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Optimal Distinctiveness of Short-Term Rental Property Design

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Abstract

The short-term rental market remains highly competitive, requiring that hosts should identify effective strategies to position their products for desirable performance. This study investigates the optimal balance beyond dyadic choice between differentiating from or conforming to competitors, in the dimensions of properties' functional and aesthetic design. We hypothesize U-shaped distinctiveness-performance relationships considering high legitimacy pressure and low strategy effectiveness in the short-term rental context. Moreover, the moderating effects of factors including online review volume and listing age are examined. Analyzing a sample of 99,757 Airbnb listings in Texas, the findings reveal different patterns of product positioning between functionality and aesthetics. The moderate degree of distinctiveness in functionalities leads to the worst performance while in aesthetics generating the best outcome. This study contributes to the hospitality literature by introducing and testing optimal distinctiveness within the short-term rental market. The findings also provide positioning guidance for short-term rental listings under different conditions.

Keywords

Short-term rental; Differentiation; Optimal distinctiveness; Functional design; Aesthetic design; Machine learning

1. Introduction

The emergence and growth of short-term rental platforms provides great opportunities for individuals and lodging service providers to lease their properties to travellers. By 2023, Airbnb, the most popular short-term rental platform, has attracted over 4 million hosts offering around 7 million listings globally (Airbnb, 2022). This notable amount of supply not only showcases its prosperity but also reflects the competitiveness of this market. Under such intense competition, product strategic positioning becomes a critical factor, which can decide the economic performance of short-term rental listings (Taeuscher, Zhao, & Lounsbury, 2022; H. Zhang, Zach, & Xiang, 2024).

Positioning entails the decisions of being different from or similar to competitors, composing two dichotomous notions of differentiation and conformity (Deephouse, 1999). Positioning and its outcomes, such as firm survival and financial performance, have been extensively studied in multiple domains, including marketing, management, and hospitality (Baum & Haveman, 1997; Deephouse, 1999; M. Kim, Roehl, & Lee, 2020). In the hospitality context, multiple dimensions of positioning have been examined, such as price, location, and design (Baum & Haveman, 1997; H. Zhang et al., 2024). This study focuses on the arrangement of short-term rental product attributes, specifically functionalities (e.g., Wi-Fi and coffeemaker) and aesthetics (e.g., color patterns and texture). Investigating product positioning in functional and aesthetic design for short-term rentals is crucial for two reasons. First, design elements largely influence customer perceptions and attitudes toward short-term rental offerings (H. Zhang, Zach, & Xiang, 2023). Second, unlike hotels, which can refer to

multiple star rating systems when designing their properties, there are no established or widely recognized benchmark systems for guiding short-term rental products. Therefore, decisions regarding functionalities and aesthetics are very challenging for short-term rental hosts.

There is an ongoing debate on positioning among scholars in both the hospitality field and broader business domains. That is because two major theoretical streams in strategic management, along with empirical evidence, equally support both of the contradictory directions of positioning: differentiation and conformity. Differentiation refers to providing products or services that are different from others (Baum & Haveman, 1997). Competitive strategists argue that being different creates competitive advantages by avoiding intense competition and building valuable and rare resources (Porter, 1980). For example, unique amenities, such as gaming consoles, attract specific customers that willing to pay a price premium. The benefits of differentiation have been verified by multiple studies in the hospitality context (e.g., Baum & Haveman, 1997; Sánchez-Pérez, Illescas-Manzano, & Martínez-Puertas, 2020).

On the other hand, conformity refers to aligning the product with the norms and standards of the external environment (Suddaby, Bitektine, & Haack, 2017). Institutional theorists argue that firms should conform to peers to acquire legitimacy, denoting acceptance by key audiences, which can mitigate risks and enhance access to resources (DiMaggio & Powell, 1983; Suddaby et al., 2017). For instance, listings that adopt styles already popular among competitors cater to established market preference, thereby increasing their likelihood of being booked. Indeed, extant studies have shown that conformity is beneficial for hospitality businesses (e.g., M. Kim et al., 2020).

However, the benefits of these two opposing strategies pose a challenge for scholars and practitioners alike. The co-existing incentives for differentiation and conformity drive scholars and practitioners to explore positions beyond the two dyadic ends, either being very different or fully aligning with competitors. This exploration is known as “optimal distinctiveness”, referring to a specific degree of distinctiveness that allows firms to achieve the best performance (Zhao, Fisher, Lounsbury, & Miller, 2017). Several studies aim to identify the sweet spot in-between, meaning a product has some attributes that differentiate it from competing products in a noticeable but not an extreme way. While Deephouse (1999) argues that a moderate degree of distinctiveness (inverse U-shaped relationship) is most beneficial, others argue that a middle ground represents the worst outcome due to simultaneous disadvantages (U-shaped relationship) (van Angeren, Vroom, McCann, Podoynitsyna, & Langerak, 2022; Zhao et al., 2017). In the latter case, a position closer to the end points is preferred.

The curvilinear relationships suggest that a more nuanced understanding of strategic positioning is necessary. This is crucial for hospitality businesses, where products are highly heterogeneous (Arbelo, Arbelo-Pérez, & Pérez-Gómez, 2021). While hotels benefit from star categories and take advantage of easily designing all rooms within the same building in a similar way, short-term rental properties face even more heterogeneity due to a lack of standards. However, with the exception of an analysis of property descriptions (Taeuscher et al., 2022a), scholars have not investigated the optimal positioning of short-term rental properties. As such, this study aims to understand how leveraging property elements, such as functionalities and aesthetics, can contribute to business success. This is particularly

relevant for short-term rental operators as changing property design is more costly than updating property descriptions. This leads to our first research question: How do product distinctiveness strategies for functionalities and aesthetics affect property success?

The dynamic relationship between distinctiveness and performance is contingent on factors related to firm legitimacy conditions and the quality of strategic decisions (van Angeren et al., 2022; Zhao, Ishihara, Jennings, & Lounsbury, 2018). In the short-term rental sector, guests' acceptance of listings, denoted as legitimacy, hinges on online reputation signals, such as review volume (Ye, Liang, Wei, & Law, 2023). Listings with a high volume of online reviews are perceived as more credible and acceptable, thus relieving demands for legitimacy stemming from conformity and influencing the distinctiveness-performance relationship. Furthermore, the impacts of distinctiveness depend on the ability of short-term rental hosts to make effective choices to achieve differentiation, such as identifying unique features that appeal to niche markets. Most hosts are micro-entrepreneurs that manage one property (T. Zhang, Bufquin, & Lu, 2019). Due to a lack of professional training or knowledge sharing systems, these hosts accumulate experience and knowledge over time when managing their property (Huang & Chen, 2021). The introduction of online review volume and listing age as moderators allows us to answer our second research question: How does the strategic position change under different listing conditions in the short-term rental context?

To answer our research questions, we conducted a panel analysis based on a dataset of 99,757 properties in Texas listed on Airbnb between April 2021 and March 2022. Distinctiveness is operationalized by the absolute difference between a focal property and the market average in functional and aesthetic design. Functional design is measured by the breadth and depth of amenities. Meanwhile, aesthetic design is quantified by design style scores predicted by a pre-trained deep learning model using the listing cover photos as input. We then regress listing RevPAR against degrees of distinctiveness and the two conditional factors as moderating variables.

