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Improving Productivity in a Service Business Evidence From the Hotel Industry

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Abstract

The objective of this paper is to compare, along three strategic dimensions, franchising with other types of operating arrangements in the lodging industry. The operating arrangements studied are, in addition to franchising, chain-managed and independent hotels. The three strategic dimensions include: (1) the variability or volatility of the task environment facing a hotel; (2) the business strategy chosen by a hotel's general manager; and (3) the level of sales revenue and profit margin achieved by a hotel.

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Abstract

Achieving increased productivity remains an important issue with many service firms. Therefore, the objective of this study was to gain insights as to how managers can improve the productivity of their service businesses. The context of the study was the hotel industry, in which the authors examined empirically the impact of labor and capital as well as selected strategic and organizational inputs on the dollar value added by the hotel. They found that regardless of hotel size, value added rose significantly with an increasing number of employees. Expanding the number of rooms available for sale as well as upscale positioning generated significantly greater value added for medium-sized hotels. The value added by large hotels was significantly enhanced when they were managed by a branded management company and were company owned. Constant returns to scale characterized the hotels. Relative to capital inputs, labor accounted for the bulk of value added.

Improving Productivity in a Service Business Evidence From the Hotel Industry

Productivity refers to the ratio of a firm's outputs to its inputs (Bucklin 1978b). The more output a firm can produce from a given set of inputs, the more productive it is. Achieving higher levels of productivity is important in all sectors of the economy, particularly in the service and retailing sectors. The reason is that these sectors of the economy are labor intensive. For example, according to one estimate, labor expenses—the hotel industry's largest operating expense—account for 40% of all hotel operating costs (Shaw 1988). Improving labor productivity in the service business is critical, as those gains allow firms to lower their costs and subsequently decrease their prices and offer more services; this can lead to increased demand, which can fund new technologies, which, in turn, can enhance labor productivity, and the cycle continues (cf. Bucklin 1981). Thus, the productivity of a service firm's labor as well as its capital have important implications for its overall marketing strategy, pricing strategy, cost structure, and profitability.

Table 1 reports the labor productivity of selected sectors of the U.S. economy from 1987 to 1993.[1] As can be seen, the labor productivity of hotels and motels increased an average of 1.07% annually from 1987 to 1993. This compares with the overall nonfarm business sector's labor average productivity gain of 1.30% during the same period. From 1994 to 1996, labor productivity in the hotel sector averaged 1.00%, whereas in the overall nonfarm business sector, the gain averaged 1.17%. Of the lines of trade reported in the table, hotels and motels only outstripped food stores, which incurred losses in labor productivity. The other lines of trade shown here, including commercial banks, which represent another "pure service," experienced

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[1] Other industry productivity measures, such as the productivity of capital, were only available for the manufacturing sector and, therefore, not reported.

larger gains in their labor productivity over the same time periods than did hotels. Some service

businesses such as banking have been able to substitute capital (e.g., computer resources) for

labor to achieve productivity growth. Other service firms such as hotels find it more difficult to

make this substitution while maintaining adequate service quality (Anderson, Fornell, and Rust

1997).

The data in Table 1 clearly indicate that even during the economic boom of the 1990s, the

hotel industry still lags behind other sectors of the economy in realizing productivity gains. Thus,

achieving higher levels of productivity remains a significant managerial challenge in this and

other service industries.

The objective of this research is to gain some empirical insights as to how managers can

improve the productivity of service firms in general and hotels in particular. Most research has

focused on labor productivity; however, a key limitation of this approach is that other factors that

influence productivity are overlooked (Reynolds 1998). In our approach, we investigate the

impact of labor and capital. In addition, we examine the effects of strategic and organizational

decisions on hotel productivity. We also offer some specific recommendations as to how firms

can boost the productivity of their hotels. Suggestions as to how these insights might be applied

to other service firms also are explored.

Our article is organized as follows. First, we discuss the concept of productivity and how

it can be applied to the hotel industry. We then describe the methodology that we used to

investigate the productivity of the two successful hotel chains. Next, the results are discussed,

and finally, we present some specific recommendations for improving the productivity of hotel

properties.

Productivity in the Hotel Industry

In this section, we discuss the concept of productivity in general and in the hotel industry in particular. Specifically, we address the concepts of production functions, economic outputs, economic inputs, and strategic and organizational inputs.

Insert Table 1 here

Production Functions

One way in which productivity is examined is through the use of production functions. Production functions measure the maximum possible output obtainable from a given amount of input (Varian 1996, p. 306). The most widely used formulation of the production function is the generalized Cobb-Douglas production function, such as the one illustrated in Equation 1:

$$O = aL^{\beta 1}K^{\beta 2}M^{B3}e^{\beta 4N}e^u,$$

(1)

where O is the firm's output, L is its labor inputs, K is its capital inputs, M are its managerial inputs as measured by continuous variables, N are the firm's managerial inputs that are measured by dichotomous variables, and e is the mathematical constant (2.718 . . .). The estimated parameters are the intercept term or technology parameter (α), the elasticity coefficient for labor (β_1), the elasticity coefficient for capital (β_2), and the elasticity coefficient for continuous managerial inputs (β_3); β_4 is a coefficient linking the dichotomous managerial inputs to the firm's output, and u is the error of estimation. Environmental factors such as competitive intensity, market size and growth, labor quality and availability, and capital costs and availability

could easily be incorporated into Equation 1. Because, however, we do not have data to estimate

the impact of these factors, we have not included them in our formulation of Equation 1.

To make estimating Equation 1 less cumbersome, we take the natural logarithms of both

sides of Equation 1 to yield the following:

$$\ln O = \ln \alpha + \beta_1 \ln L + \beta_2 \ln K + \beta_3 \ln M + \beta_4 N + u \tag{2}$$

Equation 2 is in a form that easily can be estimated using ordinary least squares regression.

Economic Outputs

As Ingene and Lusch (1979) note, physical measures of output are problematic in

retailing because a store's output "is a combination of physical items and services rendered" (p.

275). For example, a supermarket customer can purchase a half pound of cheese, a bottle of red

wine, a loaf of freshly baked bread, a bouquet of red roses, and rent a video. In making this sale,

the supermarket might provide the services of a wine consultant who assists customers in

selecting an appropriate bottle of wine, a florist who arranges the flowers in a lovely but

inexpensive vase, a video clerk who offers informal reviews of the videos under consideration, a

computer network that authorizes and processes the credit card transaction, and a bagger who

places the customer's purchase in paper or plastic bags. To aggregate these disparate

commodities—physical items and supermarket services—some common metric must be found.

The simplest, common metric is dollar units. Because we are investigating hotel productivity,

which is a pure service, dollar measures of hotel output seem especially appropriate.

If dollar units are to be used to measure hotel output, a critical issue is selecting the particular output measure. A number of choices are available. They include sales revenue, net profits, and value added.

An important limitation of sales revenue output measures is that they do not separate the supplier's contribution to sales revenue from the retailer's (Ingene and Lusch 1979). For example, if a particular hotel property is part of a chain, its sales revenues are based on its own efforts as well as corporate efforts on behalf of the chain. For this reason, we do not use sales revenue output measures here.

Another dollar output measure is profits. Equation 3 shows a profit equation:

$$\Pi = \Sigma_i P_i O_i - \Sigma_j V_j I_j - F,$$

(3)

where Π is net profits, P_i is unit price of output i, O_i is the quantity sold of output i, V_j is the cost of input j, I_j is the quantity of input j used, and F is the fixed costs of operation. As can be seen from Equation 3, net profit includes inputs as well as outputs and, therefore, is a tainted measure of output. For this reason, Donthu and Yoo (1998) recommend that "it would be desirable to avoid profit as an output measure" (p. 95).

