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Revenue Management: Advanced Strategies and Tools to Enhance Firm Profitability

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Contents

Abstract

Much of the past research on revenue management (RM) has focused
on forecasting and optimization models and, more recently, on adapta-
tion of RM to the specific needs in various industries, such as restau-
rants, car rental, transport and even health care services. Surprisingly,
although many industries have become increasingly customer-focused,
the customer seems to have been relatively forgotten in this stream of
research. Our intent in this monograph is to help explore the role of
marketing in RM in more depth.

1

Introduction

Revenue management (RM) is the application of information systems and pricing strategies to allocate the right capacity to the right customer at the right place at the right time. In practice, RM has meant determining pricing according to predicted demand levels so that price-sensitive customers who are willing to purchase at off-peak times can do so at favorable prices, while price-insensitive customers who want to purchase at peak times, will be able to do so.

RM has been widely studied [for a review of the RM literature, see Boyd and Bilegan, 2003, McGill and van Ryzin, 1999, Weatherford and Bodily, 1992] and has been applied to a number of industries including the airline industry [Smith et al., 1992], the hotel industry [Hanks et al., 1992], the restaurant industry [Kimes et al., 1998], the golf industry [Kimes, 2000], professional services [Siguaw et al., 2003], broadcast advertising [Bollapragada et al., 2002] and meeting space [Kimes and McGuire, 2001]. Companies using RM have shown a revenue increase of 2–5 percent [Hanks et al., 1992, Kimes, 2004, Smith et al., 1992], which is significant given the fixed-cost nature of many services.

Deregulation of the American airline industry was the major impetus for the development of RM. Before deregulation in 1978,

major carriers offered one-price services between cities. Immediately after deregulation, many new airlines emerged, and one airline, People's Express, developed an aggressive low-cost strategy. The People's Express story is well known: their airfares were considerably lower than those of the major carriers, and customers were attracted to the limited service that People's Express flights offered. The major carriers such as American Airlines, United Airlines, and Delta Airlines, aided by new computerized reservation systems, employed variable pricing on a flight-by-flight basis to match or undercut fares offered by People's Express. Cost-conscious passengers then switched back to the major carriers, and People's Express was eventually forced out of business. Donald Burr, the former CEO of People's Express, attributes his airline's failure to the lack of good information technology and the subsequent inability to practice RM [Cross, 1997].

Seeing the benefits of differential pricing, most major North American carriers instituted RM. RM allowed airlines to determine the minimum fare (of a set mix of fares) that should be available for a specific flight.

Not surprisingly, most of the earlier research on RM occurred within the context of the airline industry. Much of the past research on RM has focused on forecasting and optimization models [Bitran and Mondschein, 1995] and, more recently, on adaptation of RM to the specific needs in various industries, such as restaurants, car rental, transport and even health care services. Surprisingly, although many industries have become increasingly customer-focused, the customer seems to have been relatively forgotten in this stream of research. Our intent in this monograph, is to help explore the role of marketing in RM in more depth.

In Section 2, we provide an overview of RM and discuss approaches that firms can use to more profitably manage and define the ways in which they sell their capacity. In the next three sections, we will give an in-depth discussion of the roles that price, time and space play in RM. In Section 6, we discuss the marketing and customer conflicts that arise from the application of various RM approaches. We conclude with a summary and recommendations for future research.

2

An Overview of Revenue Management

2.1 Service characteristics that encourage the application of RM

The application of RM has been most effective when it is applied to operations that have the following characteristics:

- Relatively fixed capacity.

- Perishable inventory.

- Inventoried demand.

- Time-variable demand.

- High fixed costs.

- Low variable costs.

- Varying customer price sensitivity.

These attributes are generally found in some form or another in a variety of service industries. We discuss each characteristic in the following sections.

2.1.1 Relatively fixed capacity

The definition of capacity varies depending upon the industry. Capacity is typically based on physical attributes (e.g., hotel capacity is typically measured by rooms, shopping mall capacity is measured by square meters, airline and restaurant capacity is measured by seats) but in some instances is also measured by time (e.g., consulting firms, spa therapists), hours of operation (e.g., restaurants, golf courses) or labor availability (e.g., spas that have plenty of treatment rooms, but a shortage of therapists or service businesses in countries that are experiencing labour shortages). The key issue when measuring capacity is to define what the capacity constraint is for the firm. For example, a restaurant may have 200 seats, but if it has a poor mix of table sizes, insufficient staff or too small of a kitchen to be able to serve that many customers, the 200 seat inventory is no longer the capacity constraint.

Capacity is generally fixed over the short term, although a number of industries have some flexibility to be able to either reconfigure their capacity or add additional short-term capacity. For example, airlines can change their seat configuration or change the size of plane that is assigned to a route; restaurants can add outdoor seating during pleasant weather conditions; consulting firms can hire additional staff and free lancers to meet demand, and convention centers can reconfigure their meeting space.

2.1.2 Perishable inventory

One of the other key attributes of companies that can use RM is that their capacity (whether physical or non-physical) is perishable and cannot be stored for later use. For example, an unfilled airline seat, an unfilled cabin on a cruise ship or an unused consultant hour represents foregone revenue that cannot be recovered. Because of this, many industries consider offering discounts or promotions to be able to fill their unused capacity.

2.1.3 High fixed costs and low variable costs

In conjunction with fairly fixed and perishable capacity, industries using RM have relatively high fixed costs and low variable costs. This

combination gives them even more incentive to fill their unused capacity since, theoretically, anything that they make over their variable cost goes towards offsetting their high fixed costs. The relatively low variable costs give these industries some pricing flexibility and allows them the option of reducing prices during low-demand times.

2.1.4 Inventoried demand

Demand can be inventoried in two ways: through reservations and through queues. Most industries that employ RM use reservations (or advance sales) to create a demand inventory. Reservations are valuable because they give a company the opportunity to sell and control its inventory in advance of consumption (often with advance payment for that consumption). In addition, companies that take reservations have the option to accept or reject reservation requests. During high demand periods, they may choose to reject lower-value requests, for instance, while during low demand periods, they may choose to accept such requests.

While reservations help a company sell and control its inventory, they are not without problems. No-shows, late-shows, and short-shows are problems in all industries, which is why some businesses choose to rely on walk-in business rather than take reservations.

Companies that do not take reservations can use queues to select the customers they wish to serve. For example, consider the role of the queue at a popular nightclub. The bouncer has the capability to allow the highest value customers to enter the club while denying access to lower value customers. A similar situation occurs with restaurants that do not take reservations. For example, a popular restaurant in the southern United States has a very long wait list. When a table becomes available, the maître' d does not necessarily seat parties in a first-come-first-served basis, but instead chooses which parties to seat.

2.1.5 Time-variable demand

Customer demand has two components: the timing of the demand and the duration of the customer experience. Customer demand levels will vary by time of year, day of week and time of day. For example, with

restaurants, dinner demand may be higher on weekends, during summer months, or at particular times during the lunch or dinner periods. Managers must be able to forecast time-related demand so that they can make effective pricing and allocation decisions.

Time can be sold either explicitly or implicitly. When companies sell time explicitly (whether by the minute as for sun tanning studios and spa treatments, the hour as for bicycle rentals, or by the day as for hotels), they are better able to control their capacity because they know how long customers will be using the capacity. Companies that sell time implicitly (e.g., restaurants and golf courses) typically sell service experiences. They must be cautious in the way in which they attempt to control customer duration (e.g., rushing diners by presenting the cheque quickly after serving the desert) because of the potential impact on the customer's experience and resulting (dis)satisfaction.

2.1.6   Varying customer price sensitivity

Most companies have customer segments that are price sensitive and others that are not. For example, certain customers (for instance, students, families with small children or people on fixed incomes) may be willing to change the time they use service capacity in exchange for a lower price. Conversely, other customers are much less price sensitive and are often willing to pay a premium for a desirable space at a desirable time. Managers need first to be able to identify these different segments, and then tailor the design and price to the segment-specific needs.

2.2   A strategic framework for assessing revenue management

Firms using RM typically sell physical space for a given length of time for a variety of prices. In fact, success in RM is defined as maximizing the revenue per available space for a given time unit (RevPAST). For example, airlines seek to maximize revenue per available seat (the space) kilometer (a proxy of time), hotels try to maximize their revenue per available room (the space) night (the unit of time), and performing

arts centers try to maximize their revenue per available seat (the space) performance (a proxy for time). Implicit in all of these definitions are the concepts of price, time and space.

Price: The use of dynamic pricing is an outgrowth of both industry and market traditions. Any industry has the potential to use dynamic pricing; some use it, others are reluctant to either because of tradition or perceived negative effects on customer satisfaction. Revenue can reflect more than just the price of the inventory unit; it can also include ancillary revenue sources such as food, beverage, and spa expenditures (in the case of hotels), insurance and other add-ons (in the case of rental car companies) and concession revenue (in the case of stadiums and arenas).

Time: Like space, time can be sold either explicitly or implicitly. When companies sell time explicitly (whether by the minute, the hour or the day), they are better able to control their capacity because they know how long customers will be using the space. Companies that sell time implicitly typically sell service experiences and do not necessarily have control over how long customers use their space. For example, stadium operators sell tickets to a game (but do not explicitly state that customers can use the seat for a few hours). Restaurants sell meals (and customers purchase a dining experience), but internally allot a certain amount of time per table so that they can serve a sufficient number of guests to be profitable.

Space: Space can also be sold either explicitly or implicitly. When sold explicitly, space is simply sold as space (i.e., area, height or volume). For example, moving companies charge by volume, retail stores sell linear feet of shelf space, and print advertisements are sold by the line or square inch.

Conversely, when space is sold implicitly, the firm configures the physical space into an inventory type that helps meet customer needs from that space. For example, hotels configure their physical space into different types of rooms (e.g., single, double, junior suits, presidential suits, etc), and restaurants convert their physical space into tables. Multiple versions of these inventory types may be used, and in some

situations the physical space requirements associated with these inventory types may vary.