This study contributes to the field both theoretically and managerially. From the theoretical perspective, it adds knowledge to hospitality management literature by exploring product positioning strategy through an optimal distinctiveness lens, within a heterogeneous market operated by micro-entrepreneurs. From the managerial perspective, this paper provides short-term rental hosts with operational guidance on design strategy.

2. Literature Review and Hypotheses

2.1 Product positioning: differentiation vs. conformity

In the business domain, product positioning, which pertains to the specific niche a product occupies within the marketplace, is vital to product success and firm economic performance (Zhao et al., 2017). This spectrum of positioning strategies encompasses two distinct choices: differentiation, which is defined as infusing a product with unique attributes to set it apart from its competitors, and conformity, which entails aligning a product with competitors' offerings by preserving consistency across numerous dimensions (Deephouse, 1999). In other words, a product can be positioned close to, or far from, competing offers.

A positioning dilemma arises as differentiation and conformity represent two facets of the same strategic construct, each offering its own set of advantages. Despite their apparent contradictions, both strategies have the potential to yield substantial benefits grounded in two fundamental theories in management literature. According to the theory of generic strategies proposed by Porter (1980), a firm can attain competitive advantages by differentiating products from competitors, allowing it to attract specific customers and stave off intense rivalry (Sharp & Dawes, 2001). On the other hand, the benefits of conformity are rooted in the need for products to acquire legitimacy. Legitimacy entails a generalized perception that an entity is desirable, proper, or appropriate (Suchman, 1995). Institutional theories posit that legitimacy diminishes the risk of scrutiny and fosters product discovery and acceptance (DiMaggio & Powell, 1983; Suddaby et al., 2017). Conforming to competitors serves as an effective means to enhance firm performance by enabling firms, like a ski resort, to establish legitimacy and avoid penalties associated with deviating from existing norms (Zach, Schnitzer, & Falk, 2021).

The question of whether firms should offer products that are different from, or similar to, their competitors persist as a contentious and extensively discussed topic within various business domains, including the hospitality industry. Considering the simultaneous existence of benefits stemming from differentiation and conformity, previous hospitality studies have sought to identify whether differentiation or conformity predominates under varying conditions. Empirical evidence has emerged supporting both perspectives, thereby contributing to the ongoing debate. For example, Baum and Mezias (1992) concluded that differentiation towards local competitors reduces a hotel's failure rate. Differentiation has also been verified to assist hotels and short-term rental properties to charge higher prices and achieve a better financial performance (Sánchez-Pérez et al., 2020; Voltes-Dorta & Inchausti-Sintes, 2021). Contrarily, M. Kim et al. (2020) and Yeung and Lau (2005) found that it is more profitable for a hotel to conform to other hotels in the same market.

In the extant literature exploring differentiation and conformity, various product dimensions have been investigated, encompassing attributes such as property size, geographic location, vertical segment, functionalities, and aesthetics (e.g., M. Kim et al., 2020; Lim & Endean, 2009). The present study narrows its focus to two design dimensions, specifically functionalities and aesthetics, for two primary reasons. First, functional and aesthetic design dimensions can be modified by hosts throughout the product lifecycle. Second, these dimensions play a pivotal role in influencing guest decision-making processes and deciding host strategic outcomes (Lim & Endean, 2009; H. Zhang et al., 2023). We argue that the benefits of differentiation and conformity in these two dimensions are applicable to short-term rentals.

In the short-term rental context, employing a differentiation strategy can facilitate properties in attracting specific guests by offering unique elements such as home-like amenities or distinct color patterns (Suess, Kang, Dogru, & Mody, 2020). Moreover, the implementation of unique functional or aesthetic features can shield short-term rental properties from acute competition (Voltes-Dorta & Inchausti-Sintes, 2021). On the other hand, alignment or conforming with competitor standards can significantly bolster the performance of short-term rentals through legitimacy. Xie and Young (2021) offer an example of this, noting that performance enhancements can be achieved by listings that

mimic their substitute competitors, such as hotels. Similarly, the legitimacy gained from conforming to same-sector rivals creates positive outcomes. Boto-Garcia, Mayor, and De la Vega (2021) provide indirect evidence of conformity benefits: they discovered that mimicking prices within the same neighborhood leads to an increase in the area's price premium.

These contradictory arguments and findings concerning the effects of product positioning indicate that the complex tradeoff between differentiation and conformity cannot be adequately addressed through a simplified dyadic choice between the two. More nuanced investigations are required to assess the relative potency of differentiation and conformity strategies under varying degrees of product distinctiveness. Accordingly, the objective of this research is to discern the strategic outcomes engendered by dynamic levels of distinctiveness.

2.2 Optimal distinctiveness

Two well-established streams of strategic management literature, centered on differentiation and conformity respectively, converge on the concept of optimal distinctiveness. Optimal distinctiveness is defined as the degree of distinctiveness that allows firms to maximize strategic outcomes considering the simultaneous demands for competitive advantages and legitimacy (Zhao et al., 2017). Early scholars argued that a moderate degree of distinctiveness should generate the best performance because it enables firms to enjoy both legitimacy and competitive advantages (Deephouse, 1999). Previous studies empirically validated this argument with the inverted U-shaped relationship between distinctiveness and economic performance (Miller, Amore, Le Breton-Miller, Minichilli, & Quarato, 2018).

However, recent studies challenge this perspective and argue that a moderate degree of distinctiveness is not the sweet spot. Instead, it yields the least performance because of the simultaneous disadvantages of differentiation and conformity (e.g., Zhao et al., 2018). More specifically, products that have only some attributes similar to others are not sufficiently aligned with conventional expectations to appeal to those seeking familiarity and comfort. At the same time, they do not stand out enough to attract guests looking for a unique experience. This middle ground, therefore, becomes a zone of inferior performance where properties are not standard enough to be considered reliably consistent, yet not distinct enough to be memorable (Su, Gao, & Tan, 2024). In this case, firms are suggested to pursue either extreme conformity or differentiation rather than being stuck in the unwanted middle. These studies further identified when and why the effect of distinctiveness flipped from a traditional inverted U-shaped curve to this new pattern, resulting in two main factors: the demand for legitimacy and the difficulty of making strategies (Taeuscher & Rothe, 2021).

First, for firms facing high legitimacy demands, deviating from the majority initially undermines their performance, and this negative effect intensifies with the degree of distinctiveness. However, once reaching the bottom, performance begins to recover due to the advantages of high-degree differentiation, which attracts customers seeking such uniqueness. For example, Taeuscher and Rothe (2021) identified such patterns for free mobile apps, which have high demands for legitimacy due to customers' concerns about product quality and security. This applies to the short-term rental sector

as well, where guests also perceive a high degree of uncertainty and worry about listing quality and other risks in private accommodation places (Wu, Ma, & Xie, 2017; Yi, Yuan, & Yoo, 2020). In addition, short-term rental hosts lack resources to obtain legitimacy through means normally applied by hotels, like branding or adhering to existing star rating systems (Bianco, Bernard, & Singal, 2023). Thus, conforming to competitors is a critical legitimizing approach for short-term rental hosts (Xie & Young, 2021).