The final dollar measure of output that we consider is value added, which adjusts for the contribution of prior levels in the marketing channel (Ingene 1982, p. 76). Thus, in the hotel setting, value added attempts to isolate the contribution of the hotel property from the contribution of the chain itself. Because this output measure avoids the difficulties cited for sales revenue and net profit measures of output, we use value added as our measure of a hotel property's output.

Economic Inputs

Service retailers use a variety of inputs to produce their outputs. Among the key inputs or factors of production are land, labor, and capital. For many service retailers including hotels, a critical factor of production is *land* or location. Without effective locations, service retailers cannot reach their target markets effectively. But, because we have no data in our sample regarding this input, we will not address this factor of production further.

Another important input to service retailers, in general, and hotel firms, in particular, is labor. As noted earlier, the provision of hotel services is labor intensive. Producing hotel services requires effective and efficient employees. The more effective the hotel's employees, the higher the quality of output (i.e., service) the hotel can offer. The more efficient the employees, the more output per employee the hotel can produce.

A service retailer's *capital* represents another of its inputs. In the hotel industry, capital inputs include the physical plant, the atmosphere and décor (including the furniture and furnishings), the reservations computer system, the management information system, and other physical assets that are necessary for providing the hotel services demanded by the marketplace.

As with labor, a firm's capital can be used both effectively and efficiently. Thus, capital productivity indicates how well the firm uses its capital inputs. One proxy for the hotel's capital investment is its physical size—the larger the hotel, the more its capital investment in physical plant, room furnishings, dining and entertainment facilities, and hotel infrastructure (e.g., telephone service, laundry facilities, maintenance facilities). We measure the hotel's physical size in terms of the number of rooms it has available for sale. This is analogous to the way in which researchers assess the productivity of goods retailers. They often use square feet of selling

space as an indicator of capital input (e.g., Bucklin 1978b, 1983; Doutt 1984; Kamakura,

Lenartowicz, and Ratchford 1996; Ratchford and Stoops 1988).

Another aspect of capital productivity is the productivity of specialized assets—assets

made to support the specific exchange relationship between channel firms. Such investments

have little value outside that relationship (Williamson 1985). These transaction-specific assets

(TSAs) are essential to the relationship, however, because they communicate the brand name to

consumers and enable the investing firm to achieve economies not possible with more

generalized assets. For example, a hotel's participation in its chain's reservation system is

considered a TSA, whereas its proprietary reservation system is considered a generalized asset

that could be used with any brand affiliation. Thus, we expect that the more hotels invest in TSA,

the more they should generate output for the hotel.

Strategic and Organizational Inputs

Researchers have investigated a number of managerial inputs in their studies of the retail

productivity (for an enumeration, see Donthu and Yoo 1998, Table 1).We follow that tradition

by examining a number of managerial inputs in our study of hotel productivity. Among these

inputs are the strategic and organizational decisions made on behalf of the hotel. In particular, we

study the hotel's price/service positioning, its business strategy, its management arrangement,

and its ownership arrangement.

These decisions can be made on behalf of the hotel by the chain or by the hotel's

managers. They also can be made prior to the hotel's opening or after it has been established for

awhile. The point is that these decisions are not fixed; rather, they are variable over the medium

to long term. Therefore, it is appropriate to examine their impact on hotel productivity.

Price/Service Positioning. A hotel's price and service positioning indicates the price-point/service-level combination at which the hotel operates. Among the key hotel price points are luxury, upscale, midmarket, and economy. In terms of the services offered to its guests, a hotel may be characterized as either limited or full service (cf. Lewis, Chambers, and Chacko 1995, p. 361). The more service hotels provide, the more value added they are expected to generate. Moreover, the higher the price point, the more services that must be offered to justify the price. Therefore, hotels that pursue a higher price/greater service combination are expected to produce more value added.

High property business strategy. Strategic business units including individual hotel properties can be classified according to their orientation toward product market development as well as their approach to coping with environmental uncertainty (Miles and Snow1978). This typology consists of four basic strategic orientations as described below (Dev 1989; Miles and Snow 1978):

- Defenders have an internal focus and emphasize operating efficiency by strictly controlling their organizations, providing a limited range of products, and targeting limited market segments.

- Prospectors have an external focus and actively seek and exploit new market opportunities by developing new products and markets. They have the greatest adaptability to the environment.

- Analyzers emphasize exploiting new market opportunities as well as maintaining efficiency in the current market. They blend aspects of both defenders and prospectors and are often "second-in" new markets.

- Reactors lack a clearly articulated strategy and lack a rationalized link between the organization's structure and process. Reactors tend to maintain the status quo despite environmental changes.

Miles and Snow(1978) argue that "the Defender and Prospectorreside at opposite ends of a continuum" (p. 68). Between these two are analyzers, "a unique combination ofthe Prospector and Defender types" (p. 68). They view the reactor strategy as a nonstrategy that "lacks a consistent strategy-structure relationship" (p. 29) and, therefore, is not expected to produce any systematic effects. For this reason, we do not address reactor firms in this study. Hence, our focus is on the two poles of the continuum (i.e., defenders and prospectors).We treat the analyzer strategy as falling somewhere between these two predominant types. Because of their emphasis on operating efficiency, defender hotels are expected to be more productive than prospector hotels.

Management arrangement. A hotel property can be managed in a number of ways. For example, a chain-owned hotel can be managed by the chain's employees. Or, less likely, the chain may employ a management company to operate the hotel. An independently owned hotel can also be managed by a management company. Indeed, chains often operate hotels for their franchisees. An alternative to these branded management companies are independent management companies, which do not own hotels nor do they operate under their own brand names. Rather, they operate under the chain's name.

We expect branded management companies to achieve greater output. The explanation for this is that the powerful combination of the brand name and professional management services gives branded management companies a decided edge over independent management companies, even those that operate branded hotels (Brown and Dev 1999).

Ownership arrangement. Individual hotel properties have different ownership arrangements. For example, a hotel property can be 100% independently owned, or it could be 100% owned by the chain. Another option is that the chain could hold partial ownership, ranging from 1% to 99%, in the hotel property. Because we are investigating members of a chain, independently owned hotels in our study are franchised hotels. Bucklin (1977) found ownership to have no significant impact on the output of several lines of trade including supermarket retailing, casualty and property insurance agencies, and fast-food retailing. On the other hand, Good (1984) found that supermarket retail cooperatives in Newfoundland had significantly lower productivity than did chain or independent supermarkets. Thus, the empirical evidence concerning the role of ownership in productivity is inconclusive.

Our expectation, however, is that company-owned hotels will generate more value added than will independently owned hotels. There are at least three reasons for this. First, the chain can reserve the most lucrative sites for company-owned properties. This should enhance the productivity of company-owned hotels. Second, the meta-analysis results of Dant, Paswan, and Kaufmann (1996) suggest that, over time, chains acquire their more successful franchised outlets, especially those that generate the most sales and, consequently, value added. Finally, the chain may be able to realize greater economies of operation. For example, it may be able to achieve economies of purchasing from raw material and equipment suppliers and in service contracts. On the other hand, company-owned hotels may be subject to greater bureaucratic inefficiencies and face greater hazards of opportunism than independently owned hotels. We believe, however, that any scale economies experienced by company-owned hotels will be large enough to offset the inherent costs of bureaucracy.

Methodology

Sample

To examine hotel productivity, we conducted a mail survey of the individual U.S. hotels of two prominent hotel chains. The hotel companies provided us with names and addresses of the general managers of their hotels. A structured questionnaire was sent to each general manager along with a business reply envelope for returning the questionnaire.

