006) pointed out the location preference of Gujarati-owned hotels toward other unbranded Gujarati ones.

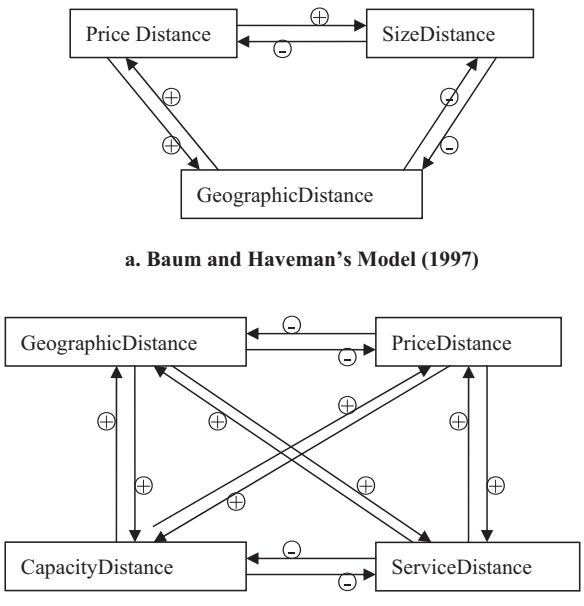

Fig. 3. Relationships among dimensions in multi-dimensional models

The most notable contribution of the agglomeration model is that it acknowledges agglomeration in explaining the choice of relative location for hotels, which is a commonly observed situation nowadays. Unlike the THC model and the mono-centric model, agglomeration models can be applied to investigate hotel location in intra-metropolitan, intra-regional, and inter-regional scales. However, these models provide limited information on choosing absolute location within an area. Therefore, to provide a more comprehensive and practical solution for hotel location selection, one still need to resort to other absolute location models after the analysis of relative locations by agglomeration models.

2.4. Multi-dimensional model

When hotels make market entry decisions, they do not only consider the geographical location but also the product position (Baum and Haveman, 1997). As a result, multi-dimensional models have been generated to explain hotels' market entry choice, for both product and geographical locations. Baum and Haveman (1997) first utilized a multi-dimensional model to study hotel location in Manhattan, USA from 1898 to 1990. Their paper assumed that a hotel chooses to agglomerate or differentiate from different perspectives. That is, the new hotel would choose its positions based on both product and geographical dimensions that differentiate from, or close to, the existing hotels'. Baum and Haveman (1997) built up three measures of distance, namely, geographic distance, price distance, and size distance to reveal the new hotel's location in three different dimensions. The results showed that there is a trade-off in multi-dimensional decision making. New hotels tend to locate geographically close to existing ones that are similar in price dimension and different in size dimension (Fig. 3a).

Urtasun and Gutiérrez (2006) applied another multi-dimensional model to investigate hotel location in Madrid,

Spain from 1936 to 1998. They extended Baum and Haveman's (1997) model by adding a service dimension, which measures the service diversity that the hotel provided. The trade-off effects between dimensions were also highlighted. They discovered that new hotels in Madrid were inclined to locate in close proximity to those of different prices, similar size, and similar service (Fig. 3b).

Apart from the aforementioned four major theoretical hotel location models, other models can be found in the past literature. Two other typological theoretical models include the regional life model (Aliagaoglu and Ugur, 2008), which shows that hotel location is entangled with other urban elements of regional life, and the Kansas tourism model (De Bres, 1994), which demonstrates a linear orientation of hotel locations to the major streets/roads and some hotspots near the off ramps of the interstate or highways. Other theoretical models used in previous research include Porter's diamond model, which analyzes operating environment characteristics of firms (Juan and Lin, 2011; Lin and Juan, 2010), the industrial life cycle model, which highlights spatial patterns in different stages of the life cycle (Sund, 2006), and Dunning's (1981) eclectic theory, which emphasizes the location advantage as one of three factors to explain hotel internationalization (Johnson and Vanetti, 2005).