Second, firms that find it increasingly difficult to make effective strategies, such as identifying the attributes that are unique and favored by specific customers, experience a reduced return for their efforts to attract new customers using differentiation. For example, a firm may differentiate part of the design attributes and keep other elements unchanged. If the differentiated part cannot attract customers as expected, the firm still needs to compete with original rivals while, at the same time, deviating from the majority will erode legitimacy. Therefore, the performance of firms that lack the ability to differentiate meaningfully will decrease with the degree of distinctiveness (Durand & Haans, 2022). However, performance will ultimately improve when the products are unique enough. Indeed, Zhao et al. (2018) found that firm performance first declines and then grows in an emerging market, where it is difficult to develop effective differentiation decisions because there are fewer clear prototypes as successful benchmarks. It is possible to identify similar patterns in the short-term rental context because most short-term rental listings are operated by micro-entrepreneurs with limited managerial experience and capability (T. Zhang et al., 2019). It is difficult for them to develop effective strategies such successful differentiation. Therefore, in the short-term rental context which is characterized by high legitimacy demands combined with a lack of strategic effectiveness, U-shaped relationships between distinctiveness and performance are expected, as suggested by the following hypotheses:

Hypothesis 1a: The relationship between functional distinctiveness and performance is U-shaped in the short-term rental context.

Hypothesis 1b: The relationship between aesthetic distinctiveness and performance is U-shaped in the short-term rental context.

2.3 The moderating role of online review volume

Two moderators, online review volume and listing age, are tested in this study. The reason for including two moderators is two-fold. First, these moderators are connected with legitimacy condition and effectiveness of strategies accordingly, which are major factors that studied in previous studies in other contexts concerning the topic of distinctiveness (e.g., Taeuscher & Rothe, 2021). Second, listing age and popularity are important conditions to consider during strategy-making process in the short-term rental context (Casamatta, Giannoni, Brunstein, & Jouve, 2022; Yao, Qiu, Fan, Liu, & Buhalis, 2019)

An online review system is an effective means to reduce information asymmetry (Manes & Tchetchik, 2018) in the tourism industry. Tourism products, especially accommodation offerings, are intangible because they cannot be experienced before the actual visit (Bennett & Strydom, 2001). Hence, a major challenge for accommodation service providers is to reduce customer uncertainty and build trust

before consumption. Online reviews are posted by customers who have consumed a specific product, they serve as a reliable quality signal (Shin & Xiang, 2020). Because of this important role, multiple aspects of online reviews, like rating, volume, and textual content, have been studied to identify their effects on customer mental and physical behaviors (Xiang, Du, Ma, & Fan, 2017).

Short-term rental properties' legitimacy pressure is rooted in the customers' concerns about property quality and possible risks (Wu et al., 2017; Yi et al., 2020). Previous organizational studies based on social judgment theory suggest that product reputation can alleviate firms' demands for legitimacy (e.g., Bitektine, 2011). This can be achieved by mitigating customer concerns, reducing perceived uncertainty, and boosting customer preferences. In the context of Airbnb, L. Zhang, Yan, and Zhang (2018) identified that online review volume plays the most stable and important role in affecting perceived trust in different models. Gavilan, Avello, and Martinez-Navarro (2018) conclude that consumers' preference for a hotel increases with the number of reviews, regardless of the average rating. Moreover, Yao et al. (2019) conclude that, under a low review volume, Airbnb listings tend to rely heavily on other signaling factors to reduce perceived uncertainty and enhance customer confidence.

Online review volume can be a strong indicator of a property's credibility and popularity, helping to alleviate customers' uncertainty and perceived risk, thereby reducing the property's reliance on conformity for legitimacy and customer acceptance. Given a high volume of reviews, a listing will face less severe penalties associated with norm violations, thus experiencing a milder decline in performance. As a result, the U-shaped relationship is flatter than the condition of low review volume. Hence, we hypothesize that:

Hypothesis 2a: The U-shaped relationship between functional distinctiveness and performance is flatter for listings with a high review volume.

Hypothesis 2b: The U-shaped relationship between aesthetic distinctiveness and performance is flatter for listings with a high review volume.

2.4 The moderating role of listing age

Previous studies suggest that the impacts of optimal distinctiveness are associated with firm life cycles and organizational knowledge (Zhao et al., 2017). The relationship between distinctiveness and performance is associated with firms' different needs for legitimacy and capabilities of differentiating at different stages of their life cycles (Durand & Haans, 2022).

When operating a new listing, hosts are more likely to make less effective differentiation strategies because they lack knowledge about the listing and its rivals. According to organizational learning theory, the knowledge gained from operations increases over time as operators manage the enterprise (Levitt & March, 1988). Knowledge obtained through differentiating attempts enlarges mature firms' probabilities of meeting audience expectations of specific product features (McKnight & Zietsma, 2018). Firms with more differentiation experiences will be more capable of capturing

market demand and develop more effective differentiation strategies (Durand & Coeurderoy, 2001). When the differentiation operations are more accurate, a slight deviation from the market norm will sharply reduce the competition intensity faced by the focal listing. Here, a light deviation means having only a few attributes (e.g., the inclusion of few modern style decorations or only game console) that differ from those of peers. The benefits from competition avoidance will offset legitimacy discounts. This means that performance will drop less heavily before it starts to recover. Thus, we have a flatter U-shaped net benefit line. Therefore, we propose the following hypotheses:

Hypothesis 3a: The U-shaped relationship between functional distinctiveness and performance is flatter for mature listings.

Hypothesis 3b: The U-shaped relationship between aesthetic distinctiveness and performance is flatter for mature listings.

3. Methodology

3.1 Data

We test our hypotheses in the Texas short-term rental market. The data is obtained from AirDNA, a vendor of Airbnb listing performance data. Our sample includes Airbnb properties operated in Texas from April 2021 to March 2022. There are four types of listings available on the Airbnb platform: entire home/apartment, private room, shared room, and hotel room. We collect monthly observations on entire home/apartment listings. After excluding listings with missing data, a sample of 829,288 listing-month observations associated 99,757 listings is kept. Then, we apply a longitudinal test to identify how design distinctiveness affects listing performance in different conditions.

3.2 Variables

3.2.1 Dependent variable

Following previous studies concerning Airbnb performance (e.g., Kwok & Xie, 2019), we use Revenue Per Available Room (***RevPAR***) as the dependent variable.

3.2.2 Independent and moderating variables

First, to measure a listing's distinctiveness degree, we need to decide to whom the focal property is compared. Based on spatial dependence theory, we assume that neighboring properties are more impactful than distant ones (Legendre & Legendre, 1998). There are several methods to decide on neighboring areas in the accommodation context. One popular approach is to use properties in the same zip code as the focal property's neighbors (Tsang & Yip, 2009).

