



HOTEL INVESTMENT IN OPEN AREA

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Abstract: Environmental open space is difficult to define and value. This paper estimates the rate of return on hotels' investment in open area for three locations in the State of Hawaii, United States. The marginal revenue for open area investment is estimated using a hedonic analysis of hotel room prices. The marginal cost of open area investment is adapted from secondary data. The study reports on estimated return rates, which in two locations are consistent with previous research and with the risk levels faced by hotels/resorts in Hawaii. The lower rate of the third location appears to be the result of inaccurate expectations about changing land values. **Keywords:** open area, rate of return, hotel characteristics, Hawaii hotels. © 2003 Elsevier Science Ltd. All rights reserved.

Résumé: L'investissement des hôtels dans l'espace ouvert. Le terrain environnemental est difficile à définir et à évaluer. Cet article estime le taux de retour sur investissement dans l'espace ouvert de la part des hôtels à trois endroits dans l'état de Hawaii, aux États-Unis. La marge bénéficiaire de l'investissement dans le terrain ouvert est estimée en utilisant une analyse hédonique des prix des chambres d'hôtel. La marge des coûts est adaptée des données secondaires. L'étude présente les bénéfices estimés, qui sont en accord avec la recherche antérieure dans deux endroits et avec les niveaux de risque qui sont rencontrés par les hôtels/lieux de vacances à Hawaii. Le taux moins élevé du troisième endroit semble être le résultat d'attentes inexactes au sujet des valeurs foncières changeantes. **Mots-clés:** espace ouvert, taux de rapport, caractéristiques des hôtels, hôtels à Hawaii. © 2003 Elsevier Science Ltd. All rights reserved.

INTRODUCTION

Environmental open area is difficult to define and hence to value (Garrod and Willis 1992). As a result, analyses of investment in open area are often skewed in favor of public, rather than private, costs and benefits. The quantity and quality of environmental open area does affect the value of property in residential and commercial real estate markets (Anderson and Cordell 1988; Bookout 1994; Evans 1992; Garrod 1994; Hensley 1994; Tyrvaïnen 1997). Lack of information about returns on private investment may lead firms to select alternatives that directly increase revenues, rather than environmental amenities that

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indirectly contribute revenue through increased consumer satisfaction. For example, a hotel is more likely to develop a retail area that will contribute directly to revenue, rather than installing a garden that will require continued maintenance without generating direct sales. If firms providing accommodations to tourists do not invest in environmental amenities due to the lack of information and knowledge, the tourism industry as a whole can suffer long-term consequences.

This paper estimates the rate of return on investment in open area for hotels. Due to the large differences in the cost of land, observations for the analysis are divided into three groups: Waikiki (City and County of Honolulu), Hawaii County, and Maui County. The principles of investment analysis are discussed and applied to hotel investment. Estimates of the revenues and costs associated with providing open area at hotels are used to calculate the rates of returns from investment in this environmental amenity. To evaluate current levels of investment, the estimated rates of return are then compared to reported rates for hotel investments in general.

HOTEL INVESTMENT IN OPEN AREA

From an economic perspective, an investment's costs and revenues are used to judge its desirability. An investment in product characteristics is like any other, although estimates of the revenues and costs associated with the investment are difficult to obtain. Investment by a hotel in land can yield revenue directly if the land is developed for commercial purposes. The land can also be developed to increase the attractiveness of the environment surrounding the property, with the value of the investment being reflected indirectly by the rooms' rental rate. Investing in land to be used for this purpose depends on an evaluation of the revenues and costs associated with such an investment.

Revenues and Costs from Open Area

Consumers choose among products by weighing the product price with their tastes and preferences to place a value on each characteristic of the product (Lancaster 1971, 1991; Rosen 1974). They select the combination of goods and services that provide the most benefit at the lowest cost (Lancaster 1991). Hence, the value that consumers place on the bundle of characteristics embodied in goods is reflected in the prices that they are willing to pay for them. This relationship between a product's price and its characteristics is the basis for a technique called hedonic pricing. It can be used to statistically allocate the price of a product among that product's characteristics.