Companies using RM have to decide how they want to balance their design and management of price, time and space so that they can maximize their long-term revenue. We discuss each of these concepts in more depth in the next three sections.

3

The Role of Price in Revenue Management

The focus of this section is on the strategic role of price in RM. In order to successfully use price as a strategic weapon, firms must address two questions: what prices to charge and how to determine which customers or market segments should be offered those prices. In addition, companies must study and understand both customer and competitive reaction to their use of RM pricing. In this section, we will address these questions through a review of the relevant literature and current practices.

3.1 The role of dynamic pricing in RM

Price can be used in two ways: to determine the optimal prices and to determine who should pay which price (typically through the development of appropriate rate fences). What makes RM pricing different is the presence of excess (or unconstrained) demand. When unconstrained demand exists, firms can select the customers willing to pay the most. Because of this, companies that are successful with RM generally show a strong positive correlation between their capacity utilization percentage and their average rate per person [Canina and Enz, 2006].

3.1.1 Inventory control by price category

RM research has been conducted since the late 1950s [Beckmann, 1958], but did not become widespread until the 1990s. Most of the early (pre-1995) RM research focused on the inventory control aspect of RM, and more specifically focused on various facets of the arrival management question, including (1) the forecasted demand for different price categories, (2) the inventory allocation decision (the amount of inventory to allocate to different price categories, and (3) the overbooking decision.

The question of duration control, whether it be in the context of the multiple flight legs for the airline industry or the multiple day usage patterns of the rental car and hotel industries were not addressed until the early 1990s [Baker and Collier, 1999, Smith et al., 1992, Williamson, 1992]. The implementation of this research was slowed because of the need to develop the necessary level of forecast detail required [Smith, 2001]. For an excellent review of RM research please see McGill and van Ryzin [1999] and Boyd and Bilegan [2003].

3.1.2 Expected marginal seat revenue model

Early research focused on the seat inventory allocation problem in the airline industry [e.g., Littlewood, 1972]. Belobaba [1987, 1989], in his work on the Expected Marginal Seat Revenue (EMSR) model, further developed Littlewood's earlier research. The EMSR model considers both fare categories (f_i) and the expected demand for each fare category (d_i). Demand is assumed to be normally distributed and customers booking lower fare classes are assumed to book earlier than those booking higher fare classes. The EMSR model is as follows:

$$\text{EMSR}_i(d_i) = f_i * P_i(d_i)$$

where f_i is the average fare level of the fare class i; $P_i(d_i)$ is the probability of selling d or more inventory units at a given price.

The model is solved iteratively to set booking limits for each fare class and the booking limit for the full fare is assumed to be equal to

the remaining capacity. Note that the fare classes are considered as a given. Belobaba [1992] later modified the EMSR to better account for the relationship between fare classes. This revision, termed the EMSRb is one of the most commonly used seat allocation heuristics in the airline industry.

Linear programming methods have also been used as a basis for RM models. The objective is generally to maximize revenue given capacity and demand constraints over time. Again, rate classes are taken as a given. The basic linear programming formulation set in a hotel context is as follows:

$$\text{Maximize } \sum_{j=1}^{m}\sum_{i=1}^{n}\sum_{t=1}^{p} R_{ij} * A_{ijt}$$

Subject to

$$\sum_{j=1}^{m}\sum_{i=1}^{n} A_{ijt} \leq C_t \quad \text{for all } t$$
$$A_{ijt} \leq C_{ijt}$$
$$A_{ijt} \geq 0$$

- i = rate class

- j = length of stay

- t = time period

- A_{ijt} = the number of inventory units to sell for each rate class i, length of stay j and time period t combination,

- R_{ij} = the revenue from rate class i and length of stay j combination,

- C_t = the capacity at time period t

- D_{ijt} = the forecasted demand for each rate class i, length of stay j and time period t combination

The linear programming formulation is generally approached in one of two ways: (1) as an allocation method in which the decision variables

are the number of inventory units to allocate to each rate class, or (2) as a shadow price approach in which the shadow prices associated with the capacity constraints are used to determine which (if any) of the rate classes should be available for booking [Baker and Collier, 1999, Simpson, 1989, Talluri and van Ryzin, 1998, Williamson, 1992]. The shadow price approach (also referred to as the network bid price approach) can be used to develop network and pricing controls for sales, call center-based, and electronic distribution and reservation systems.

Dynamic programming models have also been proposed and allow for better inclusion of the multiple decisions needed over a set time horizon than linear programming-based models [Badinelli, 2000, Bitran and Mondschein, 1995, Lee and Hersh, 1993]. Although theoretically appealing, the dynamic programming approach has been stymied because of the size of the problem and the intensive computation required.

3.2 The history of price in RM research and practice

Little of the research published before 1995 included price as a variable. Price was considered to be an exogenous variable that was provided by a third party and there appears to have been little consideration for the fact that price might drive demand or that the prices provided may not be optimal. Given that any RM decision is a function of both price and duration, it is essential that RM models include information on the relationship between price and demand, and considers the potential impact of that relationship on revenue maximization.

Most research on integrating the pricing and allocation decision began in the mid-1990s, and both deterministic and stochastic models for both the single and multiple product problems have been proposed. For excellent reviews of pricing research in a revenue management context, see Bitran and Caldentey [2003], and Elmaghraby and Keskinocak [2003].

Ladany and Arbel [1991], in their article on RM in the cruise line industry, were some of the first to consider the role of price in RM. Weatherford [1997] developed a simultaneous pricing/inventory

allocation decision model, but the complexity of his formulation led to the need for simulation to develop reasonable solutions.

Gallego and van Ryzin [1994] studied the optimal pricing decision in situations with stochastic and price-sensitive demand where a firm is trying to maximize revenue. Gallego [1996] developed a simple deterministic model to analyze pricing and market segmentation decisions, and presented optimality conditions.

Gallego and van Ryzin [1994], and Zhao and Zheng [2001] studied the problem of dynamically pricing products over a given time so that a firm can maximize revenue. Other studies have looked at similar problems in the retail context [e.g., Bitran and Mondschein, 1998, Heching et al., 2002].

Beyond developing an optimal set of prices, a firm must decide on the number of prices (or price buckets) that should be offered [Bitran and Caldentey, 2003, Quain et al., 1999]; the maximum number of price changes to make over the selling horizon [Bitran and Caldentey, 2003]; the strategy for integrating markdowns, markups and promotions [Bitran and Caldentey, 2003, Bitran and Mondschein, 1998, Heching et al., 2002] and the potential impact of price on bundled products [Morwitz et al., 1998, Xia and Monroe, 2004].

The change in research orientation parallels the changes in RM practice. During the 1980s and 1990s, the primary way that RM professionals used price was to ask the marketing department to provide prices and then used their RM system to determine how to best allocate demand to those prices. During the past 10 years, RM practice has moved from an operations focus to much more of a marketing orientation in which revenue managers try to develop products/services for particular market segments and price them accordingly. Not surprisingly, this change has also resulted in the movement of the RM function from operations-related departments to sales and marketing departments.

3.3   The use of rate fences in RM pricing

Inherent in revenue management is the concept of price customization. That is, firms charge different customers segments different prices for

what is essentially the same service. How to do this was explained illustratively by Simon and Dolan [1998] as follows:

> The basic idea of price customization is simple: Have people pay prices based on the value they put on the product. Obviously you can't just hang out a sign saying "Pay me what it's worth to you," or "It's $80 if you value it that much but only $40 if you don't." You have to find a way to segment customers by their valuations. In a sense, you have to "build a fence" between high-value customers and low-value customers so the "high" buyers can't take advantage of the low price.

In other words, if a company charges multiple prices for essentially the same product, it must differentiate those prices so that customers feel as if they are purchasing different products. For example, consider a hotel that charges three rates ($75, $100 and $125). Customers paying the $125 rate may receive additional services such as 'free breakfast', more desirable rooms and late checkout, while those paying the discounted $75 rate may be required to make their reservations well in advance and receive less desirable rooms. The conditions associated with different rate categories (or prices) are referred to as rate fences. Essentially, a rate fence is the reason why people pay different prices.

Well-designed rate fences allow customers to self-segment based on their willingness to pay and different service characteristics. Essentially, rate fences allow companies to restrict lower prices to customer segments that are willing to accept certain restrictions on their purchase and consumption experiences [Lovelock and Wirtz, 2011].

Rate fences can be either physical or nonphysical. Physical fences refer to tangible product differences related to the different prices, such as the seat location in a theatre, the size and furnishing of a hotel room, or the product bundle (e.g., business class is better than economy class). Nonphysical fences refer to consumption, transaction or buyer characteristics, but the same basic service (e.g., there is no difference in an economy class seat or service whether a person bought a heavily discounted ticket or paid the full fare for it). Examples of nonphysical fences include having to book a certain length of time ahead, not being

able to cancel or change a booking (or having to pay cancellation or change penalties), or having to stay over a weekend night [Dolan and Simon, 1996, Kimes and Wirtz, 2003, Wirtz et al., 2012]. Examples of the most common rate fences are shown in Table 3.1.

Traditionally, rate fences were not always apparent to customers seeking to make a reservation. For example, a rental car firm could offer lower rates to government employees or to senior citizens, but most customers might not be aware of these lower rates. Internet prices make rate fences much more transparent to customers, and if not well-managed may lead to questions as to why particular groups are given lower rates that may not be available to other customers. We discuss in Section 6 how such customer perceptions related to RM practices and rate fences can be managed effectively.

In conclusion, based on a detailed understanding of customer segments' needs, preferences, and willingness to pay, effective rate fences can be devised that consist of physical product features (i.e., physical fences) and nonphysical product features (i.e., nonphysical fences). In addition, a good understanding of the demand curve is needed so that "buckets" of inventory can be allocated to the various price categories. See Figure 3.1 for an example in airline industry.