We follow the centroid-based method to measure distinctiveness by comparing one property to the average of all properties in the same zip code area (Deephouse, 1996; Yeung & Lau, 2005). Functional design refers to the utilitarian elements of a product (Bloch, 1995) and, in our case, includes a list of

amenities such as Wi-Fi, etc. Each listing lists a set of amenities that the property offers. We calculate ***functional design distinctiveness*** by the following equation:

$$Functional\ design\ distinctiveness = \sum_{i=1}^{N} abs\left(A_{i,j,t} - \bar{A}_{i,t}\right)/N$$

Here, $A_{i,j,t}$ represents whether amenity i is supplied by property j at time t. If it is supplied, this value equals 1, otherwise 0. $\bar{A}_{i,t}$ is the average score of amenity i from all properties at time t. N denotes the number of amenities appearing in the whole dataset. In this study, $N = 159$, which means 159 different amenities are included.

Aesthetic design distinctiveness is measured by analyzing the listing cover photos, a key communication tool employed by hosts to convey the aesthetic design styles of their properties (H. Zhang et al., 2023). To quantify the aesthetic styles of each property, we utilize a pre-trained machine learning model, specifically the VGG-16 (Simonyan & Zisserman, 2014). This model is a derivative of the Convolutional Neural Network (CNN), a proficient algorithm noted for its ability to detect visual features, such as colors, edges, textures, and shapes (Ma, Xiang, Du, & Fan, 2018). Following J. Kim and Lee (2020), we first train the model with Place365, a comprehensive scene recognition dataset encompassing 10 million place images (Zhou, Lapedriza, Khosla, Oliva, & Torralba, 2017). More detailed information on model layer construction and parameter setting can be found in Simonyan and Zisserman (2014) and J. Kim and Lee (2020). Subsequently, the model is fine-tuned through a classification task involving 800 images, which are collected through Google Image API. This is a common way to build training sets used by previous studies (Alexandersson & Kalonaityte, 2018). These 800 images are labeled with four design styles: casual, classic, modern, and natural. Figure 1 provides a visual depiction of the conceptual structure underpinning this aesthetic design style recognition model (J. Kim & Lee, 2020).

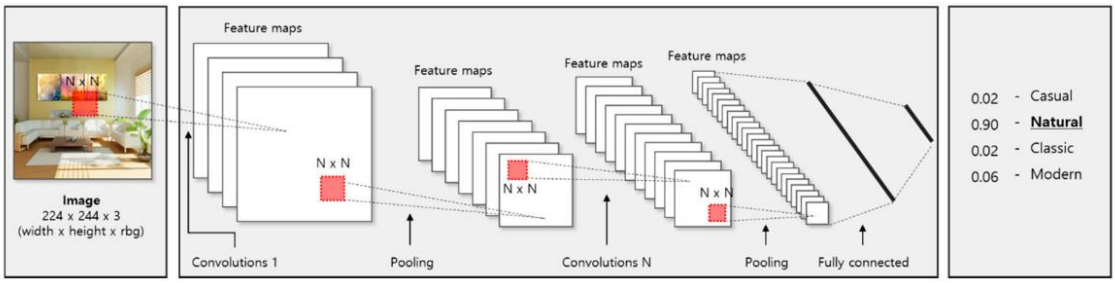

Figure 1. Conceptual structure of aesthetic design style recognition model

Similar to the findings reported by J. Kim and Lee (2020), the pre-trained model demonstrates a high level of accuracy in the prediction of aesthetic design style, ranging between 94% and 98%. Notably, this accuracy is commensurate with human performance, which averages around 95%. Then, the pre-trained deep learning model takes listing cover photos as input and generates a probabilistic distribution over four design styles: casual, classic, modern, and natural. This distribution represents each listing's aesthetic design style composition. Each numerical score within the distribution indicates the probability that the listing is representative of the corresponding style, with the cumulative total of the four dimensions amounting to 1. In instances where the score of a particular style is extremely

high, it indicates that the aesthetic design of the listing is dominated by that style. Conversely, probability scores across the four styles that demonstrate a similar magnitude suggest that the aesthetic design of the listing exhibits a balance among these styles. Figure 2 presents four examples of the model-predicted design style distributions. The distribution of probability scores for each design style can be found in Appendix 1.

Figure 2. Examples of the predicted probabilistic distribution of aesthetic design style scores

Following this, aesthetic design distinctiveness is computed as per the ensuing formula:

$$Aesthetic\ design\ distinctiveness = \sum_{i=1}^{S} abs(P_{i,j,t} - \bar{P}_{i,t})/S$$

In this equation, $P_{i,j,t}$ represents the predicted score of style i in property j at time t. It ranges from 0 to 1. $\bar{P}_{i,t}$ is the average score of style i from all neighboring properties at time t. S denotes the number of styles, four in this case.

We also test the moderating effect of ***listing popularity*** and ***listing age***. Listing popularity is represented by the number of guest reviews per month. Listing age is measured by days since a listing was created.

3.2.3 Control variables

To enhance the validity of our study, we control for host and listing characteristics and location attributes which have been identified to have significant impacts on Airbnb property performance (Deboosere, Kerrigan, Wachsmuth, & El-Geneidy, 2019; Kwok & Xie, 2019; Leoni, 2020). Host characteristics include superhost, business size, response time, and response rate. In terms of property characteristics, we consider maximum number of guests, minimum stay, instant bookability, cancellation policy, and number of photos. To identify the effects caused by differentiation strategy instead of location features, we control for kilometer distance to the nearest airport, city center, transit stop, and beach. They are measured by Euclidean distances from a rental property to points of interest, whose geographic information is available from the Texas Department of Transportation (Chica-Olmo, González-Morales, & Zafra-Gómez, 2020). The number of competitors in the same area and county dummies is also included (Voltes-Dorta & Sánchez-Medina, 2020). Detailed information on the involves variables is displayed in Table 1.

Table 1. Variable Description

Category	Variable	Description
Dependent Variable	RevPAR	Revenue per available room
Independent variables	Functional Design Distinctiveness	The degree to which a property's amenities are different from its neighbors
	Aesthetic Design Distinctiveness	The degree to which a property's aesthetic design style is different from its neighbors
Moderators	Reviews per month	Number of guest reviews per month received by a listing
	Listing age	Days since the listing was created
Control variables	Max guests	The maximum number of guests a listing can accommodate
	No. of photos	Number of photos displayed on a listing homepage
	Instant bookability	Whether the listings can be booked instantly (Instant bookable =1, otherwise 0)
	Minimum stay	Minimum night stay required by the host
	Cancelation	Cancellation policy for the listing (flexible, moderate, strict, firm strict, super strict)
	Superhost	Whether a host has a Superhost badge (superhost = 1, otherwise 0)
	Business size	Number of listings managed by the same host
	Host response rate	The rate of new inquiries and reservation requests a host responded to
	Host response time	Speed of response to guests' inquiries (within an hour, within a few hours, within a day, a few days or more)
	Nearest transit stop	Distance from the property to the nearest transit stop
	Nearest city center	Distance from the property to the nearest city center
	Nearest airport	Distance from the property to the nearest airport
	Nearest beach	Distance from the property to the nearest beach
	No. of competitors	Total number of properties in the same zip code
	Urban	Urban or rural area where a property is located (urban=1, rural = 0)

3.3 Model specification

For panel data analysis, we apply the time-fixed effect model, which allows us to eliminate bias from unobserved items that change over time but are constant over entities. In the hospitality context, the time-fixed effects are often included for seasonality considerations. A series of models are estimated, starting with a baseline model of control variables. We then gradually include design distinctiveness variables, their quadratic terms, and interaction with moderators. The quadratic terms indicate curvilinear relationships between design distinctiveness and listing performance. Meanwhile, interaction terms suggest moderation effects.