As shown in the body of prior literature, researchers from different disciplines implement different research philosophies and objectives. For example, human geographers investigate hotel location as a part of their endeavor toward understanding localized patterns in the urban landscape to provide implications for government policies and planning efforts (Bloomfield, 1996; McNeill, 2008), whereas economists develop general hotel location rules that are transferable to other cases. Some location factors have been recognized across different models. For instance, the star rating of hotels has been found to be important in depicting the spatial hierarchy of hotel distribution in the mono-centric models, and it is also significant in choosing the relative location as suggested by the agglomeration model. The same is true for CBD. While the THC and mono-centric models highlight its role in attracting hotels, the agglomeration model explains its attractiveness through urbanization/localization economies.

3. Empirical model

To better understand the driving forces behind the hotel location decision, substantial research efforts have spurred a wealth of empirical models. In most studies, qualitative descriptions, choropleth mapping, and inequity indices were used to describe hotel location distribution and possible factors shaping the pattern (Bloomfield, 1996; Bull and Church, 1994; Dökmeci and Balta, 1999; Ferreira and Boshoff, 2013; Roehl and Van Doren, 1990; Rogerson, 2012b, 2013). Apart from these traditional empirical strategies, some more sophisticated empirical models have emerged to shed light on factors determining hotel location from observed datasets.

3.1. Spatial statistical model

Spatial statistics includes a set of statistical methods used to investigate the dependence and relationship of observations over space. In intra-metropolitan and intra-regional studies, by treating each hotel location as a single point, point pattern analysis, a well-established spatial statistical tool, can be used to understand the spatial distribution of these locations. Wall et al. (1985) applied a set of point pattern analysis tools to study the spatial distribution of accommodations in Toronto, Canada. Quadrat analysis and nearest neighbor analysis highlighted the clustered pattern of distribution, and standard deviational ellipses indicated the change in mean center, dispersion, and orientation of the distribution over periods. Broadway (1993) calculated the geographic mean centers of hotel distribution in Montreal, Canada over different periods, and highlighted a moderate shift of the center. Concerning other point pattern analysis tools, Sund (2006) employed the Lorenz curve to study the inequity of hotel distribution, and Yang and Fik (2011) utilized the *K*-function to study hotel clustering at multiple different distances.

In inter-regional hotel location studies, areal spatial statistical methods unveil spatial dependence of the hotel number/investment across different regions. Luo and Yang (forthcoming) applied exploratory spatial data analysis (ESDA) to analyze the number of star-rated hotels in 342 Chinese cities and identified major clusters in hotel distribution. In a spatial regression model of new hotel capacity by Helmers (2010), the spatial autoregressive coefficient was estimated to be positive and significant, indicating a spatial clustering of new hotel entrants.

3.2. Zoning regression model

The zoning regression model treats the measure of hotel intensity within a particular zone as the dependent variable and specifies it as a function of a set of explanatory variables. In this model, a natural candidate of dependent variable is the number of hotels or new entrants of each zone (Holl, 2004; Ingram and Inman, 1996). Other measures have also been used, such as the hotel entry rate (Freedman and Kosová, 2012), the density of new hotel entrants (Freedman and Kosová, 2012), the number of hotel rooms (Shu and Dai, 2002), and the new investment in hotels (Kundu and Contractor, 1999; Polyzos and Minetos, 2011; Zhang et al., 2012) in different zones. Helmers (2010) defined the zone via a spatial weighting matrix in the spatial regression model, which was limited to a zone covered by 15 nearby hotels. In most empirical zoning regression models, linear regression was used to fit the data. A more sophisticated econometric method is the count data model that treats the dependent variable (e.g. the number of hotel entrants) as a count number (Holl, 2004; Ingram and Inman, 1996).

Several shortcomings of zoning regression models are worthwhile to note. First, the individual characteristics of hotels cannot be fully considered in the model after zonal data aggregation (Arauzo-Carod et al., 2010). Moreover, the model sometimes suffers from endogenous aggregation, which arises when the data aggregation of each zone is not exogenous. This aggregation problem tends to render inconsistent estimates of econometric models and provide misleading implications.