To perform the hedonic analysis, each observation must contain the same basic good with varying levels of the associated characteristic. For example, equivalent rooms at different hotels will all have different traits. These may include those of the rooms themselves and of the building and grounds in general. In principle, if the group contains enough goods with different combinations of characteristics, a relation-

ship can be estimated using the price of a good as a function of their various quantities (Freeman 1994).

Empirical application of hedonic price analysis is based upon two important assumptions (Ladd and Suvannunt 1976). First, the characteristics of the good do affect consumers' demand. Their quantity obtained from a unit of the good multiplied by its unit value gives the value that characteristic contributes to the good. The price of a good is a function of the trait levels associated with that good. A consumer's willingness to pay for the good, and hence its price, changes as characteristic levels change. This value can be estimated by using regression analysis to estimate the relationship between a product's price and its characteristics.

A standard, double-occupancy hotel room with no ocean view and no kitchen facilities is used as the good in this research. Its rate measured in US dollars per day is specified as the price of the good, or dependent variable. Selecting measurable characteristics to use as explanatory variables is more difficult. Goldberg, Green and Wind (1984) use six general characteristics of a room in a conjoint analysis of hotel amenities for business tourism. In addition to price, measurable variables were included to represent atmosphere/facilities, room, associated services, recreation/sports, lounge/entertainment, and security. Interviews with Hawaii hotel managers, sales representatives, and staff revealed that room-rate variables for tourists fall into three general categories: location, physical ambience, and services. The characteristics representing these categories include proximity to the ocean for location; open area quantity, spa area, and swimming pool size and quality index for physical ambience; and number of employees per room for service.

The objective measurement of these variables merits further explanation. Proximity to the ocean is assigned a value of two if the property directly abuts the ocean, while those across the street from the ocean are given a value of one, and all others are coded as zero. Open area quantity is the total square footage of undeveloped space, where developed space includes open parking areas and structures with at least three walls and a roof. This variable is assumed to generate existence value, and is thus measured as the total area for the hotel. An alternative specification was estimated using a per room figure, but the coefficient was not significantly different from zero. This confirms the expectation of an existence, rather than a use, value. On the other hand, the pool and spa are assumed to generate use value, and the measures incorporate the number of rooms. The pool index is a product of the percent of actual services out of all possible pool services, and the square footage of pool per room. Spa area is defined as its square footage per room. Thus, dollars per day for a standard room were estimated using regression analysis as a function of open area, employees per room, pool index, spa area, and ocean proximity.

No clear guidelines exist on the choice of the appropriate functional relationship between a room's rate and its characteristics. Other researchers (Garrod and Willis 1992; Harris 1997; Ladd and Suvannunt 1976; Palmquist and Danielson 1989; Pompe and Rhinehart 1995;

Roka and Palmquist 1997; Tyrvaianen 1997; Wheaton and Torto 1994) use both linear and nonlinear relationships. Hartman (1989) shows that an optimal product design exists in terms of characteristic levels if a consumer's additional satisfaction decreases as more sought or consumed (that is, as marginal utility for the characteristic decreases). This condition ensures that the cost of the optimal level can be identified. In this study, the natural logarithm of open area quantity is used to allow for decreasing satisfaction with this characteristic, while the price variable and other characteristics remain linear.

Data from a sample of hotels in Waikiki and Maui and Hawaii Counties were used to estimate the room rate and characteristics relationship. About 100 hotels with 100 or more rooms that could be rented on a daily basis were contacted to participate in the survey and the final sample included 65 observations. The SHAZAM econometric package (White 1997) was used to estimate the empirical relationship. Observations from different hotels for the same year are referred to as cross-sectional data. A strong possibility of heteroskedasticity exists for cross-sectional data, which means that the tests of significance may not be reliable. The SHAZAM diagnostic (DIAGNOS HET) indicated that heteroskedasticity was present. Therefore, the SHAZAM OLS/HET procedure was used to estimate the hedonic price functions.