4. Results and Discussion

Tables 2 and 3 display descriptive statistics and correlations for our regression sample, respectively. The correlation table shows that the two design distinctiveness variables are not highly correlated with another variable.

Table 2. Summary Statistics

	Mean	Std. Dev.	Min	Max
RevPAR	728.80	1240.01	0	33283.33
Functional Design Distinctiveness	0.11	0.03	0	0.27
Aesthetic Design Distinctiveness	0.23	0.07	0	0.47
Reviews per month	1.18	1.91	0	183
Listing age	728.42	663.84	1	4990
Max guests	5.59	3.17	1	16
No. of photos	22.21	14.99	0	507
Instant bookability	0.63	0.48	0	1
Minimum stay	9.82	23.84	1	1124
Cancelation – super strict	0.05	0.21	0	1
Cancelation – firm strict	0.44	0.50	0	1
Cancelation – strict	0.03	0.18	0	1
Cancelation – moderate	0.23	0.42	0	1
Cancelation – flexible	0.24	0.43	0	1
Superhost	0.16	0.37	0	1
Business size	406.11	998.19	1	4155
Host response rate	0.95	0.17	0	1
Host response time – within an hour	0.78	0.41	0	1
Host response time – within a few hours	0.09	0.28	0	1
Host response time – within a day	0.05	0.22	0	1
Host response time – a few days or more	0.03	0.17	0	1
Nearest transit stop	43.74	68.46	0	446.12
Nearest city center	5.59	4.33	0.02	66.32
Nearest airport	31.80	35.80	0.68	375.36
Nearest beach	224.73	218.70	0	1157.14
No. of competitors	725.66	797.92	2	3013

Following previous studies, a log transformation is applied to RevPAR to avoid a regression assumption violation caused by skewness (Dogru et al., 2020). To avoid multicollinearity in estimating quadratic and interaction effects, we standardize all continuous variables for further regression analysis. The interpretation of coefficients will be that when a predicting factor increases by one standard deviation, the RevPAR changes in percentage accordingly. Regression results are shown in Table 4. We also provide a summary of each hypothesis, its acceptance/rejection status, and references to corresponding figures in Table 5.

Model 1 constitutes the baseline model, where we find the anticipated results for most control variables. We find that number of max guests, number of photos, superhost, host response rate, distance to nearest transit stop, and distance to nearest positively affects RevPAR while instant bookability, minimum stay, business size, distance to nearest city center, and distance to nearest beach show negative impacts.

Table 3. Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. RevPAR	1.00																
2. Functional Design Distinctiveness	0.156 ***	1.00															
3. Aesthetic Design Distinctiveness	0.013 ***	0.162 ***	1.00														
4. Reviews per month	0.347 ***	0.196 ***	0.036 ***	1.00													
5. Listing age	0.013 ***	-0.024 ***	0.079 ***	0.011 ***	1.00												
6. Max guests	0.139 ***	0.156 ***	0.031 ***	0.085 ***	0.068 ***	1.00											
7. No. of photos	0.245 ***	0.215 ***	0.047 ***	0.193 ***	0.079 ***	0.410 ***	1.00										
8. Instant bookability	0.020 ***	-0.162 ***	-0.084 ***	0.006 ***	-0.207 ***	-0.023 ***	-0.023 ***	1.00									
9. Minimum stay	-0.183 ***	-0.269 ***	-0.112 ***	-0.196 ***	-0.121 ***	-0.154 ***	-0.172 ***	0.106 ***	1.00								
10. Superhost	0.049 ***	-0.004 ***	0.005 ***	0.116 ***	0.092 ***	-0.015 ***	0.045 ***	-0.048 ***	0.037 ***	1.00							
11. Business size	-0.219 ***	-0.438 ***	-0.207 ***	-0.244 ***	-0.266 ***	-0.203 ***	-0.277 ***	0.281 ***	0.478 ***	0.062 ***	1.00						
12. Host response rate	0.102 ***	0.013 ***	-0.047 ***	0.122 ***	-0.108 ***	0.011 ***	0.108 ***	0.095 ***	0.042 ***	0.100 ***	0.091 ***	1.00					
13. Nearest transit hub	0.095 ***	0.012 ***	-0.020 ***	0.122 ***	0.050 ***	0.085 ***	0.074 ***	0.008 ***	-0.089 ***	0.036 ***	-0.118 ***	0.065 ***	1.00				
14. Nearest city center	0.055 ***	0.021 ***	-0.026 ***	0.039 ***	-0.003 ***	0.056 ***	0.073 ***	0.024 ***	-0.022 ***	0.034 ***	-0.028 ***	0.024 ***	0.023 ***	1.00			
15. Nearest airport	0.149 ***	0.006 ***	-0.074 ***	0.082 ***	0.052 ***	0.102 ***	0.085 ***	0.011 ***	-0.094 ***	0.050 ***	-0.102 ***	0.043 ***	0.483 ***	0.117 ***	1.00		
16. Nearest beach	-0.027 ***	-0.023 ***	-0.039 ***	0.074 ***	-0.045 ***	-0.091 ***	-0.066 ***	-0.054 ***	-0.016 ***	-0.010 ***	-0.015 ***	0.056 ***	0.123 ***	-0.033 ***	0.098 ***	1.00	
17. No. of competitors	0.124 ***	-0.021 ***	0.084 ***	-0.007 ***	0.128 ***	0.063 ***	0.113 ***	0.088 ***	-0.066 ***	-0.067 ***	-0.075 ***	-0.012 ***	-0.064 ***	-0.065 ***	-0.077 ***	-0.333 ***	1.00

Table 4. Regression results

	DV: RevPAR (log)								
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**	**Model 9**
Functional Design Distinctiveness		0.197***	0.167***			0.169***	0.179***	0.178***	0.186***
Functional Design Distinctiveness^2			0.047***			0.046***	0.052***	0.020***	0.027***
Aesthetic Design Distinctiveness				-0.029***	-0.033***	-0.038***	-0.039***	-0.037***	-0.038***
Aesthetic Design Distinctiveness^2					-0.018***	-0.017***	-0.019***	-0.017***	-0.019***
Functional Design Distinctiveness * Reviews per month							-0.051***		-0.053***
Functional Design Distinctiveness^2 * Reviews per month							-0.025***		-0.024***
Aesthetic Design Distinctiveness * Reviews per month							0.082***		0.081***
Aesthetic Design Distinctiveness^2 * Reviews per month							0.028***		0.028***
Functional Design Distinctiveness * Listing age								0.021***	0.016***
Functional Design Distinctiveness^2 * Listing age								-0.051***	-0.050***
Aesthetic Design Distinctiveness * Listing age								0.006	-0.008*
Aesthetic Design Distinctiveness^2 * Listing age								-0.011***	-0.010***
Reviews per month	1.065***	1.054***	1.053***	1.065***	1.065***	1.053***	1.070***	1.052***	1.068***
Listing age	-0.225***	-0.211***	-0.203***	-0.225***	-0.225***	-0.202***	-0.203***	-0.162***	-0.163***
Control Variables									
Max guests	0.177***	0.169***	0.168***	0.177***	0.177***	0.168***	0.167***	0.170***	0.170***