3.4 How prices are set in practice

Although some of the pricing research previously described has been adopted by selected firms with advanced RM teams in the airline, hotel, rental car and retail industries, the majority of pricing practices are still non-mathematically based. In practice, most RM prices are set either with competitive pricing or through negotiation. This results in a large number of prices that generally have to be placed into rate categories (or buckets) so that they can be controlled by the RM system.

3.4.1 Competitive pricing

Competitive pricing has become even more important with the growth in the online travel market [Green, 2006]. Customers can easily compare prices among competitors by going to any of the large Internet

Table 3.1: Key categories of rate fences.

Rate fences	Examples
Physical (product-related) Fences	
Basic product	• Class of travel (business/economy class)
	• Size of rental car
	• Size and furnishing of a hotel room
	• Seat location in a theatre or stadium
Amenities	• Free breakfast at a hotel, airport pick up, etc.
	• Free golf cart at a golf course
	• Valet parking
	• No baggage charges on an airline
Service level	• Priority wait-listing, separate check-in counters with no or only short queues
	• Improved food and beverage selection
	• Dedicated service hotlines
	• Personal butler
	• Dedicated account management team
Other service characteristics	• Table location pricing (table with view in a high rise building)
	• Duration pricing at a buffet (a lower price is charged for customers who spend less than 60 minutes in the restaurant)
	• Extra legroom on an airline

(*Continued*)

Table 3.1: (*Continued*)

Rate fences	Examples
Non-physical fences	
Transaction characteristics	
Time of booking or reservation	• Discounts for advance purchase
Location of booking or reservation	• Passengers booking air-tickets for an identical route in different countries are charged different prices.
	• Customers making reservations online are charged a lower price than those making reservations by phone
Flexibility of usage	• Fees/penalties for canceling or changing a reservation (up to loss of entire price)
	• Non-refundable reservation fees
Consumption characteristics	
Time or duration of use	• Early bird special in a restaurant before 6:00pm
	• Must stay over a Saturday night for a hotel booking.
	• Must stay for at least five nights
Location of consumption	• Price depends on departure location, especially in international travel.
	• Prices vary by location (between cities, city centre versus edges of the city)

Table 3.1: (*Continued*)

Rate fences	Examples
Buyer characteristics	
Frequency or volume of consumption	• Member of certain loyalty-tier with the firm (e.g., Platinum member) get priority pricing, discounts or loyalty benefits • Season tickets
Group membership	• Child, student, senior citizen discounts • Affiliation with certain groups (e.g., Alumni) • Corporate rates • Loyalty club membership
Size of customer group	• Group discounts based on size of group
Geographic location	• Local customers are charged lower rates than tourists • Customers from certain countries are charged higher prices

Source: Adapted from Wirtz et al. [2012, p. 165].

travel sites such as Expedia.com, or Agoda.com and specify the date(s) of travel, the location (or origin-destination of the flight) and a particular quality level (hotel type, car type, class of service). They can also compare the price for a particular company across distribution channels, including the company's own website.

Travel firms have mixed feelings about these third party intermediaries: they like them because of the increased visibility and sales of their products, but do not like the associated cost (these intermediaries often charge sales commissions of 20–30%). In addition, when a company uses multiple distribution channels, it is essential that they

Figure 3.1: Common rate fences used in the airline industry.
Source: Adapted from Lovelock and Wirtz [2011, p. 149].

maintain the same price in each channel because of the potential impact on customer satisfaction. A number of travel firms have instituted best rate guarantees on their own websites (i.e., their lowest-cost distribution channel) in an attempt to reassure customers that the company always offers the best rate available and that they don't have to search elsewhere [Rohlfs and Kimes, 2007].

Firms generally obtain competitive information from four sources: (1) phone calls to competitors ("shopping"), (2) Global Distribution Systems (GDS), (3) third party data providers, and (4) through various electronic distribution channels such as Expedia and CTrip. This information is useful for adjusting overall price levels, but does not really provide detailed competitive pricing information by market segment.

- *Shopping*: Many hotels and rental car rental companies call their competitors on a daily basis to inquire about rates and availability. Generally, these calls are made as if they were made by a potential customer; but in many cases, the source of the call

is known. This information is then used to evaluate the current pricing policies.

- *Global Distribution Systems (GDS)*: Many airline pricing analysts rely on the fares listed in the various GDSs (Abacus, Amadeus, Galileo, Worldspan and Sabre) to determine what the competition is charging for different origin–destination pairs and use this information to make adjustments in their own prices.

- *Third Party Data Providers*: A variety of third party systems, such as Electrobug (www.Electrobug.com), RateGain (www.rategain.com) and TravelClick (www.travelclick.com), search competitive websites on at least a daily basis and provide clients with information on what their competition is charging in various markets. This information is then used to evaluate current pricing policies.

- *Electronic Distribution Systems*: Many of the on-line travel distribution systems (i.e., Expedia (www.expedia.com) and CTrip (www.CTrip.com)) provide their suppliers with competitive pricing information. Again, as with the other sources of data, this can be used to evaluate current pricing policies.

3.4.2 Negotiation

Prices for a considerable portion of airline, hotel, rental car and cruise industry inventory is set through negotiation. Group and tour operator prices are generally negotiated as are the rates offered to large corporate accounts. The prices are based on demand, the forecasted number of inventory units that will be used, when usage is likely to occur, the ancillary revenue associated with the business, and the long-term value of the business to the firm.

3.5 Summary and conclusions on the role of price in RM

In this section, we have reviewed the literature on RM allocation and pricing models, reviewed the literature on rate fences as tool for

effective price discrimination, and discussed how RM prices are set in practice. As RM practice becomes more sophisticated and as the Internet and mobile commerce become the customer's booking engine of choice, we can expect price to become an even more important component of a revenue management strategy. The technical pricing models discussed are likely to become much more widely adopted, and more sophisticated models that incorporate competitive reactions to price changes are likely to be developed. Still, as pricing becomes an even more important part of a revenue management strategy, companies must carefully monitor customer reaction to these policies since a reduction in customer satisfaction may result in lower long-term profitability. The issue of customer responses to RM practices is discussed in detail in Section 6.

4

The Role of Time in Revenue Management

When examining time from an RM context, four factors must be included: (1) the method in which time is sold (explicitly or implicitly), (2) how time is configured, (3) the degree of control that the firm has over customer use of time, and (4) the degree of customer contact present within the firm. Each is discussed below.

4.1 Explicit versus implicit sale of time

One of the key factors with defining time is whether companies *sell time explicitly* or *implicitly* (see Table 4.1 for examples). For a discussion of the role of time in service firms, see Berry [1979] and Jacoby et al. [1976]. When companies sell time explicitly, they are better able to manage their capacity because they know when customers will be using the space. Customers also have clear expectations of the length of the service (including the beginning and ending times). The questions become those of how to define and configure the time.

Companies that sell time implicitly often sell service experiences. For example, a stadium operator sells tickets to a game (but does not explicitly state that the customer has the use of the seat for 2 or 3

Table 4.1: Explicit and implicit measures of time by industry.

Explicit	Typical measure	Implicit	Typical measure
Spas	• Hour	Airlines	• Flight distance
Hotels	• Night	Restaurants	• Length of meal
Car rental	• 24-hour periods	Golf	• Round of golf
Professional services	• Hour	Stadiums	• Length of game
Meeting space	• Day or day-part	Performing arts centers	• Performance length
Limousine rental	• Hour	Movies	• Movie length
Apartments	• Month	Health care	• Appointment length

hours). Or, restaurants sell meals (and customers purchase a dining experience), but internally allot a certain amount of time per table so that they can serve a sufficient number of guests to manage capacity utilization and resulting profitability. The challenge in these contexts is how to deliver the experience the customer is purchasing (and expecting) while still maintaining the necessary control of the time. In addition, firms need to carefully manage how they control time, since if customers feel that they are rushed during a service experience, their satisfaction will be negatively affected [Noone et al., 2007, 2012].

4.2 Time configuration

Companies that explicitly sell time must decide how to configure that time. This decision has both strategic and operational implications. The key with time configuration is to determine what customers want and are willing to pay for, and how to sell the reconfigured time in such a way that it generates additional revenue.

For example, car rental firms traditionally rent cars by the day or week, but recently some car rental companies, such as ZipCar (www.zipcar.com) and Flexcar (www.flexcar.com), rent cars by the hour because of the sizeable market of customers in large cities who do not own cars, but need cars from time to time to run errands. Operationally, delivery of this sort of service is complicated by the fact that it is difficult to forecast exactly when customers will need cars, where they will want to pick them up, and when (and where) they will want to return them. These are similar problems to those faced by traditional car rental companies, but they are amplified by the stochastic nature of the short-term use demand. Zipcar has solved this problem by locating cars at various places within a city. Customers join Zip-Car, make their reservation either on-line or over the phone, and go to one of many pre-arranged locations to pick up their car. To access their car, they simply hold their membership card to the windshield (zipcar.com). Once done with the car, customers return it to the same place. The performance metric for a company like ZipCar becomes revenue per available car-hour (rather than the traditional revenue per available car-day).

Similarly, hotels typically rent rooms by the day, but some choose to rent rooms for a half-day or a third-day (often seen at airport hotels), or even by the hour (as in love hotels in Japan) if there is sufficient demand. Again, the strategic decision is whether to target this sort of market; the operational issue is how to deliver on this sort of service. Forecasting demand is complicated by the added complexity of forecasting by hour of day (although some roadside hotels already do this) and length of stay (although most traditional hotel RM systems forecast by length of stay (normally measured by the number of days). In addition, turning over the rooms becomes a bit more complicated

because housekeepers must be scheduled to allow for timely cleaning and re-renting of the rooms. The performance metric of a Japanese love hotel (or any similar hotel) becomes revenue per available room-hour (rather than the traditional revenue per available room-night).