We attempted to increase our response rate by undertaking several steps. First, a cover letter from the hotel company's chief operating officer supporting the research was included with each questionnaire. Next, the participants were assured that all responses were confidential and that only aggregate results would be presented. Third, each participant in the survey was offered an executive summary of the study as an inducement to participate. Finally, follow-up letters were sent to participants not responding during the 4 weeks after the initial mailing.

After adjusting for undeliverable mail and hotels that switched brand affiliation, our sample consisted of 1,710 hotels. Questionnaires were returned from 485 general managers, with 247 (14.4%) having completed enough data to estimate our production function. Because we asked for financial information that some general managers were hesitant to provide, we are heartened by this response rate.

Several steps were used to check for nonresponse bias in our sample. First, using a systematic sampling of the original sampling frame, telephone calls were placed to 50 nonrespondents. Each respondent was asked a series of organizational demographic questions as well as a random selection of items from the original questionnaire covering each facet of the study. No significant differences on these questions ($p > .10$) were found between the responding and nonresponding hotels. Second, the nonrespondents profile closely matched the

company-wide profiles provided by the hotel companies. Finally, the timing of the responses was

analyzed as a potential source of nonresponse bias (Armstrong and Overton 1977). No

significant differences in the variable means between early responders and late responders were

detected. Based on all of this evidence, we concluded that nonresponse did not appear to be a

problem with the overall hotel sample.

Next, we compared the demographics of our sample hotels with those of the population

as whole. The hotels in our sample were smaller (229 rooms vs. 306 rooms) but generated more

revenue per available room ($29,063 vs. $14,494) and operating income per room ($10,048 vs.

$4,199) than the broader population (The HOST Report 1993). Thus, our responding hotels

generally appear to be smaller but much more productive than the population as a whole. This

may be because our sample hotels represented more upscale hotel chains than those in the

broader population.

Measures

Responses to the questionnaire provided us with measures of hotel output variables as

well as hotel input variables. The measurement of each variable is discussed below.

Output. As argued above, the best measure of a retail firm's output is its value added. For

goods retailers such as Wal-Mart, value added is computed as the firm's gross margin (i.e., its

sales revenues minus its cost of goods sold). The rationale for this measure is that the cost of

goods sold is the value added upstream in the channel by Wal-Mart's suppliers. The gross

margin is what Wal-Mart adds to the goods it sells.

In the hotel industry, much of the value added comes from the hotel itself. However, the

chain adds value through the creation, strengthening, and maintenance of an effective brand

name. In addition, it adds value to the hotel's output through its centralized reservations system.

The chain's value added can be measured in terms of the royalty, advertising, and reservations fees it charges franchised hotels as well as the fees it repatriates from its company-owned hotels. Thus, the hotel's value added is its sales revenues less any fees that it remits to the chain.

We measured sales revenues simply by asking the respondents to report their approximate total annual sales for the year prior to the survey (i.e., 1993). They also provided us with an estimate of the fees (as a percentage of total sales) that they remitted to the chain in that same year. We converted these fees to a dollar amount by multiplying them by the total annual sales figure. To obtain a preliminary estimate of each hotel's value added, we then subtracted the dollar amount of fees remitted to the chain from the hotel's annual sales revenue.

Because this was a national survey, differing price levels are imbedded in the sales revenue figures reported by the respondents. For example, the higher cost of living in New York City enables hoteliers to charge higher prices than if they were operating the same exact facility in, say, Cincinnati. Thus, we had to remove the impact of different price levels in different areas of the country from our preliminary estimate of each hotel's value added.

A widely used index to adjust for differing price levels is the consumer price index (CPI). The Bureau of Labor Statistics computes the CPI for major cities throughout the country. It also aggregates these individual-city CPIs into four regional CPIs, one each for the Northeast, Midwest, South, and West. The only geographic information that we gathered in our survey was the state in which the hotel operated. Based on these data, we classified each hotel into one of the four U.S. geographic regions.[2] We then adjusted each hotel's sales revenues (and, hence, dollar value added) by its regional average annual CPI for 1993 (U.S. Department of Labor 1998a).

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[2] Kahle (1986) provides a listing of the states included in each region: Northeast (ME, NH, VT, MA, RI, CT, NY, PA, NJ, DE), Midwest (WI, IL, MI, IN, OH, ND, SD, MN, NE, KS, IA, MO), South (WV, MD, DC,VA, NC, SC, GA, FL,KY, TN, MS, AL, TX, OK, AR, LA), and West (CA, OR, WA, NV, ID, MT, WY, UT, AZ, CO, NM).

This provided us with our output measure (VALUE), which is each hotel's adjusted value added

for 1993.

It is reasonable to expect price levels to vary within regions. For example, the cost of

living in rural Pennsylvania might be substantially lower than the cost of living in midtown

Manhattan. Thus, our CPI adjustment is approximate. Because we did not collect more detailed

geographic information (e.g., zip codes), finer price-level adjustments are impossible.

Nonetheless, we believe that our value-added measure is reasonably free of price-level effects,

more so than if our CPI adjustment had not been made.

Labor. The general managers were asked to state the numbers of their hotels' full-time

and part-time employees. We did not collect data on the number of hours part-time employees

worked; therefore, we could not calculate an accurate weighted number of employees for each

hotel. To address the problem of the nonequivalence of full- and part-time employees, we

assumed that each part-time employee represented one half of a full-time employee. Because

some part-timers work nearly as much as a fulltime employee, whereas others merely work a

handful of hours per week, this assumption is not unreasonable. Accordingly, the total number of

employees in the hotel's employ (TOTEMP) was computed to be the number of its full-time

employees plus one half the number of its part-time employees.

Capital. We measured capital inputs in two ways. First, we used the number of rooms

available for sale as our traditional indicator of capital (RMAVAIL). This information was

gathered by a questionnaire item that directly asked hotel general managers to report the number

of rooms that their hotel had available for sale in the year preceding the study.

Our second, less traditional measure of capital is TSA. As noted earlier, TSAs are assets

that are devoted to a specific exchange relationship. In our study, these are assets invested on

behalf of the hotel (either by the hotel itself or the chain headquarters) that are only applicable to

the hotel's relationship with the chain. In the hotel industry, TSAs are primarily intangible (e.g.,

time and effort developing a customer base for the brand, systems and procedures tailored to the

brand). For the most part, tangible assets (e.g., furnishings, fixtures, equipment, and supplies)

can be used with other brand affiliations and, therefore, are not transaction specific (notable

exceptions are signs and nondurables such as pens, stationery, etc.). For this reason, our

measures of TSA center on intangible assets. Based on previous research (Heide and John 1988,

1990; Klein, Frazier, and Roth 1990), we developed six 7- point, Likert-type items (1 = *strongly*

disagree; 7 = *strongly agree*) to measure the hotel's investment in idiosyncratic assets (see

Appendix A).

  We used Churchill's (1979) approach to assess the reliability of our TSA measure. First,

we calculated the item total correlations for each item. The correlation of one item with the

adjusted scale was found to be less than 0.50; therefore, that item was dropped. Next, we

assessed the reliability of the TSA scale, composed of the remaining five items, by calculating

coefficient alpha. We found this to be .790, which is within the usual standards for basic research

(Nunnally and Bernstein 1994, pp. 264-65).

  Service orientation. We asked our respondents to record their hotel's service orientation

by checking one of three basic categories: economy, midmarket, and upscale. Within each

category, we asked them to indicate whether the hotel offered limited or full service. Because of

the small number of responses from limited-service hotels, we eliminated these hotels from our

sample. We then deleted the economy category, because too few respondents in our sample

classified their firms as being positioned as economy hotels. Thus, we had two dummy variables

to measure each hotel's service orientation: MIDMKT (coded 1 for a midmarket service

orientation and 0 otherwise) and UPSCALE (coded 1 for an upscale service orientation and 0

otherwise).