3.3. Discrete choice model

The discrete choice model explains hotel location choice based on the economic principle of utility maximization. It suggests that when hotel investors are facing a spectrum of choices of different locations, they are going to pick the most desirable location to maximize its associated utility subject to certain constraints. The utility that the new hotel obtains from certain locations can be specified as a function of both hotel characteristics (such as star rating, hotel size, and hotel function) and site attributes (including accessibility, agglomeration, and environment) (Yang et al., 2012). Therefore, compared to the zoning regression model, the discrete choice model is able to account for individual hotel factors in a more comprehensive way. Yang et al. (2012) applied an ordered logit model by categorizing hotels to different ranks according to their proximities to city center. Kalnins and Chung (2004, 2006) used a conditional logit model to unveil hotel location factors because this model is able to incorporate a large number of location options covered in the dataset.

3.4. Simultaneous equation model

A simultaneous equation model (SEM) incorporates more than one dependent variable in the system of equations and consists of multiple equations with other controlling variables to capture the relationship among multiple dependent variables. Subsequently, it is a natural candidate to empirically validate the multi-dimensional model by specifying each dimension as a single equation. To alleviate the inherent endogeneity within the model, two-/three-stage least square methods are used to estimate the SEM and obtain reliable estimates of hotel location determinants (Baum and Haveman, 1997; Urtasun and Gutiérrez, 2006).

3.5. Individual evaluation model

To understand superior locations for new hotels, the individual evaluation model investigates hotel location factors from the evaluation of individuals, such as hotel investors and potential hotel guests. Through a survey of leading hotel chains, Johnson and Vanetti (2005) identified several location advantages of international hotel chains. The size and nature of the city were found to be the most important factor. They also found that executives from different regions hold different views toward the importance of various location advantages. Adam and Amuquandoh (2013a, 2013b) surveyed hotel owners in Ghana, and the results highlighted several location factors, such as economic, neighborhood, and physical site characteristics. On the other hand, Arbel and Pizam (1977), Tsaur and Tzeng (1996), and Lee et al. (2010) shed light on hotel location factors from the demand side and highlighted hotel location characteristics preferred by customers, such as access to transportation portals and tourist attractions. Two quantitative decision-making methods have been used to further understand individual evaluation of hotel location factors: the analytic hierarchy process (AHP) model (Beedasy and Whyatt, 1999; Newell and Seabrook, 2006) and the modified Delphi method (Juan and Lin, 2011; Lin and Juan, 2010).

3.6. Hotel success model

A desirable location is always associated with hotel success in terms of several performance measures. By investigating the factors that influence the performance of pre-existing hotels, one can identify and predict potential locations for new entrants. The hotel success model includes regression models used to identify location factors associated with a premium on hotel room rate (Enz et al., 2008; Lee and Jang, 2011; Shoval, 2006), a higher revenue per available room (Canina et al., 2005; Chung and Kalnins, 2001; Tsang and Yip, 2009), a higher profitability (Biemer and Kimes, 1991; Kimes and Fitzsimmons, 1990), and a lower hotel failure rate (Ingram and Baum, 1997). The choice of performance measure could be very important if the model aims specifically to obtain a hotel location decision rule. Kimes and Fitzsimmons (1990) found that the occupancy rate, the total revenue, or total profit are not appropriate in this situation. Instead, they defined a new profitability measure by adding depreciation and interest expenses to the total profit and dividing by the revenue.

4. Operational model

Compared to the numerous studies on theoretical and empirical hotel location models, few have been concerned with the operational model on hotel location selection. One possible reason is that most models only look into hotel location from certain perspectives and do not consider all possible location factors. As a result, these models lack applicability for operational uses. Even those models covering the comprehensive aspects of factors might be complicated and difficult to understand for practitioners. The operational hotel location model applies location decision rules to determine suitable locations for new entrants, and these rules can be obtained by theoretical and empirical models. Therefore, operational models transfer knowledge from "scholarly" models to knowledge with greater practical values to practitioners.

