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Seminar Paper

# Price Theory in the Digital Age: Value Based vs. Cost-Based vs. Arbitrary Based Prices, Justifications, Discussions


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# Abstract

*In the constantly evolving digital economy, pricing strategies play a crucial role in the success of companies. This seminar paper examines the three main strategies:  the value-based, cost-based and arbitrary- based pricing approach The value-based pricing strategy is based on the perceived value of a product or service to the customer, while the cost-oriented strategy is based on production and sales costs. In contrast, the arbitrary pricing strategy determines the price without direct correlation to costs or perceived value and is based on mathematical considerations. Digitalization has a profound impact on all three pricing strategies. It enables more accurate data collection and analysis that supports a more accurate assessment of customer value and cost structures. In addition, digitalization promotes innovative pricing models such as dynamic and personalized pricing that can quickly adapt to market changes and individual customer preferences. The seminar paper analyzes the pros and cons of each pricing strategy and provides insights on how companies can effectively use these strategies to improve their market position. It examines how different industries benefit from the respective pricing strategies and which factors influence the choice of the optimal strategy.**

For reasons of more fluent readability and a uniform spelling, the male and female form was omitted. Whenever the male form is mentioned, both a male and a female person is considered.

The sections marked with * were created using AI. The contents come from the cited sources and were previously checked for meaningfulness and correctness.

# 1. Introduction

The decision on the pricing of the products or services offered is one of the most important entrepreneurial activity. In the worst-case scenario, too high prices can lead to losses, as demand falls and production capacity is thus depleted. The pricing decision is one of the most critical decision a company can make, because no tool from marketing can increase or destroy demand more than pricing strategy. (Harmon et al., 2005).
Too low prices neglect the contribution margin calculation and can attract competitors, which can lead to an existential price war. The price policy determines not only the amount of prices, but also the type of pricing. Skillful pricing can influence the demand in terms of sales volume and turnover. The task of marketing is to determine the willingness of consumers to pay (for example through market research) and to increase it through suitable measures (Olbrich and Battenfeld, 2014).

According to the classical understanding of economics, prices develop trough market exchange. However, this pricing method has long since ceased to be the only strategy and nowadays much more attention is paid to customers and their needs. Following the “pay what you want” principle, a British rock band offered their then new released album for download in 2007. The surprising thing at the time was that the band was able to benefit financially from this offer und has prompted other bands to follow the successful example. There are now music platforms and streaming services where customers can buy various subscription models according to their needs and wishes (Bitsch and Hanf, 2015).

New technologies change the implementation of price policies or completely shift the possibilities. With AI and the related methods, the possibility of how price decisions can be calculated changes. Significant developments in this area are, highly complex forecasting models which can calculate thousands of variables in near real time. Data that have not even existed before becomes accessible trough IoT. Thus, more complex and more accurate models are possible, but also price decisions for situations that have not existed so far (Weber, 2020).

This brief impulse on the subject shows that a lot has already changed and will change in pricing. In this thesis, I will discuss the most important methods, provide application examples and show possible advantages and disadvantages.

# 2. Pricing Policy

## 2.1. Definition and Relevance of Pricing Policy

At the beginning, some basic theories from marketing are to be explained for a better understanding of the pricing mechanism. Price policy describes the setting of prices, the necessary information, considerations and activities to realize the targeted prices. “From a marketing perspective, the goal of pricing strategy is to assign a price that is the monetary equivalent of the value the customer perceives in the product while meeting profit and return on investment goals” (Harmon et al., 2005, p.1).

The question of the nature of the price may seem trivial at first glance, but needs some considerations. Usually, the price is defined as the number of monetary units that a buyer has to pay when purchasing a quantity unit of a product. It is assumed that the product has a certain fixed quality. During the purchase process, the price P results from: Fee/quantity. From the buyer’s point of view, the price represents the number of units of available financial resources (purchasing power) that must be used for a product and are then no longer available for other purpose. This consideration is especially important in the value-based pricing strategy, which will be examined in detail later on in this paper. In the provider’s perspective, the price is central factor of the achievable revenue ( = price x amount) and the associated economic success of the company (Kuß and Kleinaltenkamp, 2011).

The theoretical ideal of economics is the model of complete competition, which in reality is only fulfilled in a few markets. Digitalization can bring the economic reality closer to this ideal concept through a higher market transparency. However, Digitization has the potential to cause monopolies or new information asymmetry, which could lead to a greater deviation from complete competition, resulting in a loss of welfare (Petersen, 2018).

