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Yield Management: Where We've Been, Where We Are, Where We're Going

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Abstract

The author describes yield management and the technology used to implement yield management in hotels, issues in usefulness, and legal issues concerning the use of yield management. A look into the future is provided, along with a critique of what further research may be needed in order to raise the level of usefulness of yield management systems in the hotel industry to that found in the airlines.

Keywords

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by
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Yield management and the computer systems used to implement yield management systems trace their ancestry to the airline industry. As airline systems have become more sophisticated, they have been a major factor in airline profitability. While some research indicates that yield management systems are widely used in the hotel industry, their contribution to hotel profitability has remained problematical.

Yield management has gained new credence now that the hotel business in America has enough activity to make its benefits apparent. Still, yield management is viewed by many hotel managers as something of a "black box," an add-on to the computer system which somehow determines what rate to charge.

Perhaps the simplest definition comes from Orkin[1] who defined yield as "a straightforward measure of the effectiveness of practices and policies applied to generating revenue from room sales." Yield can be expressed as follows:

$$Yield = \frac{Actual\ revenue}{Potential\ revenue}$$

Yield management systems attempt to maximize the yield (get the actual yield as close to the potential yield as possible). Hence, a

100-room hotel with a rack rate of $100 has a potential yield of $10,000 per night (100 x $100). If on any given night it experienced $7,000 in room sales, the yield for that night would be 70 percent (7,000 / $10,000). In the "good old days," when a hotel had few rate categories, this objective was achieved in a relatively simple two-step process: sell as many rooms as possible and sell the best rooms first. With today's segmented hotel market, the problem becomes complicated enough to require the use of a computer.

If this 100-room hotel were to have four rate categories with rates of $100, $90, $80, and $70, and a desired mix of 50 percent, 30 percent, 15 percent and 5 percent, the yield potential calculation might look like this:

$$
\text{Potential Yield} =
\begin{array}{lcr}
100 \text{ rooms x 50 percent x } \$100 & = & \$5,000 \\
100 \text{ rooms x 30 percent x } \$90 & = & 2,700 \\
100 \text{ rooms x 15 percent x } \$ 80 & = & 1,200 \\
100 \text{ rooms x 5 percent x } \$ 70 & = & 350 \\
\hline
& = & \$9,250
\end{array}
$$

Room Demands Complicate the System

With a highly segmented market, the problem becomes one of quoting effective room rates given a constantly changing demand curve for every given night in the future. In other words, a system is needed which will allow those quoting rates to quote the rate which will best achieve the goal of maximizing yield for a hotel in the long run, given varying customer demand for any given night. Thus, an effective yield management system adjusts "room rates in response to the level of rooms booked for future arrival dates,"[2] but it must do so in light of what the effect of encouraging discounted business on one night may have on nights immediately prior to and preceding that given night. For example, in a normal business hotel, week nights are much more popular than are weekend nights. A yield management system should weight the effect of offering a room at a discount for a guest coming in on a Sunday but staying through Thursday versus not accepting that reservation request and possibly selling the room at a high rate for a stay of Tuesday through Thursday. The complexity of this sort of decision points up how necessary a computer system can be; yet, surprisingly, this problem is beyond the capabilities of many simple yield management systems currently available.

Currently, hotel yield management software uses one or more of four approaches to yield maximization. (See Table 1.)

Naturally, in order for yield management to work, management must have certain information available. Kimes suggests the

Table 1
Four Approaches to Computerized Yield Management

Approach	Description	Strengths	Weaknesses
Rule Induction	Rate quotes based on demand versus forecast.	Simple, easy to train staff. Easily interpreted.	Does not develop an optimum solution.
Expert Systems	Rules-based system using artificial intelligence.	Much more sophisticated decision making.	Rules never change while situations do.
Optimization	Calculates best solution from various micro-economic factors.	Addresses other variables like length of stay, over-booking.	Mathematical decisions based on quantifiable variables only. Requires the "human touch."
Neural Networks	Programs which learn as they go along. Can distinguish what variables are important versus those that are not.	Can develop specific approaches of yield maximization for each hotel.	Acceptable results require a great deal of learning. Yield may suffer while program learns.

information requirements of a successful yield management system implementation.[3] See Table 2.

Yield management systems tend to provide short-term answers to the rate-quoting dilemma found most often at the point of accepting reservations. No yield management programs currently available seem of much help in making long-range strategic decisions concerning which segments to pursue and how to achieve the appropriate marketing mix which would result in long-term yield maximization.