4.1. Checklist method

Checklist method refers to the systematical evaluation of possible locations based on pre-specified criteria in a checklist. Several checklists of hotel location can be found in Medlik (1966), Smith (1995), and Rushmore (2001). Lin and Juan (2010) presented a checklist for resort park locations in Taiwan. The major criticism of this method comes from its subjectivity and a lack of generality. The checklist is usually derived from opinions of experts without rigorous empirical validation and sometimes lacks transferability to consider localized factors in different environments.

4.2. Statistical prediction

The estimates of some statistical empirical models can be used as the decision rule to calculate the suitability of potential hotel location, such as the zoning regression model, the discrete choice model, and the hotel success model. For example, Biemer and Kimes (1991) proposed a refined hotel location prediction model using the three-step bootstrap procedure based on an empirical model of profitability. However, since some common pitfalls associated with statistical empirical models are likely to influence the robustness of results, a cross-/external validation should be conducted to test the prediction performance and avoid the over-fitting problem of estimates (Biemer and Kimes, 1991; Kimes and Fitzsimmons, 1990). Smith (1995) introduced residual analysis based on zoning regression models to evaluate the business potential of locations. The validity of residual analysis relies heavily on the correct specification of the prediction model, and any mis-specification would result in misleading implications. Finally, a noticeable advantage of statistical prediction lies in the confidence interval that the prediction model generates, which helps to understand the level of certainty associated with the prediction.

4.3. Geographic Information System (GIS)

GIS is defined as a computerized system used for the storage, retrieval, mapping, and analysis of geographic data. GIS provides a more efficient decision-making support system for selecting suitable sites of new hotels by incorporating spatial considerations. Oppermann and Brewer (1996) presented a conceptual framework of hotel location decision making by GIS, including data acquisition and data analysis stages. Joerger et al. (1999) provided a detailed example of utilizing GIS for hotel location selection. In their research, according to the requirements based on soil type, land use type, conservation status, road accessibility and coast accessibility, a stepwise diagnostic GIS approach was used to narrow down possible candidates and ultimately to select suitable sites for new hotels. Beedasy and Whyatt (1999) developed a spatial decision-support system to conduct weighted linear combination technique to obtain the suitability score of each possible hotel location. Crecente et al. (2012) utilized GIS to support location selection of thalassotherapy resorts based on five criteria.

There are still several other operational models facilitating hotel location decision making. Hobson (1994) demonstrated several location examples using "Feng Shui," a set of traditional Chinese philosophical and religious principles to analyze geographic locations. Aliouche and Schlentrich (2011) proposed an international

expansion assessment model to evaluate possible locations for hotel chain expansion. Moreover, other operational location models for general tourism facilities can also be used in hotel location evaluation, such as the LOCAT model (Moutinho and Curry, 1994) and the GIS-supported sustainable tourism infrastructure planning (STIP) framework (Boers and Cottrell, 2007).

5. Discussion

5.1. Findings of previous research

Table 1 summarizes the surveyed literature (after 1990) with respect to the scale of research, the research period, the theoretical, empirical, and operational models used, and location factors highlighted. In total, only 59 published articles that directly pertain to hotel location analysis were found. Compared to the voluminous literature on other topics in hospitality management, such as hedonic pricing modeling and hotel efficiency assessment, hotel location research has attracted only limited attention from scholars over the last two decades. More importantly, this research is highly scattered throughout a diverse mix of academic disciplines, leading to substantial heterogeneity in the methodologies utilized in hotel location research.

Regarding the research scale, 26 out of 54 papers are intra-metropolitan studies, suggesting that urban hotel location research dominates the current body of literature. The THC model was popular in the 1990s, while the agglomeration model of relative hotel location became a new area of study after 2000. The dominant use of qualitative and cartography empirical methodology has been changed in recent years, and several more sophisticated empirical models – the discrete choice model and the count data model, for example – have been added to hotel location analysis. Operational hotel location models, which are essentially paramount for practitioners, have been overlooked by the past literature. One trend, if any, in the use of operational models is the emergence of GIS analysis. Along with a wider range of available geo-coded data and higher computation power, GIS has been, and will continue to be, a promising tool to evaluate the appropriateness of hotel location alternatives. Regarding location factors unveiled in past studies, various market access and market potential measures have been consistently emphasized, such as access to CBD and beach, access to transportation portals, and local population and income.