## 2.2. Consumer Behavior

We speak of consumer behaviour when people assume the role of a consumer in their experience and behaviour and acquire, use, consume or dispose of goods and services (Hoffmann and Akbar, 2018).

In all marketing activities, the focus is on buyer behavior, why? Only an good knowledge of buyer behavior makes it possible to accurately assess the effect of marketing instruments and thus determine the buyers and market potential. Thus, the following central questions are the focus of the analysis of buyer behavior:

1. Who buys?
2. How will the product/service be bought?
3. Where will the product/ will be bought?
4. Why will the product/service will be bought? (Bröring and Griese, 2011)

Research into buyer behavior can be applied in the following areas of operational marketing, among others:

- As a basis for market segmentation to identify and address the target segment correctly,
- Behavior of psychological processes leading to the behavior of buyers,
- Development of foundations for customer loyalty,
- Integration of customers into business processes (e.g. consideration of purchasing behavior in the development of new products) (Foscht and Swoboda, 2007 cit. in Bröning and Griese, 2011).

Numerous studies have already shown that consumer orientation has a positive effect on sales and profit (Sirinivasan and  Hanssens 2009, Steiner 2009 cit. in Hoffmann and Akbar, 2018). The strategic alignment of the business model to the needs of the customers should therefore be a central goal of the management. But why has customer orientation become so important for the company's success? Mainly this is due to the fact that many markets have transformed from seller markets to buyer markets over the past decades. The provision of services became the critical bottleneck after the Second World War. Seller markets where

demand is less than supply were the norm, and vendors could sell their products without focusing on specific marketing (Hoffmann and Akbar, 2018). In today's mostly dominant buyer markets, consumers can choose from a variety of equal offers- occasionally with different prices (Trommersdorf and Teichert, 2011 cit. in Hoffmann and Akbar, 2018). The reasons for this change include strong technical progress, market saturation in various industries and the market entry of new foreign competition in the course of globalization. In order to operate successfully in buyer markets, companies must differentiate themselves from their competitors and give their products characteristics that appeal to a specific target group. To do this, they must know and understand their target group and thus the consumer.

Since most consumers have only a limited income, they have to adjust their buying behavior accordingly. Consumer behaviour can be explained by the following three factors: consumer preferences, budgetary constraints and consumer choices. They will try to choose a combination of goods when buying, which will maximize their satisfaction. Consumers do not always make their decisions rationally and often buy impulsively, ignoring their budget constraints. As a result, some of them are in debt. This is where value-based price theory attaches, as especially younger customers often see the value of a product higher than they have financial resources available. Sometimes consumers are not sure about their buying decisions and are influenced by friends or acquaintances or even by changes in their mood. And even if consumers make their decisions rationally, it may not be possible for them to take into account the variety of prices and applications they are confronted with every day. Recently, economists have developed models to explain consumer behavior. These include realistic assumptions about rationality and decision-making. This research area, which is referred to as behavioral economics, relies heavily on findings from psychology and with this transformed subject areas. Therefore, it is advisable to analyze, survey and conduct representative studies before the market launch of a product and its pricing.
(Pindyck and Rubinfeld, 2018) .

## 2.3. General Conditions for Pricing Strategies

A company's pricing policy is significantly influenced by various factors that play a role in the decision-making process. These include primary costs, demand, competitive prices, the

prices of similar products within the same product line and the benefit for the customer. Knowledge of primary costs is crucial for profitable pricing, while demand determines the optimal price level. Competitive prices and the prices of similar products influence competitiveness, while the perceived benefit for the customer defines the scope for pricing. These factors must be reconciled in order to develop a successful pricing policy that takes equal account of the company's profitability and customer satisfaction (Kluß and Kleinaltenkamp, 2011).

### 2.3.1. Prime Costs

The longer-term sales generated by a company must cover all costs associated with the manufacturing and distribution of the sold product or service. This consideration is also the basis of cost-based pricing, which will be discussed in more detail later. Sometimes and for a limited time, non-cost-covering prices can also be (consciously) accepted or set by providers in order to achieve a promising position in the market. The basis for the determination of prime costs are calculation methods that are known from accounting. It is worth highlighting the fact that the calculation is by no means used to determine prices. It only provides a basis for price policy decisions by determining costs.