Companies that implicitly sell time, such as restaurants, golf companies and theaters, do not always have the ability to configure time. For example, theaters do not usually sell tickets to only the first or last act of a play and most restaurants do not sell just one course of a meal. Since these industries are primarily selling an experience or event (whether it be a meal, a round of golf or a performance), they must be careful of how they position time with their customers because of the potential impact on long-term satisfaction. In a sense, these industries must reach a balance between customer expectations (i.e., the customers are purchasing an experience) and profit realities (the firm needs to control the length of the experience in order to be able to profitably manage capacity).

4.3   Degree of control over service duration

Companies can lose control of time if customers decide to stay longer than they contracted for (in the case of industries where time is sold explicitly) or than expected (in the case of industries that sell time implicitly). Obviously, companies that sell time explicitly can simply charge customers for the added time; but this becomes complicated if other customers have already contacted for that time. For example, consider a luxury hotel. Assume that one of their guests likes the hotel so much, that he decides that he would like to stay for an additional night. This would normally not be a problem for a hotel during a low demand period (in fact, it would be considered a good thing), but it would become an issue if the hotel was already sold out for that extra night.

Companies that sell time implicitly do not always have control over how long customers use the service and in some situations cannot even ask customers how long they plan to use the service. This combination of factors makes it very difficult to manage capacity. If customers stay

longer than expected, it can have an effect on later-arriving customers, and if the company attempts to regulate the length of time someone uses the service, it can have a serious impact on customer satisfaction [Bhatia, 2002, Szuchman and Tesoriero, 2004]. For example, some customers may prefer to linger over dinner. This is generally not a problem, but during busy periods, it may cause other customers to have to wait to be seated and have a negative effect on customer satisfaction. Or, less experienced golfers may take longer to play than expected and may slow down the pace of other, more experienced golfers (and affect their satisfaction). And, if the golf course operator suggests that it is time for the guests to leave, it may be very negatively received.

Some customers may be willing to trade off the control of time for a lower price. For example, restaurants in Barcelona offer a 20% discount for customers who are willing to finish their meal by 7:30 p.m. to allow for a second seating. The practice has been widely accepted and is quite popular with a certain segment of customers.

In addition, outside sources may exert control over the length of the customer experience that can affect the revenue-generating ability of the company. For example, when movie production companies make longer movies, they limit the number of showings and revenue that a movie theater can have per day.

4.4 Degree of customer contact

Industries that use RM have varying degrees of customer contact [Chase, 1978]. For example, most hotels and rental car companies have a relatively low level of customer contact and have little interaction with the customer once the check-in transaction has been completed. In contrast, table service restaurants, spas and professional services have a high degree of customer contact and the customer is generally in direct contact with a representative of the company (whether a server, a massage therapist or a consultant) for the entire duration of the service. Companies with high customer contact (regardless of whether they sell time explicitly or implicitly) can take control over the duration and pace of the service, both of which matter to the customer.

First, the length of the service can be too short or too long [Kimes et al., 2002, Noone et al., 2007, 2009]. If customers believe that the service is too short, they may believe that they have not received their money's worth. And, if the service is too long, customers may feel as if they have wasted their time and the company will not be able to generate sufficient revenue to be profitable. For example, if a customer goes to have her hair cut, she may expect that the service will last about 30 minutes. If the haircut only takes 15 minutes, she may question the quality of the haircut. But, if the haircut takes an hour, she may feel as if she has wasted her time, and the hair salon may not be able to serve enough customers (unless they charge a high enough price) to ensure profitability.

Second, the pace of the service can be too fast or too slow [Noone and Kimes, 2005, Noone et al., 2007]. If customers believe that the service is proceeding at too fast of a pace, they may feel rushed and that they have lost control; but if the pace is too slow, they may feel frustrated. Research has shown that customers prefer a faster pace during the pre-process (e.g., the seating, selection and ordering in a restaurant) and post-process parts (e.g., the presentation of the cheque and payment) of a service, but prefer a slower pace during the core part of the service (i.e., the meal itself).

The challenge is to design the service experience so that it can be comfortably delivered during the specified time while maintaining the experience that customers are purchasing. When the customer is in direct contact with the firm for most of the service experience, it becomes critical to deliver the service experience in a certain amount of time (designed to deliver the desired type of guest experience in a way that is profitable to the firm), at a certain pace (i.e., one in which customers do not feel rushed), and at a price that maximizes revenue for the firm while maintaining long-term customer satisfaction (Table 4.2).

High customer-contact industries (both those that implicitly and explicitly sell time) must first decide on the time interval they would like to sell, then design a service that can be consistently and comfortably delivered in the time allotted. The objective is to maintain customer

Table 4.2: Degree of customer contact vs. method of selling time by industry.

		Degree of customer contact	
		Low	High
Method of Selling Time	Implicit	• Stadiums & arenas • Movie theaters • Airlines • Performing arts centers	• Restaurants • Health care
	Explicit	• Hotels • Rental cars • Meeting space • Apartment complexes	• Spas • Professional services • Health care

satisfaction while still providing the customer throughput necessary to maximize revenue and profit. For example, assume a restaurant operator decides that she needs to allot a maximum of 1.5 hours per table during busy periods so that she can maximize revenue. Once she decides this, she needs to design a menu that can be comfortably prepared in this amount of time, develop a service delivery process that proceeds at a comfortable, but fast enough pace, adopt the technology necessary to support this and train her staff on how to consistently deliver on the service process she has designed.

4.5 Summary and conclusions on the role of time in RM

The management of the time a customer uses service capacity an integral role in a firm's RM strategy. Companies can either sell their time explicitly or implicitly. Companies that sell their time explicitly can more easily manage their capacity since they know how long customers

will use their capacity. However, companies that sell time implicitly typically sell service experiences and do not necessarily know how long customers will be using their capacity. Exerting control over the duration of the customer experience has to be done carefully as customer may feel rushed with then would negatively impact their satisfaction.

5

The Role of Space in Revenue Management

Earlier research [Kimes and Chase, 1998] suggested that there are two strategic leavers to RM: price and time (i.e., duration control). However, recent research added the management of space as being equally important [Kimes and Renaghan, 2011]. To date, space management in the context of RM has received limited attention in the literature, but has the potential to help companies achieve the full revenue potential of their capacity, and to create a new and interesting stream of research for service operations and marketing academics.

As with time, space can be sold explicitly or implicitly. When space is sold implicitly, the service firm sub-divides its space into units that can be sold directly to customers (e.g., hotel rooms, airline seats, restaurant tables or theatre seats). Conversely, companies that sell space explicitly simply sell space (e.g., booth size at in exhibition, advertising space in print media, and self-storage space). Their customers decide how much of the space they wish to purchase. Essentially, when space is sold implicitly, companies retain control over the way in which their capacity is sold; but when space is sold explicitly, the customers exert more control over how capacity is sold. The method in which space is sold has profound implications on how companies position and market themselves.

We will first discuss how the interplay of space and time affects companies' RM opportunities. We will then delve into the role of space and present methods in which companies can effectively use space within their RM strategy.

5.1   The interplay of space and time

The interplay between space and time influences how companies position themselves to generate revenue. A successful RM strategy revolves around the profitable control of capacity, specifically the profitable control of space and time. The more control companies have over time and space, the higher their revenue potential. This entails selling time explicitly (because of the enhanced control over when customers use the space) and space implicitly (because of the control over how the space is defined).

Industries can be categorized by how they sell space and time (Table 5.1). Category 1 industries such as restaurants, golf courses, theaters and stadiums have control over their space but have difficulty in controlling time. RM practices often revolve around obtaining control of time while still maintaining customer satisfaction. Category 2 industries (e.g., hotel, car rental and cruise industries) are in the ideal spot for revenue generation since they sell space implicitly for an explicit length of time. It is not surprising that the most sophisticated RM applications are found in these industries because of the control that they have over both space and time. This added control allows them to package different space and time combinations that appeal to different market segments and price them accordingly. Category 3 industries are rarely seen. This may be that they do not control how their space is defined and do not know how long their customers will be using the space. The combination of lack of control over space and time makes it difficult to operate a profitable business.

Category 4 industries such as self-storage facilities, advertising and moving vans sell both space and time explicitly. This allows firms to have control over how long the customers use their space, but does not give them the control over how much space is used. This leaves them

Table 5.1: Strategic interplay of space and time.

		Time	
		Implicit	Explicit
Space	Implicit	Category 1:	Category 2:
		• Restaurants	• Hotels
		• Golf courses	• Rental car
		• Stadiums/arenas	• Spa
		• Airlines	
	Explicit	Category 3:	Category 4:
		• N/A	• Self-storage
			• Moving vans
			• Gas pipelines
			• Advertising space

with limited opportunities for differentiating themselves from their competition and also with limited possibilities for developing ancillary revenue streams.

Category 2, the combination of implicit space and explicit time, is the most desirable one, and one to which industries in other categories should strive. The key is to determine how to gain more control over both space and time. In order to gain this control, companies need to learn how to control the length of time that customers use their space and to control how space is defined and configured. Time can be managed by refining the definition of time, reducing the uncertainty of arrival, reducing the uncertainty of duration and reducing the amount of time between customers. Our intent in this section is to develop similar tools for managing space.

5.2   Space: the third strategic lever

Since space is the primary product that is sold by most companies using RM, it must be carefully considered and designed. The fact that the capacity of physical space is relatively fixed makes this decision even more important. The design of the physical environment is often seen as a given, but should be considered in a more strategic fashion since it symbolizes what a company represents, helps customers and organizations reach their goals, and can serve as a differentiator [Bitner, 1992]. The design of the space can affect both customer and employee satisfaction [Bitner, 1992, Sommer, 1969] and can also affect revenue generation [Kimes and Thompson, 2004, 2005]. If companies do not properly manage their physical space, they are destined to suboptimal revenue performance regardless of how well time and pricing are managed.