Table 1 presents the empirical results of the hedonic regression analysis. The adjusted R^2 presented in column six of the table indicates that 71% of the variation in room rates is explained by the characteristics included in the analysis. The F statistic in column seven shows that this 71% is significantly different from zero in a statistical sense. All the explanatory traits included in the analysis added value to rooms. As indicated by Student t values, all except spa area contribute significantly to room rate. While nearly all characteristics are significant, subsequent discussion is limited to an open area because it is the focus of this study. If only one variable is changing, estimation of its incremental value using the appropriate regression coefficient in Table 1 is possible.

The partial derivative of room rate with respect to open area is a nonlinear relationship between the two variables, and measures the increases in room rate as open area increases. The incremental value of open area is in dollars per room per day per square foot. This number has little use when making decisions about providing open area on the property. To translate the estimate into a more meaningful figure, the number of rooms and average annual occupancy rate at a typical operation are used to estimate the added revenue per acre.

Table 1. Results of the Hedonic Price Analysis

Statistic	Ln Open Area	Employees per Room	Pool Index	Spa Area	Ocean Proximity	Adj. R^2	F Statistic
Coefficient	8.80	99.43	0.72	0.01	20.37	0.71	195.20
Student t	6.90	3.38	3.80	1.46	2.32		

Table 2 summarizes the calculations and gives annual revenue from one acre. Columns one and two list average occupancy rates and average number of rooms that were used to obtain column three, average room days of occupancy per year. Column four, annual revenue, is average room days of occupancy multiplied by the value per room estimated using the coefficient in Table 1. The annual revenue is then divided by the acres in column six to determine the expected revenue per year per acre given in the last column of Table 2. The revenue per acre is expected annually for an indefinite period as long as the appropriate maintenance is provided. These estimates are utilized later in the analysis of return on investment.

Because previous studies find no evidence of economies or diseconomies of size with regard to the amount of landscaped area, the cost of providing open area is assumed to be proportional to the amount. For a linear cost relationship, the marginal cost is equal to the average annual cost of maintenance. The average maintenance cost is used to approximate the marginal or incremental cost.

The study used a uniform maintenance cost for types of hotel open area, although maintenance costs may vary by type. The variable cost of landscaping is based on the survey data of Cox, Hollyer and Schug (1991) adjusted for inflation. Maintenance cost includes installation, renovation, and daily care, including all purchased and rented inputs such as labor, materials, plants and overhead. The data did not vary by location, so the same figure of \$10,900 per acre is used for all locations.

Investment Analysis

An investment is acceptable if the revenues it generates are greater than its total cost, and not acceptable if they are less than the total cost. However, the calculations needed to apply this criterion are complicated because the revenues and costs occur at different times. Both the revenues and corresponding maintenance costs are realized incrementally over time. The cost of obtaining the land, however, is incurred as a lump sum at one time. Money received or spent at different times does not have the same value to people. Therefore, all revenues are adjusted for investment analysis to reflect their value at the same point in time, usually the present; this process is called present-value discounting.

Table 2. Annual Revenue per Acre of Open Area

Location	Occupancy (%)	Rooms (no./hotel)	Occupancy (rm days/yr.)	Revenue (\$/hotel)	Open Area (acre/hotel)	Revenue (\$/acre)
Waikiki	80	450	131,400	1,156,451	0.40	2,891,128
Hawaii	60	410	89,790	790,242	9.91	79,742
County						
Maui	75	435	116,081	1,048,034	10.94	95,798
County						

To apply the present-value investment analysis, all revenue and cost estimates are discounted to the present using an appropriate discount rate. However, empirical evidence indicates that rates of return on hotel investment range from less than 8 to more than 15%, with one extreme value of about 32% (Lesser and Rubin 1993). Given this large variation, the rate-of-return approach may be more meaningful than a present-value method to evaluate the investment.

