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Pricing strategies and models☆

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ABSTRACT

Price is a major parameter that affects company revenue significantly. This is why this paper starts by presenting basic pricing concepts. Strategies, such as market segmentation, discount, revenue management, price skimming, are introduced. A particular attention is paid to the relationship among margin, price and selling level. Then, the impact of prices on selling volume is analyzed, and the notion of selling curve is introduced. Related pricing methods are discussed such as price testing, cost-plus method, involvement of experts, market analysis and customer surveying. Included in the last category is the conjoint measurement concerned with finding what parameters of the items are important to customers. The profile method and a simplified version, the two-factor method, are also detailed. They provide a set of part-worths (*i.e.*, numerical values) for each tester. In other words, the opinion of each tester can be represented by a point in a space whose dimension is the number of part-worths. By applying a clustering method, specifically *K*-mean analysis, a limited number of clusters can be obtained, each of them representing a market segment. A deterministic pricing model with time-dated items is also analyzed. This model provides practical insights into pricing mechanisms.

1. Introduction

Three non-exclusive ways exist to increase the competitiveness of a production system:

- decrease production costs;
- increase the market share; and/or
- adjust the prices to the state of the market.

Adjusting the prices is called pricing strategy. A pricing strategy has as goal to establish an optimum price with current profit maximization, maximization of the number of units sold, etc.

In production management, historically, the objectives were the reduction of production costs and augmentation of market shares. Significant (and costly) efforts have been made in companies to reduce the expenses. For instance, in the automotive industry and banking sectors, costs have been reduced by 30–50% within the last 10 years. Increasing a market share, which is also costly, depends on the competitiveness of the company. In turn, competitiveness depends also on the ability of the company to meet customer's requirements.

After a long period when in production management the principal objective was the reduction of costs and increase of the market share, now more and more researchers try deal with the non sufficiently studied problem of adjustment of the prices to the state of the market. This area is called pricing or revenue management.

This paper deals with this new domain for production managers which concerns how the prices influence company revenues. It should be noted that changing a price is obviously easier and faster than developing a process to reduce production costs or to increase the market share. Furthermore, the price parameter influences directly and strongly profit margin as well as market share. It has been shown that modifying the price by 1% results in the change of at least 10% in everyday consumption.

Thus, price as an adjustment parameter for profit is the easiest and fastest way to increase competitiveness.

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Indeed, setting a price is the first step of any selling process and we will discuss this point, but pricing strategy does more. It tries to take advantage of:

- Time by playing with seasonality of demand, for example.
- Customers' preferences and purchasing behavior.
- Spectrum of available products.

These aspects are the most important when pricing is concerned and not exclusive. As mentioned in (Talluri & Van Ryzin, 2004), pricing strategy is beneficial when:

- Customers are heterogeneous, which means that their purchasing behavior over time varies, their willingness to pay varies from customer to customer, and they are attracted by different benefits offered by the same type of products.
- Demand variability and uncertainty are high, which guarantees a flourishing revenue to those who master pricing.
- Production is rigid, which encourages playing with prices when demand varies.

Note that the pricing problem is novel for production management but has been extensively studied in other fields. Initially, pricing has been used by said airline industry (Belobaba, 1987, 1989) and (Belobaba & Wilson, 1997), followed by retailers (Bernstein & Federgruen, 2003) and (Chen, Federgruen, & Zheng, 2001), hotel industry (Bitran & Gilbert, 1996; Bitran & Mondschein, 1995) and, more recently, by companies in the energy sector. Note that these sectors are characterized by production (or offer) rigidity, variability of demand and heterogeneity of customers. Interesting research work has been performed in the case of time dated items (Gallego & Van Ryzin, 1994). Unfortunately, very restrictive assumptions were introduced to reach analytical results.

The rest of this paper is organized as follows. In Section 2, we review the most common strategies used to define prices in order to maximize revenue. In Section 3, we discuss the links between selling level, price and costs. The selling curve that connects the price to the sales volume can be obtained as will be shown in Section 4. The conjoint measurement helps finding the characteristics of importance to customers in an item. This will be explained in Section 5. Section 6 provides some insights on pricing strategy for oligopoly markets, that is to say markets high time dated products dominated by a small number of providers, each of them being aware of the actions of the competitors, having the same access to technologies and resources, and the freedom to enter or exit the system at any time and freely. In Section 7, we propose an analytical dynamic pricing model. Section 8 is the conclusion.

2. Common pricing strategies

2.1. High and low price strategies

High price is accepted if it agrees with the value of the product perceived by the customers, otherwise such a strategy leads to commercial failure.

Note that while price plays a role, it is not always decisive, in particular when the product is new on the market. A recent example is the strategy of Apple to dominate in the MP3 player market: Apple based its marketing strategy on i-Pod quality and aesthetics and won the leadership in the domain despite the fact that the i-Pod was the most expensive among the similar products. So high price did not prevent the i-Pod from becoming the leader in the MP3 player market. Another pertinent example is the Mercedes-Benz class A vehicles. The price of this product has been set at a higher level than the initial cost analysis by the car company. Nevertheless, the production capacity was fully utilized during the first production year. The explanation is the power of the corporate image of Mercedes-Benz. Numerous other examples can be found in the cosmetic industry and, more generally, in the luxury goods industry. In luxury industry, high price is more of a selling point than drawback.

A low price strategy may also lead to a commercial success, especially in the food retailing sector. For instance, low price retailers such as Lidl, Aldi or Leader Price are currently having a great amount of success in Europe. Another example is Dell Computer that allows customers to personalize their PC. Amazon.com gained an significant share of the book market by sometimes reducing the prices by 40–50% and providing greater choice. These last two companies base their strategy on the use of Internet to directly distribute their items to customers, which results in a huge reduction of costs which, in turn, allows a large reduction of prices and thus improves their competitiveness.

The success of a low price strategy depends on the number of clients attracted by the product since the low margin should be compensated by a higher number of items sold. In Section 2.2.2, we provide the number of new customers required to compensate a given reduction of price.

Some disadvantages should be outlined in companies applying high or low price strategy. For instance, the image of the items sold by the company is somewhat frozen and a long term price expectation is established, which can reduce the flexibility of the decision-making system.

High and low price strategies could be described as frozen strategies since they try to attract clients by making the most of the corporate image. The drawback is the inability of these strategies to adapt themselves to fundamental disturbances. For instance, an overall impoverishment of a country may sharply penalize companies devoted to luxury and expensive items.

Other strategies are much more adjustable. We provide a short description of these strategies in the next section.

2.2. Adjustable strategies

2.2.1. Market segmentation (or price discrimination) strategy

The development of a plan based upon the fact that different groups of customers attach different levels of importance to diverse benefits offered by a type of product or service is called market segmentation. For instance, the same car model may be proposed in different versions (two-door or four-door, different engine powers, different finishing levels, etc.), and each version may attract a particular type of customer.

This strategy is applicable to a type of item in the case of a monopoly market. It consists of segmenting the market and charging a different price for each segment, depending on the willingness of these customers to pay more or less to purchase the item. Indeed, some "rate fences" should be introduced in order to make sure that the customers of a segment will pay the price assigned to the segment. These "rate fences" can be the promotion of some benefits that attract the customers of a specific niche, or by offering some particular services to the customers of a distinct segment. Again, the customers belonging to given segment should be similar or, in other words, characterized by the same parameters, and dissimilar from the customers of others. Similarity and dissimilarity are related to buying habits.

The approach to market segmentation is a four-stage process that can be summarized as follows:

- Identify the parameters that customers are interested in. For instance, in personal computer market, training, software level,