When deciding how they want to maximize the use of their fixed capacity, firms have five tools at their disposal: (1) selection of inventory types, (2) space configuration, (3) space ambience, (4) ancillary revenue sources, and (5) increase productive use of space.

5.2.1   Selection of inventory types

Inventory types vary by industry; for example, hotels offer different-sized rooms, airlines offer various-sized seats; and car rental firms rent different-sized cars. The types of inventory units offered are determined by industry norms (e.g., mid-priced hotels sell certain-sized rooms), but can also be used to differentiate a firm from its competitors (e.g., our rooms are larger), and when attached to other ancillary services (e.g., our rooms are larger and you have free internet access) can lead to a competitive advantage.

Companies must first determine the demand for different inventory units, study the needs of different market segments, and consider how to differentiate their inventory units from those of their competition. For example, casinos offer a mix of table games and slot machines. They must determine the types of games and machines that their clientele prefer and then select the inventory units to offer. Or, Singapore

Airlines found that some customers were price insensitive and wanted a larger and more private first-class seat. Based on this, the airline decided to offer private suites on some of their A380 aircraft [Heracleous and Wirtz, 2010].

The potential range of prices that can be charged for different inventory units depends on the market segment, the competition, the season, the services bundled with it, its location and the channel through which it is sold. Once the inventory types have been selected, the demand, space and time requirements, ancillary revenue streams and price will be used to determine the optimal mix of those inventory units.

5.2.2 Space configuration

Once companies decide which inventory types to sell, they must then decide how to configure their physical space and how flexible they would like that space to be. Space configuration, or supply mix, affects customer throughput and revenue. Supply mix issues occur in a number of industries. For example, car rental firms must decide on the best mix of cars [Carroll and Grimes, 1995, Geraghty and Johnson, 1997], apartment rental companies must decide on the best mix of apartment sizes, and performing arts centers must decide on the best mix of seat sections. If the supply mix is ignored, the revenue generated by even the best RM system will be sub-optimal.

Supply planning occurs in nearly all industries and can be divided into five parts: (1) number of facilities, (2) facility size, (3) supply mix, (4) supply mix flexibility, and (5) the supply assignment rule [Kimes, 2004, Kimes and Thompson, 2005]. There is a considerable amount of literature on how to determine the number and size of facilities [Klassen and Rohleder, 2001, Lovelock, 1992, Ng et al., 1999, Sasser, 1976], but limited research has been done on the optimal supply mix [Kimes, 2004, Kimes and Thompson, 2005].

Kimes and Thompson [2004, 2005] developed methods for determining the optimal supply mix in a restaurant context. They found that by adopting an optimal table mix, their test restaurant could serve up to 30 percent more guest while maintaining the same average waiting time. By adopting the optimal table mix, a restaurant can

simultaneously increase revenue by processing more customers during busy periods while using fewer seats.

If the same, or more, revenue can be generated in less space, companies can reduce development costs. This has tremendous promise for a firm's expansion strategy, because less space may be required. For example, O'Charley's, a 240-unit US restaurant chain, changed their table mix, reduced the number of seats from 271 to 183 and reduced restaurant size from 6,900 to 5,400 square feet while maintaining (and in some cases increasing) revenue. This allowed them to reduce investment costs since they were able to obtain more favorable leases [Prewitt, 2007].

In order to determine the optimal supply mix, managers must balance customer demand for different space types with the space and time requirements of each space type, the revenue associated with each space-type and the desired space flexibility.

The desired flexibility of the space configuration matters as does the timing of reconfigurations. For example, a performing arts center can change its definitions of seating sections depending upon the popularity of a particular show; for shows that are more popular, the higher-priced sections can be expanded to include more seats, and for less popular shows, the lower-priced sections might be expanded. Similar situations occur in convention centers, self-storage facilities and restaurants. All have the ability to reconfigure their inventory units to better accommodate customer demand, but the time and costs involved with reconfiguration and the impact on customer satisfaction must be carefully considered.

5.2.3   Space ambience

Companies that implicitly sell time can create an environment that may entice customers to want to spend more. Mehrabian and Russell [1974] proposed that customer behavior in different physical environments is a result of the interaction of three factors: arousal, dominance and pleasure. Arousal is defined as how much a certain environment excites people. Dominance measures how much control customers exert over their environment and pleasure is how much people like a physical

setting. Different combinations of arousal, dominance and pleasure can cause customers to choose to be in an environment, choose to leave it or avoid it completely.

Space ambience can be divided into three components: (1) ambient elements that may affect the senses such as music, light and temperature; (2) design elements such as color, furnishings and layout; and (3) social elements such as control, crowdedness and customer interaction [Baker, 1986; Baker and Cameron, 1996].

Ambient elements: Brighter lights, faster and louder music and lower temperatures are likely to increase arousal and cause customers to want to spend less time in a space [Areni and Kim, 1994, Baker, 1986, Baker et al., 1992, Milliman, 1982, 1986, Mattila and Wirtz, 2001, Wirtz et al., 2000, 2007]. The challenge for service designers and revenue managers is to determine the amount of arousal that maximizes revenue while maintaining or increasing customer satisfaction [Mattila and Wirtz, 2001].

Design elements: Color, furnishings and layout can also affect arousal, pleasure and dominance. Warmer and brighter colors have been shown to reduce the amount of time customers spend in an environment [Guilford and Smith, 1959, Shaie and Heiss, 1964]. More comfortable furnishings, such as a 24-hour chair in a meeting room or a booth in a restaurant, may cause customers to want to stay longer, while less comfortable seats may make customers want to leave [Robson, 1999].

The layout of a physical environment can have a significant effect on customer approach behaviors [Mehrabian and Russell, 1974]. For example, in environments perceived as pleasant, shoppers stay longer and spend more money [Donovan et al., 1994, Mattila and Wirtz, 2001].

Social elements: Revenue generation is also affected by the degree of perceived crowdedness, perceived control and amount of customer interaction. Space configuration can have a negative impact on customer satisfaction (and revenue) if customers feel crowded [Mattila and Wirtz, 2008, Robson et al., 2011]. Behavior in public settings is related to a human need to establish and maintain personal territory [Proshansky et al., 1970]. If customers feel as if they are too close to

other customers, they are likely to experience a loss of control and try to leave or avoid the environment. Research on perceived control [Averill, 1973, Hui and Bateson, 1991, Langer, 1983] has shown that when customers perceive that they have less control over a service encounter, they are less likely to be satisfied with that encounter.

When services are designed to have a great deal of customer-to-customer interaction (such as in stadiums and arenas or concert halls), customers may be more accepting of crowded conditions because they may be seen as part of the service experience. Conversely, in services which typically do not have much customer interaction, such as in a doctor's office, car rental locations, or in fine-dining restaurants, customers are likely to view crowded conditions less favorably.

5.2.4   Develop ancillary revenue sources

Another option for increasing the revenue potential of a space is to sell other services and products that customers can purchase while using the space or to take with them after completing the service experience. The key to determining which products and services to offer is to understand customer needs and to determine how to offer these products and services in a profitable manner.

For example, movie theaters can offer concessions and retail; stadiums can offer a variety of restaurant and bar options, spas can offer various add-on treatments, and car rental companies can offer different insurance packages and add-on features such as GPS or ski-racks.

Some industries have more potential ancillary revenue than others. The airline industry has traditionally had a limited ability to sell additional items, but recently in the United States, has decoupled food offerings from the ticket price in economy seats. They can also sell entertainment (i.e., movies), duty free items, and phone and Internet usage.

Ancillary revenue items are not necessarily desirable if they impact how long customers use the space during busy periods. Consider a restaurant on a busy Saturday night. It can offer a variety of menu items in an attempt to increase the average check per person, but if the

sales of these items cause customers to linger so that other customers cannot be accommodated, this strategy could backfire.

5.2.5   Increase the productive use of the space

Companies have four ways in which they can increase the productive use of their space: (1) reduce the amount of idle time between customers or events, (2) extend the time the space is used, (3) offer multiple uses of the space, and (4) offload non-revenue producing activities.

Reduce idle time: if companies can reduce the amount of idle time between customers or events they may be able to increase the revenue potential of their space. When space is not being used no revenue is generated from that space. For example, restaurants need to minimize the table turn time, convention centers need to minimize the amount of time between events, and airlines need to minimize the amount of ground time between flights. By doing this, they increase the amount of time that the space is generating revenue.

Extend time: time extension is particularly useful in industries that sell an experience for an externally controlled length of time. For example, performing arts centers can offer pre-show and post-show events; spas can offer food and beverage offerings and cruise lines can invite guests to arrive a few hours before their cruise sets sail so that they can explore the ship (and spend money).

Sports stadiums face a similar opportunity. For example, baseball stadiums have been faced with high fixed costs associated with the stadium, but have traditionally only been able to generate revenue during games or by offering special events such as concerts or exhibitions. Baseball stadiums in Baltimore and Philadelphia have designed their space so that customers not only have a variety of entertainment, restaurant and retail options available during the game, but that they also want to come before the game or stay after to enjoy the various offerings.

Extending time is not necessarily an option for companies that rely on customer throughput for revenue generation because of the potential impact on other customers who might want to use the capacity. For example, during busy periods, hotels do not want customers arriving

early or staying late because of the effect on other customers; but during slow periods, hotels may be happy to accommodate these customers.

Multiple uses: firms using RM have a large investment in their physical space and must determine ways to better leverage that investment. If the capacity is only used 81 times per year for approximately 3 hours each time, as is the case for US professional baseball stadiums, it is difficult to recoup the fixed cost investment in a reasonable amount of time. Stadiums can opt to play host to multiple sports and other events such as rock concerts.