Yield Management Maximizes Revenues

Research into the use of yield management systems shows some current trends. Hotels want a yield management system in order to maximize revenues.[5] Yet, they pursue this revenue maximization primarily within the context of maximizing yield on room rates.[6] One researcher found that 90 percent of hotels in her survey currently use some kind of yield management technique.[7] Most hotel users reported success using the system, with 93 percent reporting an increase in

Table 2
Information Required by Yield Management Systems

Requirement	Description
Booking patterns	By segment, how long before the arrival date most bookings take place.
Demand patterns	By segment, how many rooms are occupied on any given day assuming seasonality and weekly occupancy patterns.
Overbooking policy	The level to which reservations are accepted beyond the capacity of the hotel. Note that this policy may be defined by segment
Effect of price changes	The effects on demand a change in room rates will have. Sometimes defined as the elasticity of demand.
Good information system	When a hotel is part of a central reservation system there must be full integration with the property management system.

room rates which they attributed to the use of yield management systems. Respondents reported difficulty in training the staff in the use of the system, and resistance to undercutting of rates by corporate clients.

Kimes[8] correctly predicted that training and issues of fairness would be matters of concern when using a yield management system. She cited other problems such as employee morale, problems with established group sales incentive programs, and the need to integrate the yield management function into the hotel organization.

There may be legal issues involved in using yield management. One practice of first quoting higher rates during a reservation inquiry and then quoting lower available discounts after meeting buyer "resistance" could do more than simply build ill will among potential guests. This practice may be unfair and illegal under various state deceptive practices laws. Orkin suggests the hotel reservationist quote the highest rate first and offer discount rates or packages only after resistance to rack rates is heard.[9] Without clear guidelines as to what constitutes "resistance," the practice easily could slide over the line of what is legal to what is illegal.[10]

In a more precise look at those factors critical to the successful implementation and use of yield management systems, Griffin reports that to a greater or lesser extent there are 27 factors which have an impact on the ultimate success of a yield management system.[11]

Most critical, according to Griffin, were the system functions (what the system reports on and its decision support capabilities) and the system design (how sophisticated it is while maintaining a high degree of "user friendliness"). Griffin's conclusions tend to corroborate Jones and Hamilton who stressed the need to view yield management as a system encompassing both technology and people.[12] Without what they term a "yield culture," hotels using yield management technology are doomed to only partial success while having to fight a continual battle with their personnel to fully utilize the system.

It should be noted that yield management is established enough in our industry to have had several myths develop. Lieberman lists 10 myths, perhaps the most important being the myths that yield management only works when demand exceeds supply, that it is only an excuse for rate discounting, and that it is too complex.[13] Indeed, one could argue that one major failing of many yield management systems is that they are not complex enough to maximize yield for the total hotel operation and not just rooms yield.[14]

One of Four Systems Must Be Chosen

Keeping the issues of employee moral, training, customer satisfaction, and other critical success factors in mind, the hotel manager wishing to purchase a yield management system must determine which of the four systems will work best in his or her hotel. Incorrect fit of technology to application is common. Using the wrong yield management system is like trying to transport a family of eight in a sports car; teenagers could probably do it, but clearly there are better modes of transportation for such a crowd.

Hotel needs can be classified in a grid. (See Table 3.) A hotel's market may be relatively segmented or relatively unsegmented. Similarly, a hotel may experience at any given time relatively low or high demand. Given these possibilities, and assuming the situation a hotel finds itself in occurs more often than not, a purchaser of yield management technology can determine the minimum system necessary for doing the job as well as possible.

Hotels which find themselves primarily in Section 1 in Table 3 probably need only the simplest systems such as the rule-based or expert. Those in Section 2 need a much more sophisticated yield management system, at least an optimization system, perhaps a neural network. Section 3 hotels probably can do without a system; they need simply tell their sales people what the least expensive rate allowable may be and allow their people to bargain with those seeking reservations, keeping the bottom rate as a floor. Airline commentators seem to think that the domestic airline business is in Section 4, so those in the hotel business finding themselves in this box need the most

Table 3
Yield Management Grid

| | Hotel Market | |
	Unsegmented	Highly Segmented
High Demand	1. Traditional YM: Few discounts. Nightly walk-in trade. Set pricing policies.	2. Textbook YM: Numerous long-term contracts.
Low Demand	3. Inappropriate YM: Attempt to stimulate demand through heavy discounting leads to spiraling losses.	4. YM as marketing tool: Very low long-term pricing. Numerous discounts offered. If ineffective can lead to low market segmentation.

sophisticated systems possible. The old saying, "it takes money to make money" may be especially true in this instance, and only the best systems will prove profitable in this situation.

Computers Will Continue to Influence Industry

Perhaps no other aspect of society is changing as rapidly as our use of computer technology. To predict what will happen in five or 10 years is something no sane person would even attempt. However, trends can be seen which lead in some obvious directions. The Internet or its predecessor will be with us for a long time. This means that information will be more readily available, and available in ways that make it useful to a huge population base. Hotel industry leaders often bemoan the perceived high level of market segmentation. Finally, advances in computer technology as well as management science theory will continue to have an effect on the hotel business. Taking each issue at a time, these events can be seen as affecting yield management systems in several ways.