No. of photos	0.268***	0.259***	0.259***	0.269***	0.269***	0.258***	0.258***	0.261***	0.260***
Instant bookability	-0.073***	-0.058***	-0.057***	-0.074***	-0.074***	-0.058***	-0.059***	-0.056***	-0.056***
Minimum stay	-0.292***	-0.276***	0.280***	-0.293***	-0.293***	-0.281***	-0.279***	-0.282***	-0.280***
Cancelation									
- flexible	-1.276***	-1.244***	-1.235***	-1.277***	-1.277***	-1.236***	-1.239***	-1.230***	-1.233***
- moderate	-1.080***	-1.035***	-1.023***	-1.082***	-1.081***	-1.025***	-1.028***	-1.019***	-1.022***
- strict	-0.905***	-0.849***	-0.837***	-0.907***	-0.906***	-0.838***	-0.840***	-0.833***	-0.834***
- super strict	-0.544***	-0.462***	-0.443***	-0.547***	-0.547***	-0.446***	-0.441***	-0.439***	-0.435***
Superhost	0.181***	0.167***	0.180***	0.183***	0.183***	0.182***	0.178***	0.185***	0.182***
Business size	-0.727***	-0.656***	-0.682***	-0.731***	-0.731***	-0.686***	-0.681***	-0.690***	-0.684***
Host response rate	0.134***	0.126***	0.124***	0.134***	0.134***	0.124***	0.122***	0.122***	0.120***
Host response time									
- within an hour	1.039***	1.066***	1.068***	1.036***	1.037***	1.066***	1.059***	1.063***	1.056***
- within a few hours	0.466***	0.494***	0.497***	0.464***	0.465***	0.496***	0.495***	0.496***	0.495***
- within a day	-0.148***	-0.116***	-0.112***	-0.149***	-0.149***	-0.113***	-0.111***	-0.113***	-0.110***
Nearest transit stop	0.157***	0.146***	0.161***	0.158***	0.157***	0.161***	0.163***	0.161***	0.162***
Nearest city center	-0.025***	-0.029***	-0.028***	-0.025***	-0.025***	-0.028***	-0.029***	-0.030***	-0.030***
Nearest airport	0.394***	0.413***	0.413***	0.391***	0.391***	0.409***	0.415***	0.413***	0.419***
Nearest beach	-0.176***	-0.201**	-0.296***	-0.169*	-0.170*	-0.288***	-0.295***	-0.304***	-0.307***
Number of competitors	0.096***	0.101***	0.104***	0.098***	0.098***	0.105***	0.109***	0.105***	0.109***
County dummy	——	——	——	——	——	——	——	——	——
R^2	0.325	0.327	0.327	0.325	0.325	0.327	0.328	0.327	0.328
Adjusted R^2	0.324	0.327	0.327	0.325	0.325	0.327	0.328	0.327	0.328
F test for time effects	827.37***	966.84***	953.87***	826.86***	827.49***	955.57***	959.39***	954.28***	957.79***
Hausman test	26,341***	34,767***	35,208***	26,333***	26,381***	35,336***	35,655***	35,852***	36,354***
LM Test for time-fixed effects	3,253,567***	4,115,337***	4,005,950***	3,249,505***	3,254,200***	4,018,944***	4,042,281***	4,008,844***	4,029,343***

Table 5. Hypothesis acceptance/rejection table

Hypothesis	Result & Visualization
H1a: The relationship between functional design distinctiveness and performance is U-shaped in the short-term rental context.	Accept (Figure 3A)
H1b: The relationship between aesthetic design distinctiveness and performance is U-shaped in the short-term rental context.	Reject (Figure 3B)
H2a: The U-shaped relationship between functional design distinctiveness and performance is flatter for listings with a high review volume.	Accept (Figure 4)
H2b: The U-shaped relationship between aesthetic design distinctiveness and performance is flatter for listings with a high review volume.	Reject (Figure 5)
H3a: The U-shaped relationship between functional distinctiveness and performance is flatter for mature listings.	Accept (Figure 6)
H3b: The U-shaped relationship between aesthetic distinctiveness and performance is flatter for mature listings.	Accept (Figure 7)

Model 6 tests the general trends of listing performance considering degrees of distinctiveness in both functionality and aesthetics. The coefficients of functional design distinctiveness (b = 0.169, p < 0.001) and its squared term (b = 0.046, p < 0.001) are positive and significant. Mathematically, a positive coefficient of the quadratic term indicates an upward parabola (Lind & Mehlum, 2010). Furthermore, the minimum value of performance occurs at -1.84, between the lowest and highest values of standardized functional design distinctiveness (-4.35 and 6.05). We thus have a U-shaped relationship between distinctiveness and performance for functionality (Figure 3A) also supporting hypothesis ***H1a***. This finding is consistent with previous studies (Taeuscher et al., 2022; Zhao et al., 2018).

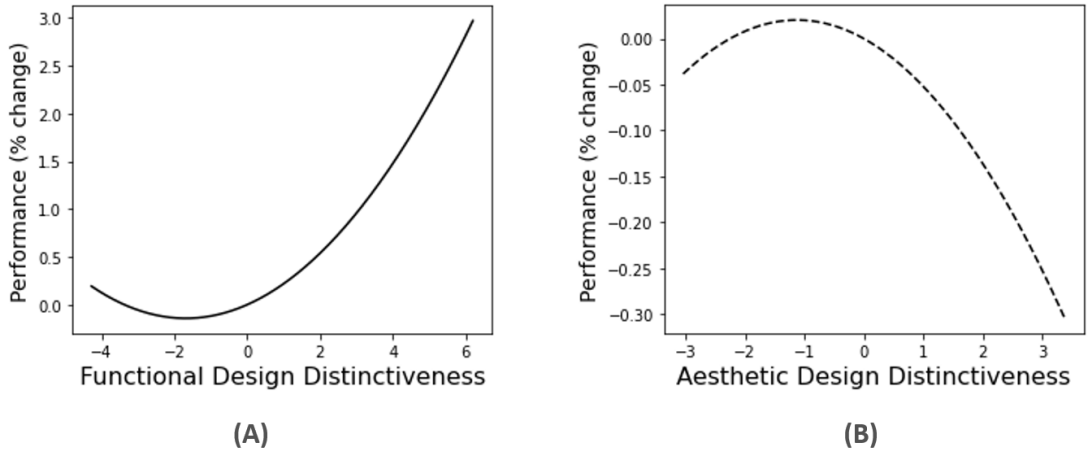

Figure 3. H1a & H1b - Estimated effect of functional (Panel A) & aesthetic design distinctiveness (Panel B) on listing performance (x-axis: standardized deviation from mean)

Regarding the relationship between aesthetic design distinctiveness and performance, the coefficients of distinctiveness and distinctiveness squared are negative and significant (b = -0.038, p < 0.001 and b = -0.018, p < 0.001, respectively). A negative coefficient for the quadratic term suggests a downward

parabola. Also, the vertex of this parabola appears at -1.06, which is within the interval of standardized aesthetic design distinctiveness, -3.00 to 3.20. Therefore, an inverted U-shaped relationship between distinctiveness and performance is identified (Figure 3B), thus rejecting our hypothesis ***H1b***. This inverted U-shaped relationship is, however, inconsistent with previous studies focusing on product functionality (Taeuscher et al., 2022). This divergence might be explained by the inherent differences between functionality and aesthetics. Aesthetics for accommodation products are more abstract and complicated to understand (Vogt, Fesenmaier, & MacKay, 1994).