Rate of return is determined by setting the discounted net revenue stream equal to the investment opportunity cost. Annual revenue per acre from open area for the three geographic areas from Table 2 is presented in column one of Table 3. Annual variable cost in column two is assumed constant at an estimated \$10,900. The cost of investment is the opportunity cost of the land or, in a competitive market like Hawaii, the market value of suitable land. Since land is assessed at 100% of its value for the highest and best use, which equals market value for real property tax purposes in Hawaii, these assessments were used as the cost of land. The assessed value of land for all three counties was collected from the Real Property Division, Department of Budget and Fiscal Services, City and County of Honolulu, with the permission and cooperation of Maui and Hawaii Counties. Since the market for land differs between the three locations, the assessed values vary by location. Table 3 gives estimates of the gross revenue, variable cost, net revenue, land cost, and rate of return on investment. These results are within the range of overall rates of return reported for hotels by Lesser and Rubin (1993). Currently, properties in Waikiki and Hawaii County are estimated to earn about 15%, while those in Maui County earn about 7%.

Waikiki and Hawaii County returns are near the top end of the range reported by Lesser and Rubin, which is not surprising because tourism in Hawaii is subject to a number of external factors. In addition, the total investment required in Hawaii is significant, and occupancy directly influences rates of return. Therefore, Hawaii hotels face significant risks in their investment decisions and require a rate of return sufficient to compensate for this risk.

The low 7% return in Maui County requires further explanation. Evaluating the return depends on current as well as future economic conditions. If the effect of inflation on revenues and costs is approximately the same, rate-of-return analyses are expected to yield approximately the same results at different points in time. The opportunity cost of land, which is its market value in a competitive market, is

Table 3. Hotel Open Area Investment Revenues, Costs and Rates of Return

Location	Revenue (\$/acre/yr.)	Variable Cost (\$/acre/yr.)	Net Revenue (\$/acre/yr.)	Land Cost (\$/acre)	Return Rate (%/yr.)
Waikiki	2,891,129	10,900	2,880,229	21,252,924	15.68
Hawaii County	79,742	10,900	68,842	530,125	14.92
Maui County	95,798	10,900	84,898	1,305,058	6.96

assumed to be the cost of investment in open area. Therefore, an investigation of land prices will provide insight into changes in the opportunity cost of land in the three locations. Land values within the City and County of Honolulu, and Maui and Hawaii Counties, are measured using aggregate property tax assessments. The City and County of Honolulu is used here rather than Waikiki because of data availability, and because about 87% of the rooms in the City and County of Honolulu are in Waikiki (DBEDT 2001). Because land prices tend to move together, an aggregate property tax assessment is used here as a proxy for the change in the opportunity cost of land. Growth in tourism accommodation inventories was greatest prior to 1980, indicating that many investment decisions were made based upon economic conditions at that time.

During the 70s in Hawaii, when many of the hotel investment decisions were made, Maui County land prices were relatively lower than in other locations. Since 1970, land values in Maui County have increased more than twice as fast as those in the City and County of Honolulu, and more than four times as fast as those in Hawaii County. The greater increases in land prices on Maui are likely to have been unanticipated, or Maui hotels would have been expected to adjust their investment in land accordingly.

Variable and Model Specification

The rates-of-return estimates for open areas are generally consistent with those for investment in general, which in open space appear to be treated the same as other types. While the methodology described here is demonstrated to be appropriate and applicable to similar investment analyses, it could be further refined. Hedonic price analysis assumes that all subjects have the same preferences and willingness to pay for a characteristic. This may not be the case in the current study. Tourists may have different preferences and select their destinations accordingly. This would result in a unique marginal willingness to pay, and marginal revenue for each one. While the latter estimates could be obtained for each individual using stated willingness to pay, the estimates would be difficult to aggregate. Analyzing each destination separately is a compromise, but further disaggregation may make it impossible to obtain a significant hedonic price analysis. Additionally, Purcell (1992) concludes that abstract landscape characteristics, which are independent of a consumer's cultural affiliation or geographic place of residence, do affect preference. Such tendencies for scene types were found to be similar for all groups of participants looking at a variety of scenes within and outside the home environment (Peron, Purcell, Staats, Falchero and Lamb 1998).