Prices and costs ‘actually’ have nothing to do with each other: This is because the price achieved for a product represents the value that a customer attaches to it at the moment of purchase, while the cost represents the resources required to produce the product or service. Thus, other factors such as reactions from competitors can be of greater importance in price formation. Two different types of costing methods are distinguished: the costing on a full cost basis and the costing on a partial cost basis. If all costs incurred in an enterprise, including those that are not related to the direct creation of a product/service, are attributed to the cost objects, it is a calculation on a full cost basis. If, on the other hand, only the costs associated with the production of a service are taken into account, this is partial cost accounting (Kuß and Kleinaltenkamp 2011).

### 2.3.2. Demand

The assessment of demand is based on a measured or estimated relationship between supply prices and the quantities in demand (for this price). Normally, demand is expected to

grow with prices falling. If the price-selling function is known, an attempt can be made to determine the maximum winning price analytically.
If the quantity sold changes strongly with a relatively small price change, one speaks of a very elastic demand, in the opposite case of inelastic demand (Kuß and Kleinaltenkamp, 2011). The individual demand curve of a consumer describes the consumer decisions made and takes budget restrictions into account. With limited income and high prices, demand tends to decline. Knowledge of market demand can help companies set their prices. (Pindyck and Rubinfeld, 2018)

### 2.3.3. Competitive Prices

When taking competitor prices into account, the aim is to align the price of a product with the price of a product/service with the price structure of the industry or the relevant submarkets. The basis for this is the desired product positioning and the relative product quality. Stabilizing or changing the market share is often the main goal of competitive pricing. It fits well with the concept of market-oriented corporate management, as prices are seen from the customer’s perspective in comparison to competing offers (Kuß and Kleinaltenkamp, 2011).

### 2.3.4. Prices of Other Products of the Same Product Line

A manufacturer’s products are often not offered in isolation on the market, but are in the context of a product line or range. A prime example are the offerings of major car manufacturers with models of different sizes and equipment variants. The problem here is to set prices in such a way that a favorable profit situation is achieved across the entire product line, while at the same time considering the interdependencies between the individual products with regard to costs and demand. Thus, it is easy to imagine that, for example, with a very low price of the VW Polo, the demand increases accordingly, but also the costs of the VW Golf from the same product line "cars" (= cannibalization).

The aim is to find prices for the individual products that are consistent with their position in the product line. Such a pricing policy tends to be long-term in nature and restricts flexibility in setting prices for individual products. Such a pricing policy is more long-term and restricts the flexibility to set prices for individual products (Kuß and Kleinaltenkamp, 2011).

### 2.3.5. Costumer Benefit

When considering the customer benefit, it is about the value of the product/service perceived by the customer. All benefits associated with the purchase of the product/service (durability, reliability, punctuality of delivery) and ancillary services (warranty, service) are taken into account. This approach is particularly important for the value-based pricing strategy, which will be described in the further course of the thesis. In this respect, this form of pricing is consistent with the way in which many purchase decisions are made and corresponds to the requirements of marketing to orient towards the customer.
However, a realistic assessment of the value of products for customers, i.e. one that is independent of the possibly overly optimistic assumptions of the company making the offer, is not without its problems. This is aggravated by the fact that the benefits of a product can be very different for different customers (-groups) (Kuß and Kleinaltenkamp, 2011).

## 2.4. Three Basic Price Positioning

Price positioning is an essential part of the pricing strategy. The decision which price positioning is relevant has an impact on the entire Marketing Mix. The different instruments must be coordinated accordingly, to create a uniform picture of the pricing strategy. Price positioning includes the combined consideration of product performance and
Product price. Basically, three different positions can be distinguished: low price strategy, medium price strategy and high price strategy.

A low price positioning means that a product with a low performance level also has a low price level. This corresponds to the simplified strategy of buying behavior, according to customers at low prices even low quality. As an example, here are the private labels of Aldi. The discounters Aldi South and Aldi Nord usually offers their products at low prices.

In the medium price positioning, a slightly higher quality is offered for a higer price.
The strategy must also be in communication and the overall appearance of the brand.
Examples for the middle price segment are the TUI brand, the VW Golf or the NIVEA Creme.

The high-price strategy does not focus on price, but on high quality. The price is measured by the value the product has, for example brands like Porsche, Apple or Rolex (Griese, 2011).