Because all of the information about service orientation that we need is contained in one

of these dummy variables, we can eliminate the other. Thus, we include only the UPSCALE

measure as our sole indicator of service orientation.

Strategic orientation. Our measure of this variable, the self-typing scale developed by

Shortell and Zajac (1990), was based on Miles and Snow's (1978) strategic orientation typology.

With this scale, respondents reported on an 8-point continuous scale how well their organizations

fit one of four scenarios designed to reflect the defender, analyzer, prospector, or reactor

strategic orientation. Lower values on this scale (e.g., 1) are more closely aligned with defender

firms, and higher numbers are more closely aligned with prospectors (e.g., 7). Middle values

reflecting analyzer firms and reactors are assigned an 8 (see Appendix A). Extensive tests for the

reliability and validity of this measure have been reported by Shortell and Zajac.

Because this scale does not allow us to separate adequately the effect of the analyzer

strategy on hotel output, we collapsed the scale into its basic components. Responses of 1 or 2 to

this scale were classified as defender hotels (DEFEND). The hotels of general managers who

responded with a 3, 4, or 5 were classified as analyzer hotels (ANALYZE). Prospector hotels

(PROSPECT) were those whose general managers responded with either a 6 or a 7 to this scale.

Reactor hotels follow no particular strategy. Because we are interested in how specific strategies

are linked to hotel productivity, we decided not to include the reactor hotels in our analysis, as

noted earlier.

Only two of these three variables are needed to determine the strategic orientation of the hotel. Therefore, we eliminated the DEFEND dummy variable. When both ANALYZE and PROSPECT are coded 0 for the hotel, the hotel must be pursuing a defender strategic orientation.

Management arrangement. Hotels can and do vary according to the way in which they are managed. We found three ways in which hotels were managed in our sample. These hotels were independently managed, managed by branded management companies, or managed by independent management companies. We used dummy variables to measure these three different management arrangements. The variable INDEPEND was coded 1 if the hotel was independently managed and 0 if not. BRANDED was the dummy variable that represented the branded management company arrangement. It was coded 1 if the hotel was managed by a branded management firm and 0 otherwise. Finally, if the hotel was managed by an independent management company, MANAGCO was coded 1 and 0 if it was not.

As with the strategic orientation measure, only two of these three dummy variables are needed to determine the management arrangement used by the hotel; hence the INDEPEND dummy variable was eliminated. When both MANAGCO and BRANDED are coded 0 for the hotel, the hotel must be independently managed.

Ownership arrangement. In our sample, hotels were either company owned or franchised to independent owners. Accordingly, we measured the ownership arrangement of the hotel as a dummy variable. The dummy variable (CO_OWN) was coded 0 if the hotel was 100% independently owned and 1 if the chain held an ownership stake in it. Note that the vast majority of the company-owned hotels in our sample were 100% company owned.

Specific firm. To control for firm-specific effects, we included a dummy variable to denote whether the hotel was a member of the Firm A chain or the Firm B chain. This variable

(FIRM_B) was coded 0 if the respondent managed a Firm A hotel and 1 if he or she managed a

Firm B hotel.

The correlations among the included measures as well as their means and standard

deviations are reported in Table 2.

Data Analysis Procedure

Using the measures just described, we modified Equation 2 to yield Equation 4, the

production function for the hotels in our sample:

$$(4)$$

$$\ln \text{VALUE} = \ln \alpha + \beta_1 \ln \text{TOTEMP} + \beta_2$$

$$\ln \text{RMAVAIL} + \beta_3 \ln \text{TSA} + \beta_4 \text{UPSCALE} + \beta_5$$

$$\text{ANALYZE} + \beta_6 \text{PROSPECT} + \beta_7 \text{BRANDED} + \beta_8$$

$$\text{MANAGCO} + \beta_9 CO_{OWN} + \beta_{10} \text{FIRM\_B} + u$$

Prior to its estimation, logarithmic transformations were made to the variables so indicated in

Equation 4.

Results

The hotels in our sample range in size from extremely small (e.g., 22 rooms) to fairly

large (e.g., 834 rooms). Compared to smaller hotels, larger hotels are likely to serve different

geographic markets (i.e., major metropolitan areas vs. small towns), face different levels of

competition, and cater to different target markets (e.g., leisure guests, business travelers,

convention trade). For this reason, we expect the parameter estimates of the production function

in Equation 4 to vary by hotel size.

Insert Table 2 here

Therefore, we classified our hotels according to the number of available rooms. Using the PKF Consulting (1997) classification scheme for full-service hotels, we divided our sample as follows.

Hotel Size	Number of Rooms	Number of Hotels in Our Sample
Small	1-124	33
Medium	125-200	92
Large	201+	122
Total		247

To determine whether an overall production function for the full sample could be developed, we conducted the Chow test for pooling the three subsamples (i.e., small, medium, and large hotels) into an overall sample (Johnston 1984). The calculated F ratio for this test was 2.437 with 22, 236 degrees of freedom and exceeded the critical $F(22, 236)$, $p = .01$, of 2.005. These results led us to reject the null hypothesis of equal regression coefficients across the three samples. Therefore, we could not pool the three hotel subsamples into a single overall sample.

We estimated the production function of Equation 4 for each hotel size grouping using ordinary least squares regression. These results are reported in Table 3. As can be seen, the estimated equations explain a substantial and statistically significant ($p < .01$) amount of variance for medium-sized and large hotels ($R^2 = .762$ and .798, respectively). Thus, for these hotels, we are confident that we captured the major determinants of hotel value added (i.e., our production function is adequately specified) and that our estimates are reasonably valid.

In contrast, the amount of variance in value added explained for small hotels was substantially less (R2 = 0.367) and not statistically significant (p > .10). This suggests that our production function for small hotels may not have captured all of the important determinants of value added. Omitted environmental factors such as local market competition and demand

characteristics (e.g., population growth) may explain a significant amount of variance in small

hotel value added.

Economic Inputs

In terms of the elasticity coefficients for the economic inputs, Table 3 shows that the

elasticity of labor increases as hotel size increases (i.e., $\beta_1^{SMALL} = 0.474, \beta_1^{MEDIUM} =$

$0.629, \beta_1^{LARGE} = 0.966$). All of these coefficients are significantly larger than zero ($p < .05$).

This finding suggests that all hotels, regardless of their size, can increase their value added

output by adding labor.

Using the procedure for testing for significant differences among regression coefficients

(Kennedy 1998, pp. 229-30), we found that β_1^{LARGE} was significantly greater than ($p \leq .05$) than

either β_1^{SMALL} or β_1^{MEDIUM} (note particularly that β_1^{SMALL} and β_1^{MEDIUM} were not significantly

different at ($p \leq .10$). This means that larger hotels are able to generate greater increased in

output for the same relative increases in labor. For example, if a small hotel increases its labor by

1%, it can expect a 0.97% increase in value added. One possible explanation for this is that the

larger hotels in our sample were not using enough labor to their size.

The capital elasticity coefficients were found to be the following: $\beta_2^{SMALL} = $ -0.255,

$\beta_2^{MEDIUM} = $ -0.382, and $\beta_2^{LARGE} = 0.072$ (see Table 3). In contrast to the labor elasticity

coefficients, only the capital elasticity coefficient for medium-sized hotels was significantly

different form zero ($p \leq .10$). It was significantly greater than that for small hotels ($p \leq .10$) but

not significantly different from the capital elasticity coefficient for large hotels. Thus, increases

in value added are difficult to achieve by increasing the number of rooms available for sale,

except for medium-sized hotels. This result suggests that the small and large hotels in our sample

operate at the proper size given their value-added output and their labor input.