5.2. Future research directions

5.2.1. Other location factors

Hotel location pattern is an outcome of local government policies adopted by hotel investors and urban planners. Under certain policy interventions and restrictions, only a limited number of alternatives are available for new hotel entrants. On the other hand, along with some policy supports, new hotels obtain extra benefits when choosing to locate themselves in particular areas. Therefore, the location decision-making process is not only a result of market forces, but is also entangled with other factors such as government policies. In the current body of hotel location literature, little is known about the impact of various government policies on hotel location. A closer examination of this area is necessary to provide a more comprehensive picture of hotel location choice. In addition, it is worthwhile to highlight other important hotel location factors that have long been overlooked, but merit in-depth investigation, such as cultural distance/affiliation of hotel investors, expected long-run risk associated with the alternative, and accessibility to different market segments. It is crucial for researchers to develop innovative models that can accommodate these factors in explaining hotel location choice.

5.2.2. GIS and spatial toolsets

Since hotel location data inherently incorporates geographic information, embracing GIS technologies provides additional efficiency in data storage, retrieval, analysis, and visualization. Therefore, working together with more sound theoretical and empirical models, GIS techniques hold the promise of further improving hotel location decisions. Moreover, due to the expansion of Internet and the availability of "big data," GIS location analysis enters a new phase of sophistication, and web-GIS, which integrates GIS with the internet, becomes greatly convenient for potential decision-makers. We recommend using the innovative spatial decision-making system, with an integration of various hotel location models with the web-GIS platform. It would produce high-quality and transferable outputs on hotel location selection. Therefore, research based on the spatial toolsets deserves further study.

For empirical models, some statistical/econometric tools of hotel location suffer because they overlook spatial dependence and spatial heterogeneity (Anselin, 1988). For example, in empirical regression models, spatial dependence highlights an interrelation between nearby hotel location outcomes, whereas spatial heterogeneity refers to a variation of regression coefficients over space, which result from the spatial variation of physical and social-economic factors. To account for these spatial issues, several advanced spatial tools can be utilized, such as spatial econometric models and geo-statistical models. All these spatial toolsets have the potential to provide a proliferated agenda for the future.

5.2.3. Agglomeration and competition studies

Past research has paid greater attention on the absolute location of hotels, while limited concern has been given to hotels' relative location. Researchers and practitioners do not have sufficient insight into the agglomeration process of hotels. The agglomeration effect can be partitioned into urbanization economies and localization economies. The former one refers to the economic benefits from the inter-sectoral clustering of diverse firms, while the latter points to the effects stemming from the firms within the same sector (Holl, 2004). The existing literature simply does not disentangle these two types of economies. Therefore, future research efforts will be required in this topic. Another area to examine is the field of imperfect competition. In general, we know little about how investors select hotel locations in the market structure of monopolistic competition, oligopoly, and monopoly. Imperfect competition and hotel location require careful analysis and in-depth investigation.

5.2.4. Location choice of chained/franchised hotels

Chained and franchised hotels are likely to utilize different location strategies from the ordinary ones, and their location choice requires additional considerations on the network construction of member hotels. In order to take full advantage of market penetration and avoid cannibalizing existing hotels within the chain, investors should consider that the location choice of a new property is contingent on the location and pattern of established ones. To the best of our knowledge, no known research has looked into this sequential location choice of chained/franchised hotels yet, and we advocate for future research on this topic to provide important insights into hotel chain expansion.

5.2.5. Sophisticated industrial and service location models

The movement toward interdisciplinary study with hybrid methodologies will continue in the near future. We need to pursue efforts to build and sustain interdisciplinary ties in the area of hotel location studies. Industrial and service location analysis is concerned with the spatial location of economic activities in a broader sense. Compared to the location models in other industries, such as

Table 1
The recent literature on hotel location analysis.

