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OVERVIEW OF METHODS AND SOFTWARE FOR PRICING**Zelenko E. V.**

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Abstract. *Despite the fact that pricing is an integral part of business strategies, it has received little attention from practitioners. To select which pricing software to use, at first it is necessary to determine pricing methods to use, some of which are complex and require preliminary market research. Therefore, the task was set, based on the features of pricing methods, to determine the most optimal of them, as well as briefly list the analogues of the developed software. As a result, the main disadvantages of analogues of the developed software are indicated, and it is also found out that the simplest method to use is the cost-based method.*

Key words: *pricing strategy, pricing methods, monitoring software, software agent.*

Introduction.

Pricing is an integral part of business strategies, a relevant resource, a vital tool for any company's financial life and one of the most crucial, challenging, and subjective decisions. Its complexity and implementation difficulties present major challenges (i.e., problems, [1, p. 14]) to many organizations. Thus, setting and changing the list price of a product or service are considered critical activities, a multidisciplinary and extremely complex process that involves production, finances, legal, and marketing aspects. That is why motivation for studying pricing is justified, as it offers companies a competitive advantage. And even despite the significance of pricing as a strategic element, which plays a pivotal role in generating revenue, as well as influences business continuity and profitability, to date, pricing has received little attention from academia and practitioners, which makes it one of the most neglected elements in the marketing mix. [2, p. 1, 2]

Since special purpose software uses different pricing methods, the selection of methods must precede software selection. Therefore, it was decided to first consider the subject of research (pricing processes) and only then, based on the findings, move on to reviewing existing software and choosing an architecture for developing a new software product for specific tasks.

Main text

Pricing methods (presented in table 1) are generally divided into cost-based, competitive-based, and customer value-based [1, p. 14; 2, p. 1, 2, 3, 6] (also demand (value) based [1, p. 14]). When using the cost-based method, marketers consider the costs of a product and add some markup or consider target return based on the breakeven point. In the competitive-based method, marketers consider competitors' prices and compare whether their benefits are more or less than competing products. Prices are set according to the comparison. In the customer value-based method, marketers consider consumers' needs and willingness to pay and then develop products according to those needs and budgets. [2, p. 3; 3, p. 3236]

Table 1 – Pricing methods and sub-methods

<p>1. Cost-based method.</p>	<p>1.1. Cost-plus method where a profit margin is added on the service’s average cost. 1.2. Target return pricing where the price is determined at the point that yield the firm’s target rate of return on investment. 1.3. Break-even analysis where the price is determined at the point where total revenues are equal to total costs. 1.4. Contribution analysis is a deviation from the break-even analysis, where only the direct costs of a product or service are taken into consideration. 1.5. Marginal pricing where the price is set below total and variable costs so as to cover only marginal costs.</p>
<p>2. Competition based method.</p>	<p>2.1. Pricing is done similar to the competitor or according to the market’s average prices. 2.2. Pricing is set above competitors’. 2.3. Pricing below competitors’. 2.4. Pricing according to the dominant price in the market.</p>
<p>3. Demand based pricing method.</p>	<p>3.1. Perceived-value pricing where the price is based on the costumer’s perception of value. 3.2. Value-pricing where a fairly low price is set for a high quality service. 3.3. Pricing according to the customer’s needs where the price is set so as to satisfy customer’s needs.</p>

Avlonitis & Indounas [1, p. 14-15]

Among these three methods, customer (demand) value-based methods are considered better than the rest two and the competitive-based method is even harming firm performance [1, p. 15; 3, p. 3236]. The benefits of using include generating profit potential and maximizing profit. This information implies that focusing on customers’ needs is better than keeping competing with competitors or keeping an eye on their costs. The idea is also consistent with the concept of marketing to satisfy customers’ needs leading to those firms will gain value back from customers bringing well-being to the whole society. But customer value-based methods are used less often (the practices of competitive-based methods account for 44%, cost-based methods account for 37%, and customer value-based methods account for only 17%, while the rest 3% are left for other approaches). [3, p. 3236]

Five important reasons behind this low number (17%) were exposed:

1. The process of assessing value is hard and takes time (the most important reason).
2. It is also hard to communicate values to customers when information is overwhelming.
3. It is hard to define market segments requiring each value.
4. Once a price is set according to value, sales teams give discounts to be equal to competitors anyway.

5. Managers put pressure to sell products at premium prices set according to value and to sell to reach volume quota at a discounted price. [3, p. 3236-3237]

It can be summarized that the customer value-based approach considered as difficult to implement operationally [2, p. 3]. The difficulty of its use is well seen in the proposed price point definition process, which requires preliminary formal market research by marketers to assess value, as well as field trials to gain market feedback on the recommended prices. In contrast to customer value-based methods, a cost-based method is a lot easier as cost data can be gathered within companies. [3, p. 3237] Therefore, companies prefer this approach [2, p. 3].