Insert Table 3 here

Returns to Scale

Returns to scale "describes the output response to a proportionate increase of all inputs" (Henderson and Quandt 1980, p. 105). Returns to scale are demonstrated by the sum of the two economic input parameters. If their sum exceeds unity, the hotels in our sample, as a group, experience increasing returns to scale. If their sum is less than one, the hotels experience decreasing returns to scale. If this sum is unity, the hotels experience constant returns to scale (Bucklin 1978b). For the small hotel subsample, $\beta_1 + \beta_2 = 0.220$, which is less than unity (see Table 4 a, b).

Using the following procedure, we test whether this sum is statistically greater than one (Ingene and Lusch 1979, p. 282). This test involves calculating the t ratio for the difference between the sum of these coefficients and unity. Equation 4 depicts how the t ratio is calculated:

$$t = (\beta_1 + \beta_1 - 1)/\sqrt{\mathrm{var}(\beta_1 + \beta_1)}$$

$$\text{where } \sqrt{\mathrm{var}(\beta_1 + \beta_1)} = \sqrt{\mathrm{var}(\beta_1) + \mathrm{var}(\beta_2) - 2\mathrm{cov}\,(\beta_1, \beta_2)}, \quad (4)$$

with df = regression denominator degrees of freedom. For our test of the null hypothesis that $\beta_1 + \beta_1 = 1$, we calculated the t ratio to be –1.566, which is not statistically significant ($p \leq .10$). Thus, the small hotels in our sample experience constant returns to scale as a group.

Table 4, part b, also shows that the t ratios calculated for medium-size and large hotels fail to achieve statistical significance ($p \leq .10$). Thus, regardless of size, hotels in our sample appear to be experiencing constant returns to scale. This result has implications for (a) the competitive structure of the hotel industry, (b) the efficient scale of hotel operations (i.e., optimal hotel size), and (c) the relative share of labor and capital employed by the hotels.

First, constant returns to scale suggests that the market for capital (rooms available for sale) and labor is perfectly competitive (Ingene 1982, p. 78; Ingene and Lusch 1979, p. 274). In other words, the U.S. national market for the output of these two chains' hotels is in equilibrium, implying that there is no long-run economic profit to be earned by opening additional hotels nationally (Henderson and Quandt 1980, p. 108). Equilibrium also implies that closing hotels will not increase long-run economic profits.

This result is not wholly unexpected. In markets with many competitors such as the hotel industry, competition forces constant returns to scale.[3] Where firms achieve increasing returns to scale, they will expand to the point at which they no longer experience increasing returns. Similarly, firms that face decreasing returns to scale will shrink their operations or exit the market. Thus, the equilibrium condition is one of constant returns in which long-term economic profits (i.e., profits greater than a "normal" return) are zero (Henderson and Quandt 1980). Hence, the competitive situation facing the hotels in our sample, as a group, appears to preclude any long-term economic profits.

Insert Table 4 about here

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[3] Recall that individual retailers compete at the local level. Thus, an individual hotel property faces a relatively high level of local competition regardless of the level of competition the chain faces at the national level.

Second, with constant returns to scale, a Cobb-Douglas firm's supply function is not well defined (Varian 1996, p. 334). This means that "as long as the output and input prices are consistent with zero profits, a firm with a Cobb-Douglas technology is indifferent about its level of supply" (Varian 1996, p. 334). In other words, there is no single optimal scale of operations; various sizes of hotels can be operated with equal efficiency. And, this appears to be the case with our sample of hotels.

Finally, labor's relative share of value added is calculated by the quantity $[\beta_1/(\beta_1 + \beta_2)]$ (Ingene and Lusch 1979). In terms of its relative share of output, labor accounts for between 62% and 65% of output, relative to capital, for small and medium-sized hotels (see Table 4, part c). For these hotels, capital accounts for between 35% and 38% of output as compared with labor. For large hotels in our sample, the relative share of outputs is dramatically different. Labor accounts for 93% of output relative to capital; capital accounts for 7% of output relative to labor. Thus, labor's contribution to output is fairly constant for the small and medium-sized hotels in our sample. It markedly increases for the large hotels, however. All of these results mean that output is more responsive to changes in the quantity of labor employed. This finding is consistent with the common practice of adjusting the amount of labor to expand output or to respond to contracting output. The reason is that hiring or laying off employees is cheaper and can be implemented faster than adding or shuttering rooms.

Note that share of outputs can provide an additional check on the adequacy of our specification of the Cobb-Douglas production function. In competitive equilibrium, as we have here, the elasticity coefficients (i.e., our regression coefficients) for capital and labor should equal their respective shares of output (Ingene and Lusch 1979, p. 274).

Comparing parts a and c in Table 4, we see that for medium- and large-sized hotels, the relative shares are quite similar to the elasticity coefficients. These results provide evidence of the validity of our Cobb-Douglas specification for hotels of these size groupings.

For small hotels, the relative shares and the elasticity coefficients are somewhat different. This is largely due to the negative, albeit nonsignificant, coefficient for capital (i.e., RMAVAIL). This result coupled with the relatively small R^2 (i.e. $R^2 = .367$) as well as the small size of this subsample (i.e., $n = 33$) lessens our confidence in our Cobb-Douglas estimates for the small hotel group. Indeed, the large number of estimated parameters relative to the subsample size as well as the lack of significant results suggest that our statistical test for this hotel size grouping may lack adequate power.

Marginal Products of the Economic Inputs

Table 4, part d, reports the average productivity ratios for the economic inputs. These were calculated by simply dividing the average value added for each hotel size classification by the corresponding average total number of employees. The results show that the labor and capital productivity ratios increase for hotels in larger size categories. In other words, larger hotels generate on average more value added per employee and more value added per available room.

To understand why this might be so, we calculated the marginal products of the economic inputs (see Appendix B). Table 4, part e, shows that as hotel size increases, the marginal product of labor increases from \$16,894 for small hotels to \$25,845 for medium-size hotels to \$48,507 for large hotels.

As noted above, constant returns to scale implies that the firms operate in a competitive environment. This implies that firms will add inputs up to the point at which their marginal

products equal their input prices. For labor, this means adding labor until the marginal product of

labor equals the wage rate. Thus, for example, medium-sized hotels will continue to add

employees until their wages (including benefits and taxes) reach $25,845. For wage rates less

than that, the hotel is able to generate additional profit by hiring more employees. Beyond that

wage rate, the hotel loses money by hiring additional employees (i.e., the marginal profit

becomes negative).

Given constant returns, the marginal products reported in Table 4, part e, should equal the

input prices. For large hotels, the marginal product of labor is $48,507, whereas the marginal

product of labor for medium-sized hotels is $25,845. This result implies that large hotels face

higher labor costs than do medium-sized hotels. Larger hotels might face higher labor costs for a

couple of reasons. First, these hotels are generally located in larger cities where competition for

high-quality labor can drive up wage rates. Second, and related, larger hotels are more likely to

be unionized, leading to higher labor costs.

The marginal products of capital are also reported in Table 4, part e. They too vary

according to size category, suggesting that hotels of different sizes face different capital costs.

For example, the average small hotel is clearly too large. For each additional room it adds, it

loses value added; thus, it might benefit by taking rooms off-line. The average small hotel should

shrink its size to the point at which the value added for taking the next room off-line just equals a

fair return on the capital costs tied up in that room. Table 4, part e, also suggests that medium-

sized hotels face higher capital costs than do larger hotels ($8,823 vs. $2,148, respectively). This

might be due to a number of factors including differential construction economies, risk

premiums, and profit-generating opportunities for room space.