The full regression model (model 9) shows moderation effects of reviews per month and listing age. A negative coefficient of the interaction terms between moderators and quadratic distinctiveness terms (e.g., functional design distinctiveness^2 * reviews per month), indicates a flatter U-shaped curve (Haans, Pieters, & He, 2016). Upon examining these interaction terms, we found that ***H2a, H3a***, and ***H3b*** are supported with the coefficients of -0.024, -0.050, -0.010, respectively. The visualization of these hypotheses also shows similar patterns; see Figures 4, 6, and 7.

As displayed in Figures 4, the curve depicting the effect of functional design distinctiveness is in a steeper U-shape under a low volume of online reviews, and the curve is flatter, even flipped, when the review volume grows. This finding of the moderating effects of legitimacy conditions reflected by online review volume aligns with previous studies (Taeuscher & Rothe, 2021).

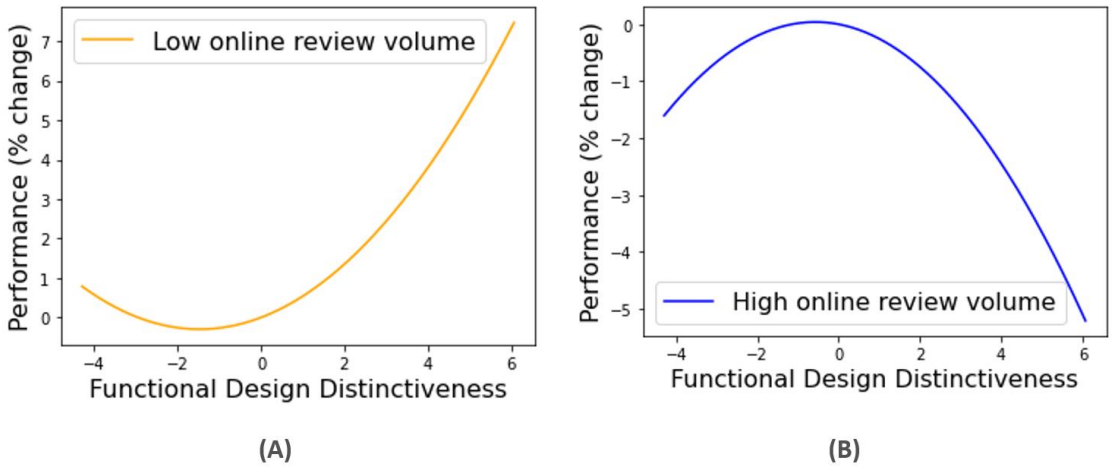

Figure 4. H2a - Estimated effect of functional design distinctiveness at different levels of online review volume (x-axis: standardized deviation from mean)

Hypothesis ***H2b*** is rejected with a positive coefficient (b = 0.028, p < 0.001), which indicates a U-shaped relationship between degrees of aesthetics and performance for listings with a high volume of online reviews. This means that for listings that received massive online reviews, their performance declines before it starts to recover. This finding is contrary to those drawn from previous studies concerning functionalities. This divergence might be attributed to the distinct ways in which consumers perceive and evaluate aesthetics (Meyer, Höllerer, Jancsary, & Van Leeuwen, 2013; H. Zhang et al., 2023). Property aesthetics are immediately visible in online listings through photos, making them a primary factor in initial guest impressions and booking decisions. Even a slight difference from general design

patterns can be easily observed, making the penalties for norm violation more evident, although being very different from peers will ultimately lift performance. More detailed changes in customer perceptions and attitudes, which explain such nuanced variations, need further exploration by subsequent studies.

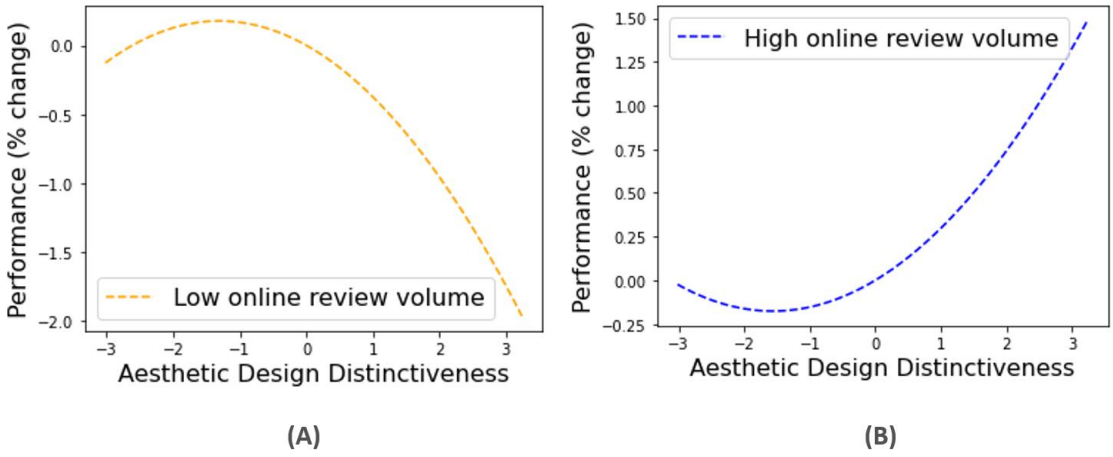

Figure 5. H2b - Estimated effect of aesthetic design distinctiveness at different levels of online review volume (x-axis: standardized deviation from mean)

The moderating effect of listing age is similar for both functionalities and aesthetics. In both cases, the distinctiveness-performance relationship is U-shaped for newly listed properties while the curves flatten so far that they flip when the listings become more mature (Figures 6 and 7). These results align with previous studies concerning the moderation effects of legitimacy status and effectiveness of strategies (Taeuscher & Rothe, 2021; Zhao et al., 2018), thus supporting hypotheses ***H3a*** and ***H3b***.