Studies	Scale, area and period	Theoretic model	Empirical model	Operational model	Location factors
Kimes and Fitzsimmons (1990)	Intra-regional, 1983 and 1986		HSM	SP	State population per inn, local median income, and nearby college students
Roehl and Van Doren (1990)	Inter-regional (USA), –1985		QC		Mobility and affluence
Biemer and Kimes (1991)	Inter-regional (market area of each inn), 1983–1986		HSM	SP	State population, median income, and room rate
Burtenshaw et al. (1991)	Intra-metropolitan (some European cities), 1960–1991	THC model	QC		Access to transport infrastructural, planning policies, and primary attractions
Broadway (1993)	Intra-metropolitan (Montreal, Canada)		SSM		Subway station, university campus, Olympics, Expo, and convention center
Bull and Church (1994)	Inter-regional (sub-regions in the UK), 1981–1989		QC		Local consumption, producer service, and tourist demand
De Bres (1994)	Intra-metropolitan (six Kansas towns, USA), 1992	Kansas tourism model	QC		Highways
Hobson (1994)	Intra-metropolitan (some Eastern Asian cities), 1994			"FengShui"	Location in relation to its environment such as roads, valley and sea
Timothy and Wall (1995)	Intra-metropolitan (Yogyakarta, Indonesia), 1994	THC model	QC		
Bloomfield (1996)	Intra-metropolitan (London, Canada), 1959–1995		QC		Massive motorization and traffic growth
Ingram and Inman (1996)	Inter-regional (around Niagara Falls), 1885–1991	AM	ZRM, HSM		Park development, hotel density and founding, hotel density, and founding of the competitor
Oppermann et al. (1996)	Intra-metropolitan (Kuala Lumpur, Malaysia), –1995	THC model	QC		
Oppermann et al. (1996)				GIS	Site, competition, and demand factors
Tsaur and Tzeng (1996)			IEM		Convenience of transportationand parking
Baum and Haveman (1997)	Intra-metropolitan (Manhattan, USA), 1898–1990	MDM	SEM		Price distance, size distance, downtown, hotel size, hotel price, GNP growth, population, and local hotel founding
Beedasy and Whyatt (1999)	Intra-regional (Mauritius)		IEM	GIS	Remoteness from existing tourist zones, proximity to roads, remoteness from urban, slope, and elevation
Dökmeci and Balta (1999)	Intra-metropolitan (Istanbul, Turkey), –1995		QC		CBD and coastal amenities
Joerger et al. (1999)	Intra-regional (northwestern Costa Rica)			GIS	Soil type, land use type, conservation status, road accessibility, and coast accessibility
Kundu and Contractor (1999)	Inter-regional (67 countries), 1988–1990		ZRM		GDP, ratio of exports to GDP, tourism receipts, and total inward FDI.
Bégin (2000)	Intra-metropolitan (Xiamen, China), 1949–1996	THC model	QC		Special economic zone and urban development
Egan and Nield (2000)	Intra-metropolitan (major cities in the UK)	MCM			Bid-rent curve
Chung and Kalnins (2001)	Intra-regional (Texas, USA), 1992	AM	HSM		Share of chained hotels and hotels with different sizes within the location
Shoval and Cohen-Hattab (2001)	Intra-metropolitan (Jerusalem, Israel), 1917–1999	THC model	QC		Political upheavals, social and cultural different between residents
Shu and Dai (2002)	(China), 1985–2004		ZRM		GDP, GDP per capita, inbound and domestic tourist arrivals, tourism revenue, foreign trade, and freight and passenger turnover
Holl (2004)	Inter-regional (Portugal), 1986–1997	AM	ZRM		Population, access to road, and sectoral diversity

Table 1 (*Continued*)