Strategic and Organizational Inputs

The strategic and organizational inputs also affect hotel value-added output when the hotels are segmented by size (see Table 3). Neither investment in TSA, the analyzer strategic orientation (ANALYZE), the prospector strategic orientation (PROSPECT), independent management company management arrangement (MANAGCO), nor FIRM_B were significantly related value-added output.

Indeed, none of the strategic and organizational inputs were significantly linked to the value-added output of small hotels. For medium-sized hotels, the only strategic and organizational input that was significantly related to value added was the upscale service orientation ($\beta_4^{MEDIUM} = 0.639$, $p < .10$). This coefficient was significantly larger (p $< .01$) than its counterpart for large hotels ($\beta_4^{LARGE} = 0.098$, p $< .01$) but not so for small hotels ($\beta_4^{SMALL} = 0.225$, p $> .10$). Note that β_4^{SMALL} and β_4^{LARGE} were not statistically different from each other at the .10 level.

Of the strategic and managerial inputs for large hotels, only the branded management company management arrangement ($\beta_7 = 0.427$) and company ownership ($\beta_9 = 0.225$) were significantly ($p < .05$) related to value added. The large hotel coefficient for the branded management company management arrangement was significantly ($p < .05$) greater than its counterpart for small hotels ($\beta_7^{SMALL} = -.0437$, $p > .10$) but not significantly different from its counterpart for medium-size hotels ($\beta_7^{MEDIUM} = 0.083$, $p > .10$). Note that β_7^{SMALL} and β_7^{MEDIUM} were not statistically different ($p > .10$). The large hotel coefficient for company ownership was significantly ($p < .10$) greater than its counterpart for small hotels ($\beta_9^{SMALL} = -0.222$, $p > .10$) but not significantly different from its counterpart for medium-size hotels ($\beta_9^{MEDIUM} = 0.011$, $p > .10$). Note that, once again, β_9^{SMALL} and β_9^{MEDIUM} were not statistically different ($p > .10$). In

summary, these results indicate that the strategic and organizational inputs generally appear to have little impact on hotel output, even when the sample is segmented by hotel size.

Discussion

In this article, we have attempted to understand the economic as well as the strategic and organizational factors that influence the level of value added produced by the individual hotel properties of two successful hotel chains. The most consistent finding was that labor input, as measured by the total number of employees, significantly affected hotel value-added output. In addition to this factor of production, capital as measured by total rooms available for sale had a significant impact in the medium-sized hotel segment. Medium-sized hotels that projected an upscale service orientation also were significantly more productive (i.e., generated more output) than midmarket hotels. Only in the large-hotel segment were branded management company hotels and company-owned hotels able to produce significantly more value added. Surprisingly, the hotel's strategic orientation or its investment in TSA had no impact on the level of value added generated by the hotel.

In one sense, our results revealed the obvious—the value created by a hotel is highly determined by the number of employees it uses and the number of rooms it makes available for sale. Because labor and capital are two traditional economic inputs, it would be surprising if these inputs were not significantly related to hotel output.

As a group, the strategic and organizational factors that we studied had little influence in generating value-added output. Several reasons for this are plausible. First, we only studied the U.S. hotels of two successful chains. Had we expanded our sample to include other chains as well as independent hotels, we would have obtained more variance on these factors, which might

have increased the likelihood of statistically significant regression parameters. The lack of

variance on these factors was especially problematic with the small-hotel subsample and, to a

lesser degree, with the medium-size hotels. Having larger subsamples may have overcome this

problem. Second, as noted earlier, a hotel's management matches its strategic orientation to the

environment it faces (Dev and Brown 1991). If the match is appropriate, performance should be

enhanced; if not, performance will be harmed. Thus, depending on its environment, different

strategic orientations might be equally effective in producing value added for a hotel. The same

argument might be made for other strategic and organizational factors. For example, the hotel's

management arrangement is often chosen on the basis of the local conditions facing the hotel;

therefore, no systematic relationship between it and value added would be uncovered. In

contrast, our results suggest that the high degree of competition in the hotel industry might force

firms to adopt quite similar strategic and organizational approaches to the marketplace. In other

words, in a competitive market, hotels tend to mimic the business strategies and organizational

patterns of successful firms, resulting in little variation in these variables.[4] As noted above, this

might be particularly true for the small hotel subsample.

Research Implications

This study suggests a number of implications for future research. For example, the

proposition that local conditions preempt several of the strategic and organizational factors might

be tested in future research. Indeed, several researchers have studied how variations in the extent

of competition within a trading area and the nature of the demand-and-supply environment

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[4] For an analytical and empirical application of this argument in the context of marketing channels, see Coughlan (1985).

within the trading area (e.g., population growth rate, household income, seasonality of demand, availability and cost of labor) affect productivity measured at the trading-area level (e.g., Bucklin 1983; George and Ward 1973; Ingene 1982, 1983). These macro-level variables could be measured easily at the micro (i.e., firm) level. Incorporating these environmental factors into our production functions and supplementing them with other factors not measured here (e.g., the availability and cost of capital) will provide more fully specified statistical models of productivity, especially for the small-hotel subsample.

In this research, we used the hotel's value added as a measure of output. This measure aggregated the output of all of the hotel's departments into a single figure. Future research might attempt to separate this overall output measure into separate figures for each of the hotel's major departments. Measuring output as value-added return on investment would adjust for differences in the hotels' investment base, another factor that might account for differences in dollar value added. Future research also might attempt to use nonpecuniary indicators of hotel output. Included in these measures might be occupancy rates, number of meals served relative to dining service capacity, and so forth. These physical output measures avoid some of the difficulties of using dollar measures, as discussed earlier.

Another challenge for future research is to obtain finer measures of the input factors. For example, the number of employees could be broken down by specific function (e.g., sales force vs. housekeeping staff vs. cooks vs. wait staff vs. reservations staff vs. front-desk employees). The type of capital assets also could be measured with more detail. For example, the number of years since remodeling, the age of reservations systems and its technology, and the use of automated self-checkout systems could be measured in addition to the number of rooms available for sale. At a minimum, future research should measure the hotel's assets devoted to

guest services other than lodging (e.g., food and beverage, personal fitness). An important factor

of production—land—was not examined in this research; therefore, future studies should gather

information about the hotel's land (namely, the quality of its location).

Our sample was restricted to hotels from two successful chains. To enhance the

generalizability of these results, future research should expand the sample to include other chains

as well as independent hotels. Furthermore, ours was a cross-sectional study. As shown in Table

1, productivity changes over time. Having longitudinal data, however, would allow those

changes to be tracked. Next, data on the hotel's primary market segments (e.g., leisure vs.

business guest) also might be helpful in more fully specifying the production function of

Equation 4. Moreover, our study shares a weakness of most studies on retail productivity and

that is "the lack of data on the customer's input into the process" (Kamakura, Lenartzowicz, and

Ratchford 1996, p. 350). Hotel guests do perform some of their own services with the capital

provided by the hotel (e.g., self-checkout, making their own coffee, providing their own snack

and beverage service from the minibar, pressing their own clothing). The extent of guest

participation in these services should also be taken into account in evaluating hotel productivity.

Finally, a comparative study of productivity that builds on our investigation and conducted

across a variety of service industries appears warranted. Such a study can illuminate important

similarities and differences among lines of trade, thereby providing insights for improving

productivity in the service sector as a whole.

Managerial Implications

Bucklin (1978a) offers a number of suggestions as to how firms can use analysis of their

productivity to enhance their operations. These suggestions can apply to restaurants, banks,

health care providers, financial institutions, and other service firms in addition to retail,

wholesalers, and manufacturers. We illustrate these suggestions by applying our findings from

the hotel industry.