# 3. Value- Based Pricing

## 3.1. Definition and Basic Principles

Value-based pricing is a strategy in which prices are set on the basis of the perceived value of the product or service to the consumer rather than on its historical price. The principle applies especially in markets where owing an item increases the customer's self-image or enables special experiences. To this end, this perceived value reflects the value that consumers are willing to place on the product and consequently affects the price that the consumer ultimately pays (Bloomenthal, 2023). For example, the perceived value of umbrellas and waterproof clothing correlates with the season and the weather (Shahmoradi, 2023).

A customer is given the pricing power to pay any price including zero, which removes the capital market. The social market includes non-monetary exchange relationships and functions trough exchange values and norms such as reciprocity, cooperation and distribution. The factors influencing the price are: social democratic factors, basic attitudes and values, social factors and product-related factors. A person's social class has a significant influence on their price awareness, particularly through factors such as education, profession and income. A higher income, for example, gives greater financial flexibility, but also influences the consumer behavior. A person's basic attitudes and values play a decisive role in their price decision and willingness to pay. For example, personal convictions and ethical values, such as sustainability and fair trade, influence the willingness to pay more for products that correspond to these values. Societal factors such as social norms, identity and anonymity have a significant impact on pricing decisions and customers' willingness to pay. Social norms often influence what is considered an appropriate price, as people tend to be willing to pay more for products that are considered valuable or desirable by their community. Individual identity also plays a role, as people often pay prices that reflect their self-perception and social status. Product related factors such as satisfaction, personal contact and reputation play a decisive role In customers' pricing decision and willingness to pay. Satisfaction resulting from the quality and benefit of a product increases the likelihood

that customers will be willing to pay higher prices and they recognize the value of a product (Kim et al, 2009 cit. in Bitsch and Hanf, 2015).

When customers buy, they compare: Where do I get what at what price? In the end, a product/service is often bought where it is cheapest. But in many cases this is not the only interest of customers and therefore it is important that a company creates added value for its customers. In marketing, the added value is defined as the additional benefit that results for the customer when purchasing a product or service. The thing that enhances one company's offer over another. The added value does not necessarily have to have a concrete financial value. Added value can be generated in various ways. These often mean no additional effort for the companies, but a decisive purchase argument for the customers (Jimenez, 2022).

When it comes to creating added value for the customer, the product itself is often the most obvious starting point. Everything that goes beyond the basic expected benefits is the added value here (Jimenez,2022). Creating value for the customer involves: developing a product/service that fulfills the desires and needs of customers, establishing a communications strategy that effectively communicates the products'/services' value to customers and selecting a distribution program that makes the product/service available to the customer.

Creating any added value is relatively easy. The actual entrepreneurial trick is to make it fit and as unique as possible. If a company wants to create added value successfully, it has to know its own target group and find out what is attractive to them. At the same time, the added value should lie in something that the competition does not offer and ideally cannot offer so easily. Because then the unique selling proposition is preserved as long as possible. All this sometimes requires some research and ingenuity, but can ultimately be the decisive factor in the competition (Jimenez,2022).

Creating customer value enhances the competitiveness of the company's product/service by generating high customer satisfaction. This, in return, motivates the customers to make frequent purchases. As a result, the company secures customer lifetime value but also

captures a larger share of the customer’s purchasing portfolio. Altogether, these factors contribute to the company’s long-term profit growth and boosts its market value (Netseva-Pocheva, 2011).

## 3.2. Examples From the Digital Economy

Value based pricing can be applied above all in the luxury segment. Customers are more willing to pay a higher price because they want to benefit from a certain brand value or customer experience. Here are some examples:

1. Apple: Apple products are known for their premium pricing, a strategy aimed at delivering high value to specific customer segments. This approach is supported by several key components. First, Apple’s design philosophy emphasizes sleek, minimalist aesthetics and high-quality materials that contribute to the perception of luxury and exclusivity. Second, the user experience is carefully designed, from intuitive software interfaces to seamless integration across the Apple ecosystem, increasing customer satisfaction and loyalty. Finally, Apple’s strong brand image plays a crucial role; the brand is associated with innovation, reliability and status, justifying the higher price for many consumers
2. Cosmetic/beauty products: High-end cosmetics brands like Estée Lauder or Clinique use value-based pricing to set prices for their products that are valued for their quality and their positive impact on customers' appearance and self-esteem. Customers are often willing to pay a higher price for cosmetic products if they are convinced that these products can give them a better look and increased self-confidence. By using high-quality ingredients and innovative technologies, these brands can offer added value that sets their products apart from others on the market. This not only emphasizes the exclusivity of their brand, but also strengthens customers' trust in the effectiveness and quality of their products.
3. Luxury cars: Manufacturer of luxury cars such as Mercedes-Benz, BMW and Audi set prices based on the perceived quality, prestige and technical innovation of their vehicles. Tools such as vehicle configurators allow demanding customers to personalize their cars by choosing from a variety of options, including colors, equipment packages and technical extras. These personalization opportunities