Chervenak predicts that yield management systems can pose a danger to room rate levels.[15] As he sees it, greater traveler access to various computerized reservation networks may result in more reservation activity as travelers seek bargain rates. This may increase cancellation activity to levels found in the airline industry today, forcing hotels and travel agencies to rethink their policies regarding

guaranteed reservations and advance deposits. It might be noted that Sabre, a major airline reservation system, experiences 35,000 rate changes daily by member airlines. As more people "surf the net," information will become even more readily available. Programs in use now allow travelers to seek the lowest fares between any cities. For instance, in one test, the lowest fare between Miami, Florida, and Toulouse, France, was via Toronto, Canada. It is obvious that shortly travelers will be able to seek the best prices on accommodations in destination cities as well.

There are some who see a trend toward fewer rate categories, with the result a curb on rate erosion and discounting. Glab notes that travel agents especially would breathe a sign of relief were the rate cutting prevalent in many yield management systems to be eliminated.[16] This contradictory prediction helps illustrate how hard it is to peer into the future. If this happens, then marketing on the Internet could well take on the more classic attributes of salesmanship, enticing travelers through an appeal to their senses and emotions rather than through their pocketbooks.

Systems Will Become More Sophisticated

Several researchers even predict a trend away from the use of yield management systems.[17] But the hotel manager who waits for the demise of yield management is taking a great risk. If one believes that yield management is not simply a computerized way toward rate discounting but a process of managing room inventory in times of varying demand, then those expecting a trend away from yield management may be quite incorrect. If anything, the trend will be toward the use of more sophisticated yield management systems should room occupancy percentages remain relatively high.

Dunn and Brooks point the way to more sophisticated yield management program with their proposal for a system they call "market segment profit analysis."[18] While it may be obvious to most hotel professionals that a low room rate given to a group can be more than offset by corresponding increases in food and beverage sales, surprisingly, most yield management systems today fail to take this factor into account. Naturally, such non-rooms department revenue must be included in any yield management decision making, and the newer systems have the capability to do so.

More sophisticated systems need not be more computer intensive. Badinelli and Olsen propose a rules-based system which could be used by even the smallest hotel property.[19] It can run on any personal computer and requires minimal input. While these are important issues, this system requires more testing to see how high the quality of its output may be. They do lead the way to the next obvious level of yield

management using optimization analysis rather than marginal revenue models. Optimization refers to a suite of mathematical procedures which search for the best (optimal) solution over the long run, rather than a short-term revenue maximization decision. This idea of possibly foregoing business today so as to increase revenue over several future days is one of the principal goals of yield management.

There are some things which can be safely predicted. Obviously, new yield management programs will be more sophisticated. Sophisticated is a computer term which means "requiring more knowledge to use." New systems may quote rates automatically at the time a person makes a reservation, but arriving at that point in time may require much more elaborate installation procedures and have higher employee training requirements. The trend is toward optimization programs and neural networks and away from expert systems. While a program that learns as it goes along may sound great, how many mistakes can a hotel tolerate during the learning stage? Clearly, the neural network yield management program is more conducive to chain reservation systems than to individual properties. Perhaps Badinelli and Olsen will be right and small properties will use a rules-based system of limited sophistication. This fast-paced field of study will require a lot of research activity before yield management systems can be said to be fully matured.

Research in Field Notes Confusion

It seems that currently research on yield management systems is confusing and in-exact. What research has been done indicates that hotel personnel are as confused about yield management as are the researchers. There are several things which are true, however. First, like any new policy or procedure, yield management system implementation requires the same thought and planning associated with any major change in the hotel's normal way of doing business. Clearly there are critical steps necessary toward successful installation and use of a yield management system. More research needs to be done to determine what those steps are.

Second, a clear distinction must be made in the literature concerning what a yield management system can and cannot do. Yield management is a short-term yield optimization technique; its use without an established long-term yield strategy is about as prone to error as the man who set out to drive from New York to Los Angeles without a map. The car was adequate to the task, but without a road map, the likelihood of arriving in Los Angeles quickly, if at all, was problematical. Again, the limitations of yield management have barely been addressed.

Third, researchers have been too caught up in breathlessly announcing the new yield management technology. Some research

already reported may be flawed methodologically. Telephone surveys or simple survey questionnaires may lack the reliability necessary to draw any meaningful conclusions concerning yield management system implementation and use. Besides, what hotel manager would be willing to admit that he or she doesn't use the current technology, especially if his or her new PMS system included the module? It is probably true that many hotels simply don't need a yield management system. Fourth, many studies have used inadequate sample sizes. Several studies looked at about nine hotels, way too small a sample for conclusions drawn by the researchers to be significant.

There is a need for yield optimization. The principal reason for airline profitability, given the brutal market, may be the effective use of yield management technology. Until more research is published, and more is known about which systems work best, we may leave the hotel manager with the following sage advice: Buy the most advanced system possible and treat its integration into the hotel system as a major event. Expect to spend a lot of time and money training staff and motivating them to use the system properly. Finally, keep reading professional publications and research journals like the *FIU Hospitality Review* for articles reporting research in this rapidly-changing field.

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