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Smart Pricing and Revenue Management

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Introduction

Pricing is an important strategic decision in almost every business. Good pricing strategy brings extra revenue to the business.

Consider the following example: As a store manager, you need to set the price and sell 100 T-shirts for the upcoming special event. Since the T-shirts are designed for this particular event, we assume the T-shirt has zero values after the event.

To set the price, we need to study the relationship between price and the demand. (In big companies, it is done by the marketing department.) Anyone, who took the 'Economics 101' class, knows that the demand decreases as price increases. And, vice versa, the demand increases as price decreases. Let us simply and hypothetically assume the following price/demand relationship after marketing research:

Price	Demand	Revenue
\$40	10	\$400
\$30	50	\$1,500
\$20	100	\$2,000
\$10	150	\$1,500

Table 1. Price/Demand relationship

Table 1 shows that if the price is set at \$40/piece, then the demand is 10. And the revenue will be $\$40 \times 10 = \400 . (The unsold 90 T-shirts become worthless after the selling season is over). If the price is set at \$30/piece, then the demand

increases to 50 and revenue will be \$1,500. 'Table 1' shows that in order to maximize the revenue the price should set at \$20 a piece. It will generate \$2,000 revenue. In this particular price setting, demand is exact equal to 100, which is the number of shirts we would like to sell.

It seems that \$2,000 is the maximum revenue we can make based on the price/demand relationship. However if we exam the price/demand relationship (i.e., Table 1) more carefully, we will have some very interesting findings. The relationship shows that when the price is set at \$20/piece, there are 100 people who are willing to buy the T-shirt. But the relationship also shows that when the price is set at \$30/piece, there are 50 people who are willing to buy. In other words, among 100 people who are willing to pay \$20/piece or more, actually there are 50 people who are also willing to pay \$30/piece or more. If we can identify these 50 people and sell 50 the shirts to them at \$30/piece, and sell another 50 shirts at \$20/piece, then we can bring in more revenue. In this way, it will generate a revenue of $\$30 \times 50 + \$20 \times 50 = \$2,500$, which is \$500 more then selling \$20/piece to everyone.

As a matter of fact, Table 1 shows that, there are 10 people who are willing to pay \$40 a piece, and 40 people who are willing to pay \$30 a piece, 50 people who are will to pay \$20 a pieces. If we can sell the shirts to the people according to the price they are willing and able to pay, we can generate total revenue of \$2,600. (You can do the math by yourself.) We list the findings in Table 2.

Price	Demand	Detailed Demand
\$40	10	10 willing to pay \$40
\$30	50	40 willing to pay \$30
\$20	100	50 willing to pay \$20
\$10	150	50 willing to pay \$10

Table 2. How much are people willing to pay?

Smart pricing, in this particular example, calls for charging different people with different price according to the maximum amount that they are willing and able to pay.

Building the Fence among the Market Segments

But in reality, only auction style selling can achieve that goal. The majority of the businesses can not ask how much a customer is willing to pay. And no customer wants to pay more for the same product (i.e., the same T-shirt) that someone else is allowed to pay less. From

business point of view, you can not charge someone with higher price without sound reasons. Quantity discount (the more you buy, the less unit price will be) maybe one of the reasons, but it is not applicable in

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our example. In general, you can not use price discrimination against people. But you are allowed to use price discrimination against different market segments. Market segment is defined as a group of people who are similar to each other in their attitudes about certain variables. The profits can be increased further if the market can be segmented with different prices charged to different segments. The price charged will be the one that the members of the segment customer are willing and able to pay.

Using price discrimination against market segment might require creating a 'fence' to prevent members of a higher price segment switch to the lower price segment.

In our example, we can define two market segments. One market segment is the customer who definitely will attend the event and hence will order the T-shirt early. The other market segment is the customer who is undecided to attend the event and might order the T-shirt late on. So we can set the price at \$20/piece but require customer to order the T-shirt two weeks before the event. Otherwise, we charge the customer \$30/piece. By requiring that the purchase must be made two weeks before the event, we successfully build a fence between two market segments and prevent the high-price segment customer (being charged at

\$30/piece) to buy the product at the lower price. The customers who are undecided to attend the event and pay a higher price late on can not complaint of being charged at a higher price. In the real life, the situations are more complicated than selling the T-shirt according the price/demand relationship in Table 1. If we define two market segments as above, then we need to re-exam the demand. It is quite possible that 50 people who are will to pay \$30 or more may be split in both the segments. There are many management tools available to deal with the problem here. Revenue Management is one of them and is widely used in service industries as well as managing the perishable assets. (One can view our T-shirt is kind of perishable product since it losses it's value after the event.) Next section, we introduce the basics of Revenue Management.

Revenue Management

Revenue Management (RM) is the practice of maximizing revenues through adjusting price and availability of products and services according to customer demand. The concept was originated in the airline industry and has migrated to other business areas. Today, hotels, rental cars, cruise lines, restaurants, theatres, and television broadcasting are all applying RM to maximize their revenues.

Consider a simple but classical RM problem. An airline operates a daily flight with 120 seats from New York City (JFK airport) to Boston (Logan airport). The ticket has two fares (low-fare costs \$150 round trip, and high-fare costs \$350 round trip.) The low-fare targets the leisure travelers who are sensitive to the price and usually book in advance. The high-fare targets the business travelers who are willing to pay more but need to book in last minute. Here we have two market segments, but the demands within each market segment are uncertain. The airline would like to maximize the revenue by selling as many seats at high-fare price as possible but leaves no empty seats. Since the low-fare demand comes first, the airline has to decide how many seats should be sold at low fare price, hoping the remaining seats can be sold at high price. Suppose the airline decides to sell 80 seats at low fare price, then once the booking for the low fare reaches 80 the airline will stop selling the low fare ticket. The question is whether the airline is able to sell the remaining 40 seats at the high price. The smart pricing here is to control when to close the selling of low-fare seats. If we close the low-fare seats too early, then we may not be able to sell all the remaining seats at high-fare price

and leave some seats unsold, which is a revenue loss. If we close the low-fare seats too late, then we might be left with not enough seats available to sell to someone who is willing to pay the high price. In this case, the airline only makes \$150 instead of \$350. In order to prevent the business travelers taking advantage of low fare, the airline can build the “fences” between two segments. Advance booking, Saturday night stay, refund policies are common “fences” used by the airlines to separate the two segments.

Business Applications

Revenue management can be applied to almost all the business, especially the service industry, which typically has perishable assets. The commonalities of the businesses that practice the RM are:

- 1) The service or product becomes no value after certain period;
- 2) Market segments are exist so we can charge different prices to them;
- 3) The same service or product can serve different segments;
- 4) The demand for each segment is uncertain;
- 5) There exist some ‘fences’ among different segments.

In the airline example, the service or product is to move a customer from A to B by using one seat. Once the flight is completed, there is no value for the unsold seats. Leisure and business travelers are two natural market segments. The seats can be used by either type of the travelers. The airline is not certain about exact number demand in each segment. And many ‘fences’ available to separate the two segment customers, e.g., Saturday night stay, advance booking requirement, refund policies, etc.)

Conclusion

We start with a very simple example to show that by targeting different market segments with different prices we can further increase the revenue. The key is to build a fence that the members of high-price segment won’t switch to the low-price segment. We then introduce the idea of Revenue Management using a classical airline RM problem, which faced the problem of deciding the booking limit for the low-fare market segment. Finally we discussed the possible applications to various businesses.

Reference:

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