increase customer loyalty to the brand and increase their willingness to pay a higher price to get a vehicle that suits their individual preferences and needs.

4. Designer clothing: Designer clothing from brands such as Gucci, Prada and Louis Vuitton use value-based pricing to sell at a higher price, due to perceived quality, prestige and exclusive design. These luxury brands have earned a reputation for outstanding craftsmanship, high-quality materials and unique design, resulting in their products being seen by many as status symbols. Through their skillful marketing strategy and the creation of an aura of exclusivity, these brands can increase their prices while maintaining high demand. For many customers, buying designer clothing is not only a simple act of consumption, but also a way to demonstrate their social status and feel belonging to an exclusive circle of people. Although the prices of these garments are often high and often do not even represent a fraction of the actual value of the product, for many they are a symbol of luxury and style, which explains their continued popularity. (ChatGPT,2024)

### 3.3. Advantages and Disadvantages

*Value-Based Pricing is a strategic approach to pricing that takes the customer's perspective into account to a large extent. In contrast to traditional methods, which are often based on costs and competitive prices, value-based pricing focuses on the perceived benefits for the customer. By understanding their customers' needs, preferences and willingness to pay, companies can set prices that reflect the value that their products or services. This enables companies not only to take advantage of price elasticity, but also to build long-term customer relationships. Customers feel better understood and valued through value-based pricing, as their individual needs and the benefits they receive determine the price. By incorporating the customer perspective into pricing, this strategy can help companies strengthen their competitive position, increase profitability and ultimately ensure long-term success (Hinterhuber,2008). Value-based pricing offers companies the opportunity to clearly differentiate themselves from competitors by emphasizing the unique value of their products/services. In a competitive market environment such differentiation can be crucial to remain successful in the long run (Lepkowska, 2023).*

*Value based pricing may seem attractive at first glance, but this pricing strategy also has some challenges and potential disadvantages. One of these challenges is that the data required to determine customer value is often difficult to obtain and interpret. Companies must conduct extensive market research and collect data on customer preferences, needs and willingness to pay, which can involve considerable effort.*
*Furthermore, focusing on customer value can lead to comparatively high prices. Although this can lead to higher margins in the short term, there is a risk that customers will be put off and search for cheaper alternatives. Therefore, when applying value-based pricing, companies must keep an eye on long-term profitability and ensure that pricing does not lead to a loss of market share. Another aspect against it, is that customer value is often not automatically given, but must be actively communicated. Customers need to understand why the products or services have a higher price and what benefits they can derive from them. This requires an effective marketing and communication strategy to convey customer value transparently and convincingly (Hinterhuber, 2008).**

### 3.4. Discussion on Applicability and Effectiveness

Value-based pricing can basically be used for almost all product families, provided that they are sufficiently homogeneous and the data situation allows sufficient differentiation (Prof.Roll & PASTUCH).

Volatile commodity prices, growing competitive pressure, changing customer expectations - especially in B2B markets, these circumstances require companies to continuously adapt their product and service portfolios. The associated pricing of products and services is becoming more important. The classic cost-based approach to pricing is often not very efficient as it does not consider the real customer benefit. A much better approach is the value-based pricing method, which is based on an open, direct communication exchange with the customer. This involves pricing additional benefits or values for a customer in comparison to the price of the next best alternative from the competition. The correct application of value-based pricing leads to a significant increase in earnings, as the customer benefit is reflected in the price as added value and is also paid for. Value based pricing is primarily a common instrument for products that stand out positively from the competition due to certain features from the customer's point of view and can therefore be

differentiated. In order to successfully apply the value-based pricing, two fundamental questions need to be answered:

1. How does a customer measure the value of a product?
2. How can added value be converted into a price?

This approach is based in a really deep understanding of customers and customer segments as well as the market environment. The trust built up over the years and the constant exchange with the customer play an important role here. A detailed SWOT analysis is a good way of taking stock before using the pricing instrument. The valuation of individual value-added features in a monetary currency generally leads to optimal utilization of the price corridor across different customer segments. This approach significantly increases the regulation of unused profit potential, provided that the sales department succeeds in enforcing the prices on the market (pn-consult,2024).