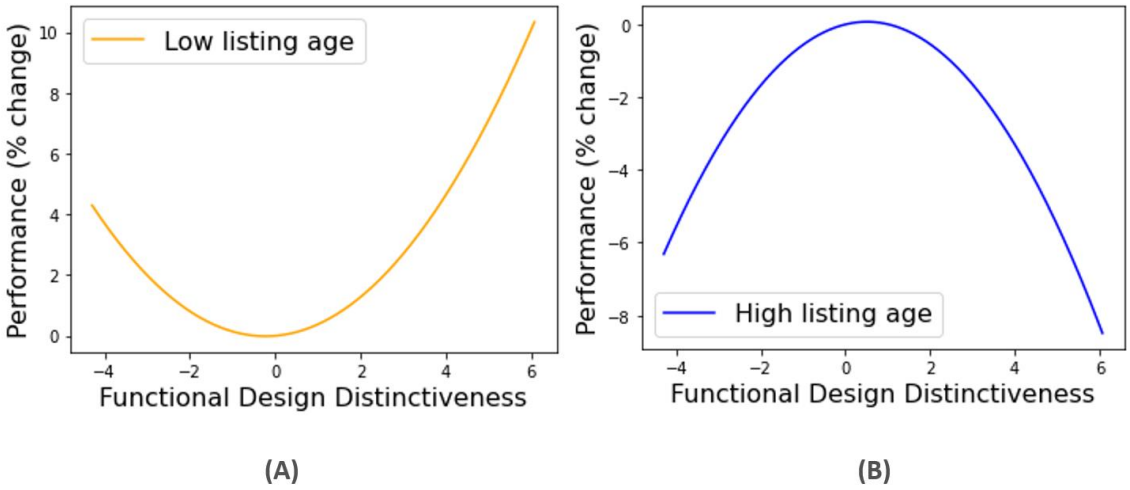

Figure 6. H3a - Estimated effect of functional design distinctiveness at different levels of listing age (x-axis: standardized deviation from mean)

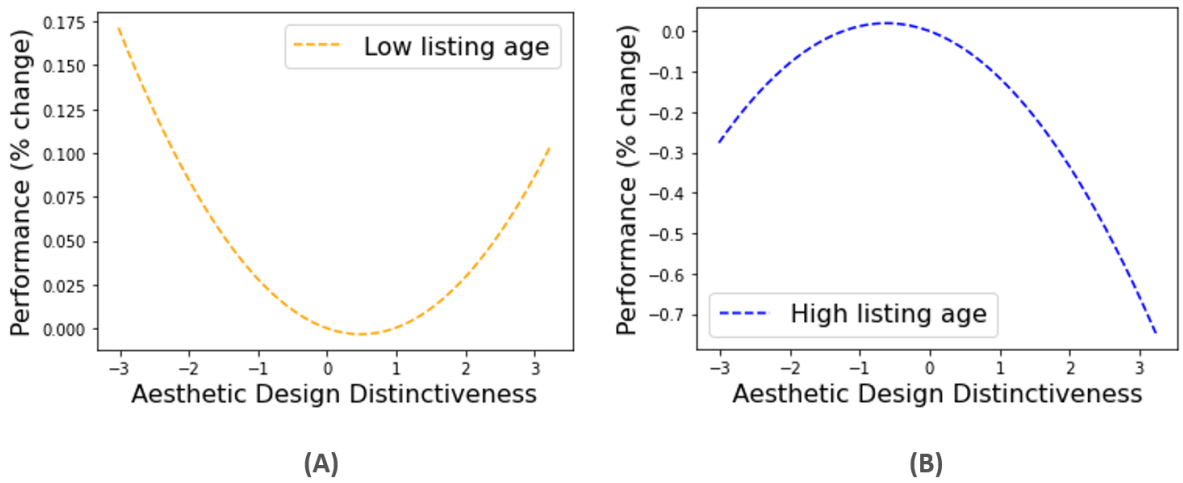

Figure 7. H3b - Estimated effect of aesthetic design distinctiveness at different levels of listing age (x-axis: standardized deviation from mean)

5. Implications and Conclusions

In this study, we aim to address two research questions: (1) how do product distinctiveness strategies for functionalities and aesthetics affect property success, and (2) how does the strategic position change under different listing conditions in the short-term rental context. To address these questions, we first measure product distinctiveness in two dimensions, functional and aesthetic design. Then, panel models are applied to examine the effects of design distinctiveness and identify moderating roles of online review volume and listing age.

The theoretical contributions and implications of this study are threefold. First, it introduces the optimal distinctiveness framework into hospitality literature. This framework advocates a paradigm shift in the positioning discourse, emphasizing the importance of a dynamic balance between differentiation and conformity, rather than a unilateral choice (Zhao et al., 2017). In some conditions, the performance associated with high conformity is not substantially different from that of high differentiation, e.g., for functionality under high listing age. However, at the same time, the optimal performance appearing at the moderate degree of distinctiveness is much higher than the performance at either end. This highlights the critical importance of further exploring optimal distinctiveness in the hospitality literature and future studies to understand more nuanced positioning strategies.

Second, this study enriches the optimal distinctiveness literature by shedding light on the distinctiveness-performance relationship and the difference in impacts of distinctiveness between two design dimensions. These findings indicate that the dynamic balance between differentiation and conformity can be determined by the product attributes to which the differentiation strategy is applied (Baum & Haveman, 1997). Subsequent studies should explore the varied impacts of distinctiveness across dimensions beyond aesthetics and functionality, such as product size, quality, and sustainability practices, and further explore potential factors that lead to inter-dimension differences and coordination strategies among these dimensions.

Third, this research adds knowledge by underscoring the importance of contextual factors such as online review volume and listing age in shaping the distinctiveness-performance relationship. These factors reflecting firms' demands for legitimacy and effectiveness of strategies shift the outcomes of distinctiveness (Taeuscher & Rothe, 2021). This nuanced understanding of how context influences the distinctiveness-performance relationship offers a more granular approach to strategic positioning. An avenue for future studies is to extend our work by introducing related factors, such as online review rating and sentiment, and consulting services offered by management companies which can enhance strategic effectiveness.

From the practical perspective, this study offers valuable guidance to short-term rental hosts in positioning their listings under different conditions. Generally, it is more recommended for listings with fewer online reviews and shorter ages to invest in product positioning because both sides, differentiation and conformity, will lead to better performance than a moderate degree of distinctiveness. When comparing these two ends, differentiation is suggested for functionalities while conformity prevails in the aesthetic dimension.

The positioning suggestions change accordingly when they mature or accumulate more online reviews. For properties that have been listed for a long time, it is not beneficial to pursue either extreme differentiation or conformity in both design dimensions. Similarly, for listings that have received a large number of online reviews, there are no incentives to become either very different from or similar to their peers in functionalities. However, they have the chance to pursue outstanding performance through unique aesthetics.

In addition, product position is constantly evolving because it is inherently dependent on the actions of rivals as well as entries and exits. Therefore, short-term rental hosts should diligently monitor the competitive landscape where their listings are situated. Adapting and updating the product positions in response to the changing rival conditions is essential for maintaining competence and achieving business success.

This study also has some limitations. First, this study mainly focuses on the physical side of design, while design in hospitality encompasses richer aspects such as customer service and work process. Hence, future studies are encouraged to explore optimal distinctiveness for additional design dimensions. Second, we only test the influence of distinctiveness on listing revenue. However, higher revenue does not mean better customer feedback or long-term success. Hence, we encourage further studies on more potential outcomes, such as satisfaction and survival. Third, due to data constraints, we were unable to consider age of the property, neighborhood condition, or corporate management of properties. As these factors could potentially influence the distinctiveness-performance relationship in the context of short-term rentals, their exploration remains a valuable avenue for future research.

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