Studies	Scale, area and period	Theoretic model	Empirical model	Operational model	Location factors
Kalnins and Chung (2004)	Inter-regional (zip-code units in Texas, USA), 1992–2000	AM	DCM		Incumbent market share, hotel chain size, distance to headquarters and owner's nearest hotels, and population and income of zip code.
Kalnins (2004)	Intra-regional (Texas, USA), 1990–1999	AM	HSM		
Canina et al. (2005)	Intra-regional (USA), 2000	AM	HSM		Share of hotels with different sizes and strategies within the location
Johnson and Vanetti (2005)	Inter-regional, 2001	Eclectic Theory	IEM		Size and nature of the city, infrastructure within the region, and perception of the region
Egan et al. (2006)	Intra-metropolitan (Beijing, Shanghai, and Shenzhen, China)	MCM	QC		Hotel's bid-rent curve and agglomeration
Kalnins and Chung (2006)	Intra-regional (Texas, USA), 1990–1999	AM	DCM		Proximate unbranded Gujarati motels, same owner's proximate hotels and experience, distance to nearby hotels, local population, income and retail outlet growth, and local unbranded motel rooms
Newell and Seabrook (2006)			AHP		Volatility of demand, number of visitors, site attributes, age of target hotel, and current hotel supply
Shoval (2006)	Intra-metropolitan (Jerusalem, Israel), 1999	MCM	HSM		Hotel market source
Sund (2006)	Intra-regional (Switzerland), 1992–2002		SSM		City with affluent business and leisure tourism, access to international airports, and proximity to mountain resorts
Urtasun and Gutiérrez (2006)	Intra-metropolitan (Madrid, Spain), 1936–1998	MDM	SEM		Price distance, size distance, service distance, zoning, founding time, chain affiliation, and hotel category
Aliagaoglu and Ugur (2008)	Intra-metropolitan (Erzurum, Turkey), 1963–2002	Regional life model	QC		Bus stations and coffee houses
Enz et al. (2008)	Intra-regional (USA)	AM	HSM		Share of hotel with different strategies, cluster size, strategy dispersion, and size dispersion
Tsang and Yip (2009)	Intra-metropolitan (Beijing, China), 1998–2001	AM	HSM		Proximity to upscale joint venture hotels
Helmers (2010)	Intra-regional (within Texas, USA), 1997–2005	AM	HSM		Distance to large hotels, metropolitan location, ownership, luxury rating, local income, incumbent occupancy, and capacity
Lee et al. (2010)	Intra-metropolitan (Seoul, Korea), 2002		IEM		Safety, access to transportation portals, and connection to area attractions
Lin and Juan (2010)		Porter'sDiamond model	IEM	Checklist	Factor endowments, demand conditions, firm strategy structure and rivalry, related and supporting industries, government, and chance
Aliouche and Schlentrich (2011)	Inter-regional (different countries)			International expansion assessment model	Macro-/micro-environmental factors
Juan and Lin (2011)		Porter'sDiamond model	IEM		Factor endowment, demand endowment, firm strategy structure and rivalry, related and supporting industries, government, and chance
Lee and Jang (2011)	Intra-metropolitan (six cities in USA), 2008	MCM	HSM		Proximity to airport and CBD

Table 1 (*Continued*)