A customer value analysis can be conducted and considers the following factors and key figures: Perceived Value, Economic Value to Customer, Economic Value Added and Price Sensitivity Measures. The perceived benefit of the customer cannot be calculated so easily and directly, but a technique that is often used is the conjoint analysis or trade-off analysis. “This technique enables managers to compute the consumers’ utility function for individual variables and to understand how they are combined, traded off, and otherwise valued” (Harmon et al., 2005, p. 13).

The Economic Value to the Customer or also called “exchange value” is the maximum amount a customer is willing to pay, assumed that he is fully informed about the market. This indicator is analogous to the reservation price. The question “What is is it worth to you?” is answered by that. “Economic Value-Added measures the life cycle economic costs and benefits to the user of one product when compared with a reference product.
The Economic Value-Added measures the company’s net operating after taxes. Both vendors and customers us this concept to answer the question: “Will this asset generate returns above the cost of capital ?” (Harmon et al., 2005, p. 14).

The Price Sensivity Measurement models are useful for estimating market demand and calculating the proportion of buyers who would purchase the product within a specific price range. PSM determines the limits of buyer resistance over a range of prices related to the product's value perceptions. (Harmon et al., 2005)

### 3.5. Implementing Value-Based Pricing

After the target market is chosen, marketers must determine the value that the customers should perceive in a product. This assessment includes identification of the customers' value drivers, price sensitivity, Economic Value to the Customer and other price-related characteristics. After determining the price, the customer is willing to pay, this information is combined with cost-volume estimates to assess whether the configured product can be sold profitably. "This type of information, which is interactive with the market, can be used to adapt the product's design to meet the customer's value expectation or to chancel the project" (Harmon et al., 2005, p.17).

In order to better reconcile the production costs with the price expectations of the customers, companies should pay more attention to pricing throughout the development cycle which is easily shown in Figure 1 (Harmon et al., 2005).

No matter which value-based pricing method you choose, it will almost always be a supplement to the existing methods. On the one hand, cost data is always important for decision-making, on the other hand, the cost-plus pricing effort is always the least. In the combination lies the power (Rrof.ROLL &Pastuch).