Offload production: since firms using RM have a fixed capacity of space, they should strive to reduce or remove non-revenue producing operations to a less expensive alternative. For example, restaurants might move food production areas to an off-site location (e.g., Taco Bell's famous K-minus strategy which shifted the kitchen out of its high rental restaurant locations to lower cost, centralized facilities), hotels might move maintenance and other back-of-house functions either off-site or to undesirable locations within the hotel, and cruise lines could put staff sleeping and eating facilities on less desirable decks. The key is to keep as much of the physical space as possible devoted to revenue generation.

5.3   Summary and conclusions on the role of space in RM

The management of space is equally important to the management of time and price for effective RM. Managers must understand the interplay of space, time and price in the development and execution of a successful RM strategy. Since the primary product RM-practicing companies sell is space for a certain amount of time, it is essential that they adopt a strategic view of their space. Companies need to manage both the configuration of their space and how they design the ambient elements of that space. Space is a scarce resource, and if not carefully managed and controlled, companies may never achieve their revenue potential regardless of how well they manage price and time.

6

Potential Customer Conflicts Caused by RM and Their Management

When a firm implements an RM program, conflicts with customers will invariably arise [Wirtz et al., 2003]. Such conflicts may adversely impact long-term customer satisfaction and may ultimately hurt the firm's long-term success. Such customer conflicts can arise when a firm implements variable pricing and inventory controls and the customer believes that he/she has been treated unfairly [Kimes and Wirtz, 2003]. Furthermore, fair behavior has been found to be essential to the maximization of long-term profits, and if a firm is to be successful with RM, customer loyalty must not be compromised.

Surprisingly, although most industries have been increasingly customer-centered [Schlesinger and Heskett, 1991], the customer seems to have been relatively forgotten in RM research. Little work has been done to explore the potential conflicts that arise from trying to integrate a customer orientation with RM implementation, the way in which customers perceive RM strategies and how those conflicts could potentially be minimized or resolved [for an exception see Wirtz et al., 2003, Wangenheim and Bayon, 2007]. In this section, we focus on potential customer conflicts, discuss the reasons for these conflicts, and propose various marketing and organizational strategies that can be employed

to reduce such conflicts. The objective of this section is to understand better how firms can effectively implement RM without compromising customer satisfaction.

6.1 Potential conflicts arising from a revenue management orientation

When a firm that is fundamentally customer oriented implements a revenue management system, a series of customer conflicts can arise that may be detrimental to the firm's long-term success. For example, the price of an airline seat can be as volatile as commodities on the futures trading floor. On a scheduled flight between Sydney and Melbourne, an economy class seat can range from around $149 return to $480. Whether passengers sharing the same row have paid $149, $259, $350 or $480 may merely reflect that fact that one booked a week earlier, was with a conference group, or was prepared to return at a later date, or stay over a weekend night.

How do customers feel about such price discrimination when they become aware of it? Imagine Ron, who is traveling on business and paid $320 for a hotel room, meets Kelly at the lounge and finds out that she had paid only $220 for essentially the same room because she had indicated that she was on holiday when making her room reservation. In another common scenario, the same hotel may adopt bargaining, where the published rack rate is offered first and then varying levels of discounts are given only when the customer 'bargains'. Thus Sarah, who is also on leisure travel but paid $260 for the same room, later finds out from Kelly that she could have bargained for a lower rate. Both Ron and Sarah may well perceive that the hotel has acted unfairly.

Other conflicts may be due to relationship expectations. For example, regular customers of an airline might expect to be accorded priority seat allocation during peak times. Such a strategy aims to secure a stream of future revenue from the customer by building a long-term relationship. In contrast, certain RM techniques restrict capacity availability for lower-paying customers during peak times. That means that the highest paying customers, not necessarily the most loyal customers, would get their seats confirmed during periods of excess demand. This

issue has become increasingly problematic also in the context of loyalty programs where members of frequent flyer programs often find that they are unable to redeem points on flights in peak periods. This is especially frustrating when call center operators inform the frequent flyer member that "Yes, seats are available, but there is no allocation left for frequent flyer redemption tickets." And the reason for this is simple — RM systems can fairly accurately forecast not only the demand for any given flight, but also the percentage of last minute business passengers who are prepared to pay full fare. Such high yielding passengers are the backbone of not only an airline's profitability, but also the profitability of most businesses that are characterized by fluctuating demand, finite capacity and perishable inventory. However, the intermittent availability of reward seats to regular customers can cause them to become frustrated and angry, and put their loyalty at risk. It is common that customers perceive the firm negatively when it executes inventory and pricing controls.

6.2 Understanding customer reaction to RM pricing

Although better RM decisions can lead to increased revenue, firms must consider the impact of PM pricing and restrictions on long-term customer satisfaction. While RM has been associated with short-term revenue gains, for RM to be truly successful, the focus should be on long-term revenue gains. That is, the lifetime value of a customer should have a substantial impact on RM decisions. For example, consider a busy restaurant. If one of their VIP customers shows up without a reservation, the maître 'd will ensure that the VIP is seated even if other customers must be displaced or inconvenienced. Several articles have addressed the interplay between RM and long-term customer value [Noone et al., 2003, Wangenheim and Bayon, 2007, Jing and Lewis, 2011]. Wangenheim and Bayon [2007] found that airline passengers who experienced negative consequences from RM (such as being denied boarding or having to take a later flight) had significantly lower expenditures with that airline in the future. The negative effect was even strong for the higher value customer segments, whereas positive

consequences (such as being upgraded) only mattered for low-value customer segments. They had no effect on high-value segments.

Similarly, Jing and Lewis, in their study on stockouts in online retail [2011], found that consumer reaction to stockouts varied by segment, and they recommended that retailers delay providing information on inventory shortages until they were able to better forecast a customer's spending behavior so that they could better gauge the impact of the shortage on lifetime value of that customer.

Customer satisfaction with RM practices is affected by the (1) perceived fairness of those prices and practices [Bolton et al., 2003, Kahneman et al., 1986a,b, Xia et al., 2004]; (2) notions of procedural and distributive justice [Smith et al., 1999, Sparks and McColl-Kennedy, 2001, Tax et al., 1998]; (3) familiarity with the pricing practice [Kahneman et al., 1986a,b, Wirtz and Kimes, 2007]; (4) the relative advantage received from the pricing practice [Xia et al., 2004, Wirtz et al., 2007]; and (5) the framing of the prices [Kimes and Wirtz, 2003, Wirtz and Kimes, 2007].

6.2.1   Perceived fairness

Perceived fairness is strongly affected by the reference price and the reference transaction [Kahneman et al., 1986a,b, Thaler, 1985]. When companies use RM, they may alter the reference price and reference transaction and, if they do not carefully plan how they are going to present their pricing practices to customers, may run the risk of customer dissatisfaction.

Perceived fairness is based on how customers view the reference transaction and the reference price [Kahneman et al., 1986a]. For both Ron and Sarah, the scenario in the previous section may mean that their reference price has just been reduced to Kelly's $220. Thus, both would view their higher room rates as unfair, because they believe that the hotel has charged them a higher price to reap higher profits without increasing value to the customer. For example, customers may have seen a cruise advertised for $2,000 per week and be upset if they are quoted a rate of $3,000 when they try to book the cruise. Similarly, customers who pay $25 per person for Sunday brunch may be upset when the Easter Sunday brunch costs $35 per person.

The principle of dual entitlement [Kahneman et al., 1986a] states that customers believe that they are entitled to a reasonable price and that companies are entitled to a reasonable profit. When this relationship becomes unbalanced in favor of the company, perceptions of unfairness may occur. Based on their research on the principle of dual entitlement, Kahneman et al. [1986a,b] found that (1) price increases are seen as acceptable when costs increase, (2) price increases are seen as unacceptable if costs have not increased; and interestingly, (3) maintaining a price increase is acceptable even if costs go back to their original, lower levels.

6.2.2 Procedural and distributive justice

Customers also evaluate the fairness of a policy (procedural justice) and the fairness of the outcome of that pricing policy (distributive justice) [Smith et al., 1999, Sparks and McColl-Kennedy, 2001, Tax et al., 1998]. It is possible that a customer could consider a policy to be fair (procedural justice), but the outcome resulting from its implementation to be unfair (distributive justice), and vice versa. For example, customers may feel that in general, a rental car company's Internet pricing policies are fair but that it is unfair that they may have to pay more than others.

6.2.3 Familiarity

Perceived fairness is affected by community norms [Monroe, 1976], and perceived fairness of a pricing practice is judged relative to these community norms. That is, a reference price provides a basis for fairness judgments because it is normal, not necessarily because it is just [Kahneman et al., 1986a,b]. This means that reference prices are not static but are continually adapted with market conditions [Wirtz and Kimes, 2007].

In a revenue management context, there is evidence to suggest that customers are shifting their fairness perceptions to community norms. For example, Kimes [1994] showed that RM pricing practices were considered more acceptable for airlines than for hotels in 1994. Interestingly, in a follow-up study eight years later, Kimes and Noone

[2002] found that there were no longer significant differences between the acceptability of these same practices in both industries. US golfers and diners are also more accepting of RM practices and find them relatively fair [Kimes and Wirtz, 2002, 2003]. As a market becomes more familiar with RM practices, the unfairness perceptions of those RM practices tend to decline over time [Wirtz and Kimes, 2007].

6.2.4   Relative advantage

Xia et al. [2004] suggest that perceived price differences could lead to perceptions of advantaged inequality (i.e., the consumer pays less than the reference price or another consumer) or disadvantaged inequality (i.e., the consumer pays more). Every RM pricing practice can be seen from two perspectives — one from the person paying the higher price (e.g., a non-student who pays a full price and cannot take advantage of a special student rate), and the other from the person who can take advantage of a lower price through the same fencing mechanism (e.g., a student who pays the discounted student rate).

When there is a wide variation in the prices charged (as is the case with airlines, rental car companies and hotels), customers are likely to compare the price paid to the prices paid by other customers [Bolton et al., 2003, Chen et al., 1998, Martins and Monroe, 1994], and customers who receive a lower price may be seen as receiving an unfair advantage [Adams, 1963]. Wirtz et al. [2007] found that customers who are familiar with a revenue management pricing practice do not consider relative advantage when assessing the perceived fairness of that practice, but unfamiliar ones do.