One way in which productivity analysis can be used is evaluating the firm's competitive

position in terms of its productivity. Table 5 compares the labor and capital productivity ratios of

our sample with the larger population of hotels and motels.[5] The hotels in our sample generate

more sales revenue per employee and more sales revenue per room than the industry average. In

this sense, the hotels of the two firms we studied represent a target for other firms to reach. To

maintain their competitive superiority, the hotels in our sample must continue to find ways to

enhance their productivity.

Anderson, Fornell, and Rust (1997) suggest two key ways in which productivity can be

enhanced. First, capital can be substituted for labor by improving current labor practices or

automating some of those practices. A difficulty with this is that "the greater role of personnel in

determining quality for many services [such as lodging services] implies that in many cases, it

will be difficult to substitute capital for labor" (p. 135). Second, management can improve the

quality of its resource allocation decisions. Examples include improved employee scheduling and

increased marketing activities designed to smooth out peaks in demand. In addition, Lovelock

and Young (1979) suggest that involving consumers more in the production of their services can

improve a service firm's productivity. Hotels have done that to some extent by providing their

guests with automated self-checkout procedures and with the equipment to make their own

coffee, fix their own snacks and beverages, and press their own clothing, for example.

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[5] The data in this table are not directly comparable as our study refers to hotel performance in 1993, whereas the Census of Service Industries data were for 1992. Regardless of this discrepancy, the table suggests that our sample is more productive than the industry in general.

As enumerated earlier, our research shows several ways in which hotels can increase their

output. To recapitulate, adding labor up to the point at which the marginal product of labor

equals the wage rate is the most potent means of increasing value-added output. Expanding the

number of rooms offered for sale to the point at which capital cost of adding an additional room

equals the marginal product of capital also enhances the hotel's output. Note that we found these

equilibrium points to vary according to hotel size. Taking medium-size hotels more upscale

(within the confines of the overall brand image, of course) is another way in which a hotel can

improve its output. Beyond this, larger hotels can enhance their output by changing their

management arrangement to branded management companies. Company ownership also

provides an output advantage to larger hotels; however, contractual constraints may prevent the

conversion of franchised hotels to company ownership.

Insert Table 5 here

Bucklin (1978a) argues that by thoroughly studying its productivity, a firm can develop

standards for motivating its employees. These standards can be developed for every department

in the hotel. Thus, they will vary according to the specific output of the department. For example,

the lodging sales and banquet sales departments might be measured on guest profitability per

employee, whereas the dining facility might be evaluated on the meals served per labor hour.

Care must be taken so that these productivity standards are high enough to be challenging but not

so onerous that they are unattainable.

Another use of productivity information is to forecast labor, capital, and technological

requirements (Bucklin 1978a).We illustrate this using the parameter estimates of Equation 4

reported in Table 3. Assume that the hotel wishes to forecast the amount labor required to

achieve a 15% increase in value added. Recall that β_1 represents the elasticity of labor and is interpreted as the percentage change in output due to a 1% change in labor. For medium-sized hotels, $\beta_1 = 0.629$ (see Table 3), which implies that a 1% increase in labor will yield a 0.63% increase in value-added output. This suggests that labor should increase by roughly 24% to achieve a 15% increase in value added (i.e., 15.0/0.63 = 23.8). In making this calculation, we assume that the strategic and organizational inputs remain constant and that sufficient slack in capital inputs exists such that diseconomies do not occur.

A final consideration is the link between a hotel's productivity and its profitability. For example, Withiam (1997) reported that in 1996, hotels experienced increased operating profits, even though occupancy rates were stagnant. The reason is that firms were able to raise their prices while maintaining high levels of productivity. Had the hotel industry been able to experience even greater productivity in 1996, its profitability would have been even higher.

Summary

The lodging industry has experienced below-average growth in labor productivity throughout the 1990s (see Table 1). Thus, achieving increased productivity remains an issue with many firms in this industry. The objective of this empirical study of two successful hotel chains was to gain insights as to how managers can improve the productivity of their hotels. We examined the impact of the usual factors of production—labor and capital—as well as selected strategic and organizational inputs. The output measure we used was a dollar measure of the value added by the hotel. We conducted our analysis for different hotel-size classifications.

For all three size classifications (i.e., small, medium, and large hotels), we found value added to rise significantly with an increasing number of employees. In addition, increasing the

number of rooms available for sale as well as an upscale price/service positioning generated

significantly greater value added for medium-sized hotels. Also, the value added by large hotels

was significantly enhanced with management by a branded management company and company

ownership of the hotel.

For each size grouping, we found that constant returns to scale characterized our hotels.

Relative to capital inputs, labor accounted for about two thirds of value added for the small and

medium-sized hotels and about 93% for the large hotels. The marginal product of labor was

found to increase with increasing hotel size. The marginal product of capital varied less

systematically. Small hotels experienced a negative marginal product of capital, whereas midsize

hotels realized the greatest marginal product of capital. In general, these results suggest that to

produce more value added, hotels should add inputs (i.e., labor and capital) to the point at which

the marginal product of each input (e.g., labor) is equal to the price of that input (e.g., wage rate).

Managers of service firms can use productivity analysis in a number of useful ways

(Bucklin 1978a). It can be used to benchmark the firm's productivity against market leaders,

industry averages, or peer competitors. Such analysis also can be used to determine ways in

which productivity can be enhanced (e.g., substituting capital for labor, shifting functions to

suppliers or customers). Setting standards for motivating employees, forecasting labor, capital,

and technological requirements as well as determining the impact of productivity on profitability

are other ways in which this analysis can be used.

Appendix A

Selected Questionnaire Items

Transaction Specific Assets (TSAs)

- The systems and procedures we use with this brand could not be used for any other hotel brand without major changes. [a]

- To market our services under this brand, we have had specialized training that we could not use with another brand.

- Our hotel/firm has spent a lot of time and effort to develop a strong customer base for this particular brand.

- The systems and procedures we use to sell hotel services are tailored for this brand.

- We have spent a lot of time and effort learning special selling techniques for this hotel brand.

- If we switched to a competitive brand, we would lose a lot of the investment we have made in marketing our services.

Hotel Strategic Orientation (STRAT)

- Hotel A maintains a "niche" within the market by offering a relatively stable set of services/facilities. Generally Hotel A is not at the forefront of new services or market developments in hospitality. It tends to ignore changes that have no direct impact on current areas of operation and concentrates instead on doing the best job possible in its existing arena.

- Hotel B maintains a relatively stable base of services at the same time moving to meet selected, promising new service/market developments. The hotel is seldom "first-in" with

new services or facilities. However, by carefully monitoring the actions of institutions

like Hotel C (below), Hotel B attempts to follow with a more cost-efficient or well-

conceived service.

- Hotel C makes relatively frequent changes in (especially additions to) its set of

   services/facilities. It consistently attempts to pioneer by being "first-in" in new areas of

   services or market activity, even if not all of these efforts ultimately prove to be highly

   successful. Hotel C responds rapidly to early signals of market needs or opportunities.

Hotel D cannot be clearly characterized in terms of its approach to changing its services or

markets. It doesn't have a consistent pattern on this dimension. Sometimes the hotel will be an

early entrant into new fields of opportunity, sometimes it will move into new fields only after

considerable evidence of potential success, sometimes it will not make service/market changes

unless forced to by external changes.