At the same time, the model may not be accurately specified in terms of variables included or functional form. The marginal revenue estimated here would be consistently over- or under-estimated, ensuring that the deviation would be in the same direction in every case. Preliminary research conducted to determine which traits are important to consumers focused on characteristics in general; no query about spe-

cific ones was made. Therefore, the empirical estimation procedures could be refined through further investigation of stated and revealed consumer preferences for various characteristics.

Given the variety in hotels and consumers, measuring characteristic levels remains a challenge. With regard to open areas, a large body of research on the topic of landscape quality exists. However, the literature dealing directly with references for natural landscapes in an urban setting is not extensive, and emphasizes the importance of nature in such settings (Herzog 1989). Kaplan and Kaplan (1989) found preferences to be strongly affected by the context of the scene, with preference correlating positively with vegetation. In contrast, the presence of manmade objects was found to decrease the positive aesthetic response to a view (Coeterier 1994).

Open area is considered a homogeneous characteristic in this study. The literature indicates a preference for natural elements that obscure manmade objects. Therefore, the quantity and quality of natural elements, rather than generic open space, are more likely to be valued. Interior or vertical uses of natural elements are other ways to enhance values, particularly those in more urban settings such as Waikiki. Further research is needed to determine tourists' valuations of different types of open area, in order to predict how landscape design elements will affect the value of a given amount.

The cost function used here is assumed to be linear, and the cost of design and installation for open area is not included. More work is needed to determine the exact nature of design, installation and maintenance costs. Any investment in a landscape can be broken down into these three cost components, and the return on investment in any or all of them differs depending on the quantity and quality of the initial and on going investments (Cox, Hollyer and Leones 1994). For example, the cost of converting developed land back into open area in Waikiki would differ significantly from the cost of converting barren lava rock in Hawaii County. Therefore, open area creation may not be feasible in Waikiki since land is extremely costly, making interior or vertical landscapes the only alternative. In Hawaii County, on the other hand, soil can be brought in to cover and plant the extensive open spaces surrounding many resorts along the Kona coast.

CONCLUSION

Environmental open space is difficult to define and value, given the complexities of estimating the marginal revenue and marginal cost of hotel open area. This paper estimates the rate of return on investment in open area at hotels and resorts in Waikiki, Hawaii County, and Maui County. Hedonic price analysis is used to determine the marginal revenue from open area, while costs were estimated from secondary data. The estimated return rates for the three areas were 16, 15, and 7%, respectively. The Waikiki and Hawaii rates are consistent with previous research and with the risk levels faced by hotels and resorts in the state. These results indicate that hotels are making rational decisions regarding investment in open area. The possible exception of proper-

ties on Maui can be explained by the long-term nature of the investment decision, and the observed change in the opportunity cost of land over time. Maui's low rate appears to be the result of inaccurate expectations about future land values that resulted in smaller returns on investment in other locations.

As the world becomes increasingly developed, tourists will continue to seek interaction with nature. The response of the tourism industry to this preference will remain a prominent issue for research. The industry likely will continue to maximize its return on investment by providing open areas valued by tourists. At the same time, residents are likely to encourage efforts to make tourism developments more attractive. In Kauai County, for example, the planning commission restricted hotel zoning by mandating maximum building heights and the amounts of land that can be covered by buildings. The commission also specified that parking areas and some buildings must be screened and/or landscaped. In Waikiki, public open area in the form of mini-parks has been a strong component of revitalization. The amount of benefits that hotels in the area reap from these publicly sponsored mini-parks is open to question. With slight modification, the methodology presented in this paper can also be used to analyze these types of public policies and programs.

In other countries, where economies are less mature, or in more rural areas, landscaping is likely to be more profitable than in tourism destinations located in urban areas. Public decision-makers need to consider the opportunity cost of land as an integral component in public policies to support tourism development. Even if the opportunity cost of land is low, as is to be expected in some areas, capital constraints may prevent private firms from investing in additional land. If the tourism industry is unable to finance open-area investment, consideration should be given to the provision of an environmental amenity that can be experienced by tourists as a substitute. **A**

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