6.2.5   Framing

Price differences can either be presented as a premium or discount to regular prices. For example, a restaurant may decide to charge higher prices for weekend dinners. They can either present the higher price as a premium over regular menu prices, or they can position the regular menu price as a discount from the higher weekend prices.

Prospect theory holds that price differences framed as a customer gain (i.e., discounts) as fairer than those framed as a customer loss

(i.e., premiums or surcharges), even if the situations are economically equivalent [Chen et al., 1998, Kahneman and Tversky, 1979, Thaler, 1985]. RM research has shown that customers view prices framed as a discount as fairer than those presented as a surcharge [Kimes and Wirtz, 2002, 2003, Wirtz and Kimes, 2007].

6.3 Marketing and organizational strategies to reduce customer conflicts due to RM

In this section, we first discuss how RM strategies may cause customer conflicts, and second, we suggest marketing and organizational strategies that can be employed to help reduce these conflicts and integrate the firm's RM pursuits with its customer orientation. A summary of the potential causes of customer conflicts and the strategies that are proposed to reduce them is provided in Table 6.1. Each conflict and its potential strategies for conflict reduction are discussed in the following sections.

6.3.1 RM pricing strategies

Although customers are willing to accept market-clearing prices for purchases of automobiles, houses and art, they tend to view market-clearing prices for most service purchases as unfair. In service transactions, the higher prices charged during busy periods may be seen as gouging and violate customer beliefs about dual entitlement, whereas the discounts available during low-demand periods may reduce the customer's reference price and make future purchases at the regular or premium rate seem unfair. This implies that charging a higher price during high-demand periods may be viewed as unfair. For example, Kahneman et al. [1986a] found that consumers viewed a $5 surcharge for a Saturday night dinner reservation at a popular restaurant to be unfair.

Kahneman et al. [1986a] concluded that "community standards of fairness effectively require the firm to absorb an opportunity cost in the presence of excess demand, by charging less than the clearing price" (p. 735). Both perceived unfairness and the increase in perceived financial

Table 6.1: Strategies to reduce customer conflicts caused by RM.

RM Practice	Potential customer conflicts	Marketing and organizational strategies to reduce conflicts
RM pricing strategies affecting the reference price, e.g.: • Discounts during off-peak periods hours • Surcharges during peak periods	• Perceived unfairness • Reduction in reference price • Perceived financial risk	• High published price • Physical and non-physical rate fences (e.g., through benefits and restrictions) • Obscure the reference price • Bundling of services
RM strategies affecting the reference transaction, e.g.: • Separate check-in lines for elite customers • Different tiers of theatre seating	• Change in the nature of the service • Reduction in service quality	• Spatially segregate customers • Differentiate service benefits • Determine and set optimal capacity limits
Inventory control • Capacity restriction • Overbooking • Length of usage restrictions	• Perceived unfairness • Perceived lack of customer appreciation • Perceived change in the nature of the service	• Preferred availability policies for loyal customers • Well-designed service recovery programs • Clear communication and positioning of length of stay usage restrictions

Source: Adapted from Wirtz et al. [2003].

risk adversely affect the firm's objective of increasing customer satisfaction and gaining customer goodwill [Kimes and Wirtz, 2003]. However, there are a number of ways in which firms can offer multiple prices without upsetting customers: (1) by raising the reference price, (2) by attaching restrictions or benefits (i.e., physical and non-physical rate fences) with different price, and (3) by obscuring the reference price through bundling of services:

- ***Raise the reference price through a high published price.*** If the reference price (for airlines, this would be the full fare; hotels, this would be the rack rate) is raised other prices will be seen as relatively low compared to the reference price. For example, airlines frequently use this practice when they offer 'super-saver' fares that offer a substantial discount off their full fare. Since less than 5% of airline passengers actually pay full fare, the discount seems a lot better than it actually is.

- ***Physical and non-physical rate fences.*** If companies include certain benefits (such as a larger car or free Internet access) with higher rates and attach restrictions (such as time of booking or change penalties) to lower rates, they can effectively differentiate not only the price, but also the inventory unit. We provide a list of possible rate fences in Section 3, Table 3.1.

- ***Bundle services and obscure the reference price.*** Firms with excess inventory that they would like to sell at a lower price are often concerned that an extremely low price might send the wrong signal to current and potential customers. If an airline can package a lower-priced airfare with other products (such as a hotel room or rental car), it can obscure the reference price since customers will not know how much the flight actually costs. Tour operators, and more recently, Expedia.com and Travelocity.com, have been very successful in offering packages and allowing travel firms to distribute their inventory while obscuring the actual price of the product.

In addition, some on-line travel distribution channels such as Priceline (www.priceline.com) and Hotwire (www.hotwire.com) allow travel

firms to easily dispose of their distressed inventory while obscuring the identity of the firm. Companies using these 'opaque' sites (so called because the identity of the company selling the inventory is obscured) can specify the number of inventory units available and the minimum acceptable price. Customers then place bids for an inventory unit in a particular city or for a particular flight, but do not know the identities of the companies providing inventory. If a bid is higher than the minimum acceptable price, it is accepted and the customer is then given the company name. In addition, all of these reservations are non-refundable: if a bid is accepted, the customer's credit card is immediately charged.

6.3.2   RM pricing strategies impacting the reference transaction

Firms employing RM often use demand-based pricing to build demand during off-peak periods. Customer conflicts may arise when such discounting practices attract inappropriate clientele that change the nature of the service that regular customers have come to expect [Lovelock, 2001]. For example, the business clientele of a fine dining restaurant may resent the noisy tour groups that have been attracted to lunch at greatly discounted prices. Or, a manager of a high-priced U.S. public golf course reported that his regular customers who played during the week (normally a very low-demand period) were not at all pleased to find out they would be sharing the course with children attending a golf camp.

RM may also result in over-stretching of capacity, such as crowding business class or first class cabins through upgrading of overbooked passengers. Stretching beyond a certain level of capacity often changes the nature of the service and may result in inferior quality and customer dissatisfaction. Potential strategies to reduce these conflicts include spatially segregating customers, differentiating service benefits and setting optimal capacity utilization guidelines.

- ***Spatially segregate customers and differentiate service benefits.*** Spatially segregating the main customer segment and/or offering them exclusive and perceptible service benefits may help offset negative perceptions about the changed reference transaction. For example, restaurants can seat business clientele

in a private section, and hotels can set aside dedicated check-in facilities and selected high floors for preferred guests. To illustrate, the General Manager of an international five star hotel in Rihad in Saudi Arabia explained "We put the locals on floors 4 to 6 and international business guests on 9 to 11 because the local custom is to party to the early hours of the morning and, in the past, foreigners have complained bitterly".

- ***Determine and set optimal capacity utilization.*** Lovelock differentiates between maximum capacity and optimal capacity [Lovelock, 2001]. The former is the physical limitation of the number of customers that can be accommodated at any one time. The latter is the ideal level of capacity utilization in which demand and supply are well balanced and customers receive the promised service level and experience. For example, a plumbing company should not plan to be fully scheduled, as there would be no slack to allow for unexpected, last minute and urgent demand, where a price premium might be charged. A self-storage facility that is frequently running at 100% occupancy would mean that many customers might not get the size of space that they requested. A service firm must determine an optimal capacity utilization that balances revenue and enables it to deliver a level of service that meets or exceeds its client's expectations. This optimal capacity level must then be set as a guideline for RM practices.

6.3.3   Inventory control strategies

Inventory control strategies such as restricted or preferred availability, overbooking, and length of stay restrictions can change the balance of the reference transaction and can cause customers to view the transaction as unfair.

6.3.3.1   Capacity restrictions

Restricted or preferred availability restrictions may result in regular customers being turned away during periods of high demand in favor of higher-paying occasional customers. For example, travel agents who

provide year-round support to hotels or airlines may find themselves facing limited inventory allocations during peak periods when they most need the capacity to serve their clients. This intermittent availability to regular customers is likely to result in customer dissatisfaction and endanger future repeat business. For example, Benny in Boston has been on an airline's waitlist for two months and later finds out that his colleague, who booked in Singapore, recently obtained an instant confirmation for the same flight. In Benny's case, he may view first-come-first serve queues as the norm and view this as extremely unfair.

In the same vein, loyal rental car customers feel disappointed and angry when less loyal, but 'big ticket' customers receive preferential treatment by being chauffeured to their cars at airport long term parking lots in full view of other loyal customers [Fournier et al., 1998]. Keeping inventory or bestowing overt preferential treatment for higher paying passengers (or more profitable segments) may be viewed as opportunistic and thus unfair.

Many service firms have launched loyalty programs and built in policy rules to give preferential availability to loyal or repeat customers. For example, some airline RM systems have incorporated 'Loyalty Multipliers' to regular customers' lower fares so that their reservation systems can accord preferred availability. Hotels offer loyal corporate accounts 'Last Room Availability' despite their lower negotiated rates. While this type of policy may afford regular customers 'special treatment' status, it does not address the dilemma faced when members of loyalty programs cannot secure bookings in peak periods. Starwood Hotels and Resorts, after guest surveys showed that blackout dates were a key dissatisfier among regular guests, redesigned its loyalty program which featured no blackout dates for free stay redemptions.

6.3.3.2 Overbooking

Firms using RM typically use overbooking to protect themselves from anticipated cancellations and no-shows. Firms practicing overbooking are faced with the trade-off between the opportunity cost of unused inventory and the cost of customer displacement.