Please place your hotel on this scale by circling the number that best describes your hotel's
approach (if your hotel is most like Hotel D, please circle "D").

```
                      A             B                      C
Low change 1      2       3       4       5       6       7       High change          D
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APPENDIX B

Determining the Marginal Product of a Factor of Production

Equation B1 reproduces the generalized Cobb-Douglas production function discussed earlier and

depicted as Equation 1:

(B1)

$$O = \alpha L^{\beta_1} K^{\beta_2} M^{\beta_3} e^{\beta_4 N} e^u.$$

The marginal product of a factor of production represents the responsiveness of output to

changes in inputs. Specifically, it measures the change in output brought about by a one-unit

change in an input. For illustration, we derive how responsive changes in output are to a one-unit

increase in labor. We take the partial derivative of Equation B1 with respect to labor. This results

in Equation B2, which shows how output changes with respect to a one-unit change in labor.

(B2)

$$\frac{\delta O}{\delta L} = \alpha \beta_1 L^{\beta_1 - 1} K^{\beta_2} M^{\beta_3} e^{\beta_4 N} e^u$$

$$\frac{\delta O}{\delta L} = \left(\frac{\beta_1}{L}\right) \left(\alpha L^{\beta_1} K^{\beta_2} M^{\beta_3} e^{\beta_4 N} e^u\right)$$

$$\frac{\delta O}{\delta L} = \beta_1 \left(\frac{O}{L}\right)$$

where O/L = the average labor productivity ratio. For small hotels, we substitute in Equation B2

the mean values of O(i.e., value-added output, termedVALUE) and L (total employees, termed

TOTEMP).We also substitute the parameter estimate β_1 for small hotels from Table 3.We

therefore obtain the marginal product of labor, as expressed in Equation B3

$$\frac{\delta O}{\delta L} = (0.474 \times \$1,937,788 \div 54.4) = \$16,894. \quad \text{B3}$$

Thus, by hiring an additional employee, the average small hotel can increase its value-added

output by $16,894 per year. The marginal product of labor indicates that in competitive

equilibrium, which is the situation here, the average small hotel pays each employee an average

of $16,894 annually. The marginal product of capital can be calculated and interpreted similarly.

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Table 1. Labor Productivity Rates in Selected Lines of Trade (in percentages).

		Average Annual Labor Productivity Growth Rate[a]	
SIC	Line of Trade	1987- 1993	1994- 1996
531	Department stores	1.53	2.73
54	Food stores	−1.47	−1.70
56	Apparel and accessory stores	1.68	5.13
5731	Radio, television, and electronic stores	7.90	4.07
5734	Computer and computer software stores	18.83	19.50
602	Commercial banks	2.57	3.03
701	Hotels and motels	1.07	1.00
	Average nonfarm business sector	1.30	1.17

SOURCE: U.S. Department of Labor (1998b, 1999) and authors' calculations.
NOTE: SIC = Standard industrial code.
a. Labor productivity was measured as sales per employee.

Table 2. Correlations, Means, and Standard Deviations.

Variable	1	2	3	4	5	6	7	8	9	10	11
1. VALUE	1.000	0.936	0.551	0.037	0.516	0.067	−0.031	0.373	−0.127	0.221	0.370
2. TOTEMP	0.936	1.000	0.638	0.018	0.574	0.057	−0.001	0.327	−0.108	0.210	0.436
3. RMAVAIL	0.551	0.638	1.000	−0.002	0.356	0.058	0.024	0.208	−0.038	0.285	0.343
4. TSA	0.037	0.018	−0.002	1.000	−0.083	−0.008	0.015	0.043	−0.008	0.069	−0.177
5. UPSCALE	0.516	0.574	0.356	−0.083	1.000	0.008	−0.037	0.129	−0.025	0.118	0.425
6. ANALYZE	0.067	0.057	0.058	−0.008	0.008	1.000	−0.780	−0.001	0.015	−0.028	−0.095
7. PROSPECT	−0.031	−0.001	0.024	0.015	−0.037	−0.780	1.000	0.009	−0.076	−0.011	0.057
8. BRANDED	0.373	0.327	0.208	0.043	0.129	−0.001	0.009	1.000	−0.169	−0.096	0.096
9. MANAGCO	−0.127	−0.108	−0.038	−0.008	−0.025	0.015	−0.076	−0.169	1.000	−0.350	−0.026
10. CO_OWN	0.221	0.210	0.285	0.069	0.118	−0.028	−0.011	−0.096	−0.350	1.000	0.134
11. FIRM_B	0.370	0.436	0.343	−0.177	0.425	−0.095	0.057	0.096	−0.026	0.134	1.000
Mean	$6,479,898	137.5	236.0	3.888	0.150	0.640	0.255	0.045	0.381	0.166	0.259
Standard deviation	$9,303,183	135.7	131.6	1.290	0.358	0.481	0.437	0.207	0.487	0.373	0.439

NOTE: $n = 247$.

Table 3. Production Function Estimates.

Variable	Parameter	Small Hotels		Medium-Size Hotels		Large Hotels	
		Parameter Estimate	t Value	Parameter Estimate	t Value	Parameter Estimate	t Value
INTERCEP	α	14.129	9.533*	10.331	9.260*	10.594	18.038*
TOTEMP	β_1	0.474[a]	2.079**	0.629[a]	7.808*	0.966[b]	10.376*
RMAVAIL	β_2	−0.255[a]	−0.732	0.382[b]	1.661***	0.072[a,b]	0.527
TSA	β_3	−0.297[a]	−1.266	−0.070[a]	−0.994	−0.096[a]	−1.111
UPSCALE	β_4	0.225[a,b]	0.462	0.639[a]	4.391*	0.098[b]	1.105
ANALYZE	β_5	0.015[a]	0.063	−0.066[a]	−0.610	−0.053[a]	−0.469
PROSPECT	β_6	0.136[a]	0.517	−0.069[a]	−0.589	−0.161[a]	−1.311
BRANDED	β_7	−0.437[a]	−0.889	0.083[a,b]	0.544	0.427[b]	2.673*
MANAGCO	β_8	−0.171[a]	−0.902	−0.009[a]	−0.150	0.064[a]	0.871
CO_OWN	β_9	−0.222[a]	−0.688	0.011[a,b]	0.120	0.225[b]	2.488**
FIRM_B	β_{10}	0.221[a]	0.694	0.044[a]	0.476	−0.114[a]	−1.567
R squared		0.367		0.762		0.798	
F		1.273		25.919		43.878	
df		10, 22		10, 91		10, 111	
p		.303		.000		.000	

NOTE: Parameter estimates with different superscripts are significantly different ($p \leq .10$).
*$p \leq .01$. **$p \leq .05$. ***$p \leq .10$.

Table 4. Derived Economic Characteristics of the Sample.

	Hotel Size		
Characteristic	Small	Medium	Large
a. Elasticity coefficients (from Table 3)			
Labor (β_1)	0.474	0.629	0.966
Capital (β_2)	−0.255	0.382	0.072
b. Returns to scale ($\beta_1 + \beta_2$)			
$\beta_1 + \beta_2$	0.220	1.011	1.038
p value	.132	.966	.855
Returns to scale	Constant	Constant	Constant
c. Relative share of output			
$[\beta_1/(\beta_1 + \beta_2)]$			
Labor	0.651	0.622	0.931
Capital	0.349	0.378	0.069
d. Average productivity ($)			
Labor[a]	35,625	41,088	50,191
Capital[b]	18,535	23,071	29,929
e. Marginal products ($)			
Labor	16,894	25,845	48,507
Capital	(4,720)	8,823	2,148

a. Average value added per employee.
b. Average value added per available room.

Table 5. Productivity Measure (in dollars)

	This Study	1992 Census Data
Labor productivity (sales/employee)	50,650	46,151
Capital productivity (SalesPAR)	29,514	21,591

SOURCE: U.S. Department of Commerce (1996) and authors' calculations.