It is worth adding that accounting professionals typically use the cost-based approach and regardless of the specific approach used — be it cost-, value-based, or competition-based — what is vital in this context is cost information [2, p. 6].

Due to the complexity of the customer value-based method implementation, in the initial versions of the developed software, it was decided to use cost-based method.

As pricing is a competitive strategy and is typically hidden from customers [2, p. 2], it was decided to consider the main available features provided by well-known price monitoring software.

Prisync provides tools for competitor price tracking and dynamic pricing: stock availability monitoring, marketplace and product variant price tracking, MAP monitoring, recommended price module [4] (the number of services provided may depend on the selected package).

Competera is a technology company that offers a comprehensive pricing platform to save costs, recover profits and meet new shopping patterns with the help of a sophisticated market-driven engine to ensure short- and mid-term growth and an algorithm-based engine for long-term growth. Offers a combination of assets to navigate retailers to optimal prices and help them cut expenses and maximize their financial performance. [5]

OmniaRetail provides dynamic pricing, tracking product prices and comparing them with competitors. [6]

PriceRest provides Price and Competitor Monitoring, MAP Monitoring, price suggestions, etc. [7]

IntelligenceNode provides pricing optimization, pricing trends analysis, competitor prices real-time monitoring, data-driven pricing decisions to improve profitability. [8]

According to the author of this study, based on 4 years of experience of cooperation with companies working in the field of eCommerce and using Dropshipping, the main disadvantages of using such software for a retailer are:

1. Understanding how pricing algorithms (of the software used) work, as well as the possibility of making changes to their work.
2. Lack of control over the causes of errors.
3. Periodically arising need to adapt software or company processes to the requirements for interaction with third-party software.
4. Additional costs for purchased services at the initial stage of project development.

5. Dependence on a stable Internet connection.

In the 4th paragraph of the above list, it is understood that the necessary costs for the retailer to pay for service packages of supplier companies and monitoring platforms can be: €29/69 per month for goods supplier's services ([9]) + \$199/399 for pricing platform's services ([4]) \approx \$230/430/273/473 per month (depending on combinations of packages used; in accordance with the ratio €1:\$1.07 as of March 14, 2023). The cheaper service package (\$99) of the Prisync platform ([4]) was not considered due to only three price updates per day, which is not enough to get up-to-date price values in the case of cooperation with suppliers that have the ability to provide hourly prices ([9]). But even companies supplying goods sometimes practice selling service packages, according to which prices for goods are updated, for example, 2 times a day ([9], as of 12.2019-02.2021), which makes it necessary to predict prices at certain points in time, in for which current product prices are not available. This would allow the use of less expensive service packages of companies supplying goods and monitoring platforms.

Considering the above, the next task arises — to develop software that will meet the following requirements and features:

1. In case of using only the client application: Due to the lack of the need for data exchange, it will make price calculations faster than in the case of using price monitoring platforms with a client-server architecture (sufficient computing power is assumed).
2. In case of using only the client application: It will not require an Internet connection, which will allow to predict prices without the need for constant exchange of large amounts of data (29765 items, according to the latest data analysis [10]) with the server at a time interval when price updating is not provided for by the rules of cooperation with the supplier of goods.
3. In case of providing software as OSS (open-source software), will provide the client with the opportunity to make changes to pricing algorithms, thereby more flexibly adapting the module to given environmental conditions, as well as controlling the causes of errors. This clause also provides for a reduction in the retailer's costs for software purchase.
4. Will adapt to changes in data without human assistance.
5. Will be able to predict prices.

In order to eliminate the need for human assistance and also to ensure adaptation to new data, the work of the developed software involves the use of software agents and machine learning.

And since pricing decisions are becoming more and more tactical and operational that companies have to make pricing decisions as swiftly as possible in order to remain competitive [1, p. 12], it is assumed that pricing processes automation using machine learning, having a positive impact on the first requirement (speed) with or without price forecasting, will inevitably lead to an increase in competitiveness.

Summary and conclusions.

The methods of pricing and their features are considered. It was found that the most simple and therefore frequently used method is based on costs. Monitoring

platforms and the main disadvantages of their use were considered as analogues of the software being developed for pricing. To eliminate the disadvantages it was proposed to develop software that is simpler in architecture, which, nevertheless, using software agents and machine learning will ultimately have a positive impact on the processing speed data, budget savings and competitiveness.

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