Studies	Scale, area and period	Theoretic model	Empirical model	Operational model	Location factors
Novak et al. (2011)	Inter-regional (Croatia), 1997–2007		Regression explaining hotels from different countries		Foreign direct investment, market interconnectedness, and tourist flows
Polyzos and Minetos (2011)	Inter-regional (prefectural level units in Greece), 1991–1998		ZRM		Natural coastal resource, transportation infrastructure, population, and policies
Yang and Fik (2011)	Intra-metropolitan (four cities in China), 2010	AM	SSM, ZRM		Agglomeration, access to subway stations, bus stations, and tourist attractions
Crecente et al. (2012)	Intra-regional (211 sites in Spain)		EVAMIX multi-criteria approach	GIS	Resources, facilities, legislation, containers, environmental quality, impacts
Freedman and Kosová (2012)	Inter-regional (counties in USA), 1993–2006	AM	ZRM		Incumbent market share, population, and employment
Rogerson (2012a)	Intra-metropolitan (three cities in South Africa), 1990–2010	THC model, MCM	QC		Beachfront locales
Rogerson (2012b)	Intra-regional (South Africa), 1990–2010		QC		Urban tourism nodes
Yang et al. (2012)	Intra-metropolitan (Beijing, China), –2004	MCM, AM	DCM		Star rating, opening years, service diversification, ownership, agglomeration effect, public service infrastructure, access to road, subway, and tourism sites
Zhang et al. (2012)	Inter-regional (provinces in China), 1990–2009		ZRM		Inbound tourist arrivals and spending, FDI, GDP per capita, policies, and mega events
Adam (2013)	Intra-metropolitan (Kumasi Metropolis, Ghana), 2010	MCM	QC		Bid-rent curve
Adam and Amuquandoh (2013a)	Intra-metropolitan (Kumasi Metropolis, Ghana), 2010		IEM and factor analysis		Economic, neighborhood characteristics, physical site characteristics, laws and regulations, social-cultural and transport factors
Adam and Amuquandoh (2013b)	Intra-metropolitan (Kumasi Metropolis, Ghana), 2010		IEM		Economic, neighborhood characteristics, physical site characteristics, laws and regulations, social-cultural and transport factors
Ferreira and Boshoff, 2013	Intra-metropolitan (Cape Town), 2007–2010	THC model	QC		CBD, seaboard, and accessibility
Rogerson (2013)	Intra-regional (South Africa), 1990–2010		QC		Market demand
Luo and Yang (forthcoming)	Inter-regional (cities in China), 2001–2010		SSM		GDP, foreign investment, and tourist arrivals

Research scale: Intra-metropolitan (26); Intra-regional (13); Inter-regional (14).
Theoretical model: THC model (7); MCM – Monocentric model (7); AM – Agglomeration model (13); MDM – Multi-dimensional model (2).
Empirical model: QC – Qualitative and cartography (17); SSM – Spatial statistical model (4); ZRM – Zoning regression model (8); DCM – Discrete choice model (3); SEM – Simultaneous equation model (2); IEM – Individual evaluation model (8); HSM – Hotel success model (11).
Operational model: Checklist (1); SP – Statistical prediction (2); GIS (4).

retail, manufacturing, and health care, we can identify significant gaps in both depth and width. To further improve current hotel location models, researchers can introduce more sophisticated ideas and insights from industrial and service location models, such as location allocation models, trade area analysis, models in new economic geography, and models in spatial industrial organization. However, it is worthwhile to note that some refinements might be necessary when applying these models outside the hotel industry. This limitation is due to the fact that hotels are serving a major market consisting of travelers rather than local residents. In summary, integrating advances from industrial and service location models present substantial opportunities for additional hotel location research.

6. Conclusion

This review paper presents an important first attempt to understand the current body of hotel location literature and to identify the advantages and disadvantages of various hotel location models. We divided all hotel location models into three categories: theoretical, empirical, and operational. Furthermore, we discussed different model sub-categories within each of these three models. Future research directions are also identified based on this review. We advocate future studies on some neglected but crucial location factors, further research of the agglomeration process in hotel location, and the development of more sophisticated spatial models and decision-making systems to take advantage of an abundance of available geo-coded data. We wish that this systematic review of hotel location literature will provide researchers useful information for further development of hotel location models, and, more importantly, offer practitioners a list of methods to help them in choosing desirable locations.

Nevertheless, it is paramount to concern the limitation of various models. Before embarking on practical hotel location selection projects, one should keep in mind that all location models are not a panacea, and they cannot substitute for intelligent decision making. Managerial insights and judgments are of great importance in interpreting the results of various location models and translate it to meaningful and refined location strategies (Ghosh and McLafferty, 1987). Moreover, since no single model or method is consistently superior in all situations, we recommend the application of multiple methods and robustness check of their results to handle location projects, especially those with extraordinary complexities.

Although all efforts have been made to assemble an exhaustive list of previous hotel location literature, it is possible that some papers may have been missed due to a segmented body of hotel location literature across different disciplines. Moreover, we did not cover some papers investigating hotel location factors with indirect methods. For example, although we reviewed the hotel success model that identifies location factors contributing to better hotel performances, other studies on hotel pricing models and hotel efficiency models can incorporate some location measures as well, albeit in a trivial way.

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