If a customer is involuntarily displaced, the costs can be enormous, including the potential of future lost business and poor word-of-mouth. However, overbooking is not necessarily incompatible with good service. If the cost of customer displacement can be reduced, companies can be more aggressive with their overbooking policies while maintaining (or increasing) customer satisfaction. For example, in the North American airline industry, the voluntary 'bump' system has met with great success. If a flight is oversold, the gate agents ask for volunteers willing to take a later flight in exchange for free (but restricted) tickets for future flights or cash payments. Many customers are eager to obtain the free travel, and the airlines are usually able to obtain more than sufficient volunteers for this program. The great majority (90%) of 'bumps' are now voluntary, and both airlines and consumers are benefiting.

It is important to anticipate and back up overbooking programs with well-designed service recovery procedures (i.e., a standardized response to customers) and staff training to ease the burden on frontline staff. For example, American Airlines reduced their overbooking levels because of the strain it placed on frontline staff. Even though they were using a voluntary bump system, had developed a standardized script for staff to use and had conducted effective training, frontline staff still felt uncomfortable with the procedures. American decided to forego the incremental revenue gain they could have obtained from more aggressive overbooking because of the long-term cost that it had on employees.

The airline experience illustrates the components of a well-designed overbooking service recovery system. They are:

- Offload/walk guests who volunteer and provide an effective service recovery. The choice to be displaced should be voluntary if possible. Some customers may be willing to be displaced if compensated for the inconvenience.

- Give advance notice. Advance notice of the displacement situation should be given so that customers can make alternative arrangements. Or even better, the company should discuss and make the alternative arrangements for the customer such as offloading and

rescheduling to another flight the day before departure, often in combination with cash compensation.

- Educate about the benefits of overbooking. Frontline employees and customers should be educated about the benefits of overbooking. For example, Singapore Airlines tells its frontline employees and passengers that overbooking is practiced to enable more passengers to enjoy an early confirmation on their preferred flight.

- Offer substitute services. If possible, a substitute service should be offered that delights the customer and minimizes customer exposure to a competitor's service. For example, airlines upgrade a passenger to business or first class on the next available flight, often in combination with options 1 and 2 above. Another example is a Westin beach resort that has occasional overbooking and offers guests departing the next day the option of spending the last night in a luxury hotel near the airport or near the city at no cost. Guest feedback on the free room, the upgraded service, and a night in the city after a beach holiday has been very positive. Employees are also more comfortable handling such overbooking situations, as affected guests are satisfied and happy. From the hotel's perspective, the cost of the move only includes a one-night stay in the luxury hotel instead of turning away a multiple-night guest arriving that day.

6.3.3.3   Length of usage restrictions

Length of usage restrictions are often used as part of a revenue management strategy. For example, a hotel may impose a three-day minimum length of stay for certain discounted rates. If a customer checks out early, some hotels will impose an early departure fee on that customer. Not surprisingly, this policy often meets with customer outrage.

Similarly, hotels that use maximum length of stay restrictions may face the problem of customers who would like to stay longer but at the discounted rate. A manager of a casino hotel in Las Vegas often has 'low-rollers' (low-spending gamblers) who want to extend their stay. In

low occupancy times, this is not a problem, but if the hotel is expecting a large number of 'high-rollers' (high-spending gamblers), the staff will physically remove the belongings of the low-rollers and change the locks on their rooms so they cannot return. While this is obviously an extreme case, hotels can reduce the negative impact of length of usage restrictions by pursuing other less obtrusive approaches such as having the customer initial the departure date upon check-in, having a clearly communicated policy for all reservations, and explaining rate implications associated with shortening or lengthening the stay.

Length of usage restrictions are applicable to a variety of industries including the restaurant business. For example, while most restaurants do not explicitly restrict customer dining times, they may seek to implicitly control dining duration in an attempt to increase table turnover and profit. If not done carefully, customers may feel rushed and dissatisfaction may result [Noone et al., 2009]. The author of a Wall Street Journal article described how busboys attempted to remove his still unfinished meal from the table, and his general dissatisfaction with the rushed dining experiences at several high-priced New York City restaurants [Bhatia, 2002]. While increasing the table turnover rate is desirable, restaurant operators must do so carefully since creating customer discomfort is a poor long-term strategy.

To conclude, companies implementing RM must consider how it will impact customer reference prices and transactions, and ensure that customer perceptions of fairness are not adversely affected. By designing pricing and inventory control strategies with customers in mind, companies can reduce customer dissatisfaction while increasing firm revenue.

6.4 Summary and conclusions on potential customer conflicts and their management

In this section, we have addressed the fundamental conflicts that arise when a firm simultaneously adopts customer orientation and RM practices. Because RM is usually implemented with direct revenue and profitability goals in mind, its indirect impact on customers seem to have

been relatively forgotten. We argue that RM may alienate customers unless the firm carefully addresses potential problems in advance.

We outlined a series of actions that firms can implement to avoid that RM programs undermine a firm's crucial customer orientation. In other words, revenue and customer orientations can co-exist, but only if top management acknowledges potential conflicts and is prepared to commit resources to rectify the problems. We emphasize 'top' management because pricing is typically the domain of a sales and marketing division; customer service, and with it a heavy focus on customer orientation, often rests with operations. To successfully resolve the conflicts outlined in this paper, each of these functional groups must understand the need for an integrated approach and must be involved in implementing and practicing RM.

7

Summary and Future Research Directions

RM involves using dynamic pricing to sell capacity for varying lengths of customer usage. Essentially RM is the strategic deployment and management of price, time and space. Dynamic pricing includes not only the determination of the optimal prices and pricing schedules, but also the psychological aspects of different pricing practices. Time design involves deciding how time will be sold (implicitly or explicitly) and if sold implicitly, how better to control customer length of usage. Similarly, space design entails determining how to determine not only which units of capacity will be sold to different market segments but also to design the most profitable mix of capacity units.

RM directly affects customers and as a result the impact that various combinations of dynamic pricing, space design and time design have on long-term customer satisfaction and loyalty are essential to understand and manage. If not managed correctly, RM may still lead to higher short-term profits, but will reduce long-term profitability.

7.1 Future research directions

RM represents a fertile research area for marketing scholars. It incorporates a number of traditional areas of marketing enquiry

including pricing, promotion, market segmentation, distribution, consumer behavior and service design. The potential of RM-specific marketing analytics adds to the richness of these interesting research questions. In this section, we will discuss future research opportunities within each of these areas.

7.1.1 Pricing

Since pricing is one of the key areas of RM, a number of interesting research questions can be posed. Additional research on determining optimal prices and pricing structures would be of great value to RM, as would further study on the design and application of psychological pricing approaches such as framing, the attraction effect and presentation on RM practice. A variety of innovative pricing approaches including auctions and the integration of new types of rate fences have been proposed. Research on the effect of these and other pricing innovations would be of great value.

7.1.2 Promotion

Given that RM entails profitable management of customer demand in a capacity-constrained environment, careful design and deployment of promotions is key. Currently, most industries practicing RM use various promotions to try to drive demand to off-peak periods, but often give little thought to how best to design and deploy these promotions. Promotion has obviously been studied in great depth within the marketing literature, but the role that promotion can play in successful RM has received limited attention. The rise of social media presents another fertile research area. Research on how social media can be used to communicate promotions, new rate fences, pricing mechanisms and promotions would be useful.

7.1.3 Market segmentation

The success of any pricing strategies is dependent upon good customer and market segmentation. As with promotions, companies using RM typically have not used an analytical approach to segmentation and

have mostly relied on 'gut feel' for what might work. There is a strong need for research which applies solid segmentation methods to RM practice. In a related vein, additional research is needed on how best to incorporate the large amount of data currently available on customer and market behavior into improved segmentation approaches. Finally, research on the impact of targeting versus self-selection into rate fences in various industries would be valuable.

7.1.4 Distribution

Companies and industries using RM offer their services through a variety of physical and online distribution channels. As with any distribution approach, the channels have varying costs and effectiveness. Channel integration and price integrity are also important issues. Cross-industry research on how best to analyze and develop a successful distribution strategy would prove useful. In addition, since companies using RM are by definition capacity-constrained, it is essential to further understand how to effectively use various distribution channels to sell unused capacity.

7.1.5 Consumer behavior

As discussed in Section 6, implementation of any RM practice can affect customer perceptions of fairness and satisfaction. While there have been a variety of studies done on perceived fairness, framing, perceived unfairness and justice perceptions, additional and more in-depth studies of these and other concepts in a revenue management context would greatly add to the marketing literature and to business practice.

Although some companies have integrated loyalty and CRM programs into their RM practices, the application has not typically been done in an integrated approach. Research on how companies can use marketing science techniques to help protect or allocate capacity to the most valuable customers would be beneficial to RM practice.

Finally, additional studies on the impact of social media and online reviews on the adoption and acceptance of RM practices represent another fertile research area.

7.1.6   Service design

As discussed in Sections 4 and 5, the interplay of time and space creates a number of interesting service design opportunities. Companies can essentially 'slice and dice' different combinations of time and space to create new service offerings that may appeal to particular market segments. As discussed in Section 4, car rental companies have recently started selling time in shorter increments. Similarly, some hotel companies have developed new offerings by renting smaller spaces (e.g., capsule hotels) and for shorter periods of time (e.g., airport and Japanese Love hotels). This same potential exists in other industries. The research question is how best to combine space and time to appeal to profitable market segments.

7.2   Summary and conclusions

RM is a fertile area for future research for marketing scholars. RM started as essentially an inventory allocation system with little thought given to the customer. As RM has become more widely adopted, the marketing implications have become ever more salient, yet many research questions still remain unanswered.

Effective design and management of price, time and space can help capacity-constrained firms make more profitable use of their resources. Real potential exists for novel use of RM in industries not typically associated with RM. Even companies with RM experience can improve performance by refining their design and management of price, time and space.

In the long run, achieving the full potential from RM lies in management's ability to market and manage every available moment as a unique product. This, in turn, requires that we treat when the service is provided as a design variable that should be as carefully managed as the service process itself. Such a reformulation presents an exciting conceptual challenge to the fast growing field of service research.

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