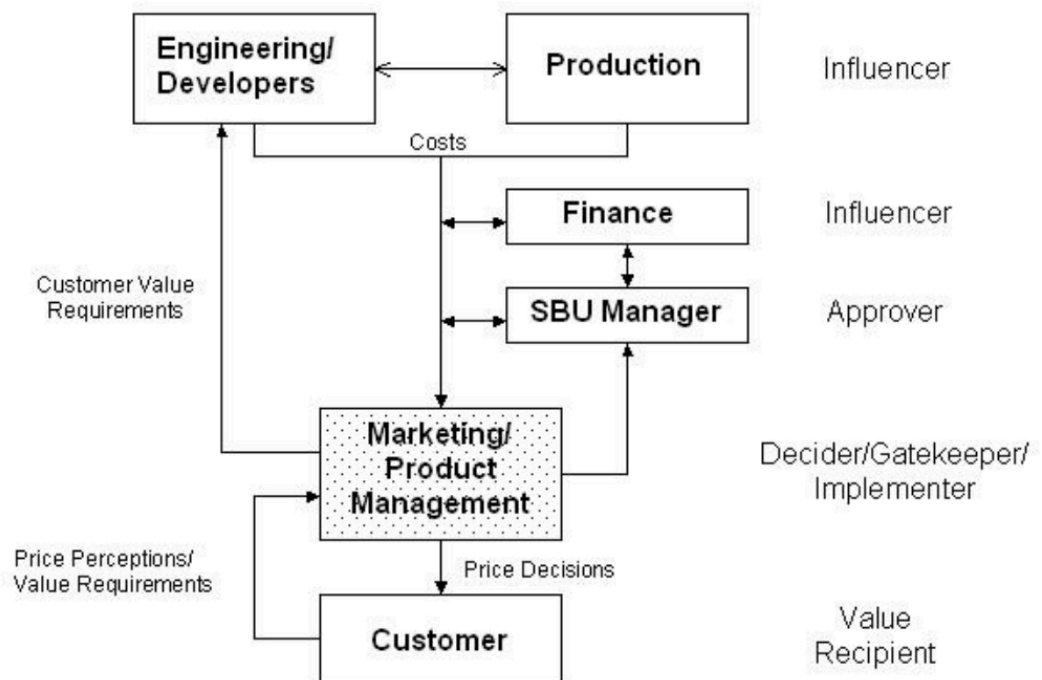


Figure 1: Value-Based Decision Process

# 4. Cost- Based Pricing

## 4.1. Definition and Basic Principles

Historically, cost-based pricing is the most popular method since it relies on more readily available information (Harmon et al., 2005). Cost based pricing focuses on the consideration that a firm's prices must ensure its profitability, or at least that it covers all its costs (including distribution costs).

In addition to the desired cost coverage, in the best-case scenario the firms can achieve an additional markup to compensate for its effort and risks (Coubercoubetis and Weber, 2003). "For example, in a retail store, if a merchant buys something for 5€, and they sell it for 10€ to a customer, this is called cost-based pricing" (Helmold, 2022, p.77). However, this price cannot be set arbitrarily because if we remember the previous topic block, we know that the

willingness to pay of the customers is limited and is based on the perceived benefit (Helmold, 2022).

The cost of a certain product/service can be split into direct costs and indirect costs. “Direct cost is the part of the cost that is solely attributed to the particular service and will cease to exist if the service is not produced. Indirect cost is other cost that is related to the provision of the service “(Courcoubetis and Weber, 2003, p. 179). The sum of all factor cost that remain the same when the quantity of a product/service changes are called fixed costs. When the cost depends on the amount of the product/service produced we have variable costs. Another useful approach to identify the costs of a product/service are average costs, which are obtained by dividing the cost by the produced quantity of a product/service. A fundamental difficulty in defining this price is that products/services are normally produced mutually. “A large part of the total costs is common costs, which can be difficult to apportion rationally amongst the different services” (Courcoubetis and Weber, 2003, S. 164). Nevertheless, these data can be made more easily accessible that for example with the value-based approach, trough the cost accounting.

Another condition should be defensiveness against other competitors, “discouraging the entry of competitors why by posting lower prices could capture market share” (Courcoubetis and Weber, 2003, p. 164). If prices do not reflect actual costs or hide the costs of inefficiency, they invite competition from other companies. The customers will choose the provider from who they think they get the best deal and the firms seek to offer better deals to customers by developing improved cost functions and operating different production levels (Helmold,2022).

### 4.2. Examples from the Digital Economy

“Firms such as Ryanair and Walmart work to become the low-cost producers in their industries. By constantly reducing costs wherever possible, these companies are able to set low prices” (Helmold, 2022, p. 77). This leads to a lower profit margin but higher sales figures in the long term. Airlines use a cost-based pricing strategy to determine the final price for customers. When you buy a ticket, you usually pay for the ticket plus extra money

for additional services such as luggage or larger services. These add-ons cost more and are therefore passed on to the customer plus an additional surcharge (symson)

.

The transfer of traditional pricing concepts to digital products/ services is limited (Botni and Chung, 2000; Buxmann et al., 2018; Frohmann, 2018 cit in Panzer and Schmid, 2023). The potential price is influenced by six key features. Reproduction is simple because of its reproducibility, change and indestructibility, which affects the cost structure. Companies find it particularly attractive to have a high prevalence and frequent network effects. Interaction with services increase the attractiveness of further product distribution. The lock-in effects caused by the high cost of acquisition support long-term business relationships and income models that aim to capitalize existing customers. The relatively high fixed costs can be seen in the context of easily reproducibility and high lock-in effects. Uncertainty regarding quality and lock-in-effects make the first purchase decision challenging, which raises the significance of trust and brand (Panzer and Schmid, 2023).

Tesla, the renowned manufacturer of electric vehicles, pursues a cost-based pricing strategy for its vehicles. The company takes into account various factors such as raw material costs, manufacturing costs, research and development investments and desired profit margins to determine the prices of its electric cars. Tesla's pricing approach allows the company to cover its costs while remaining competitive in the market, promoting sustainable transportation (FasterCapital,2024).

### 4.3. Advantages and Disadvantages

*Cost-based pricing is characterized by its simplicity as it is relatively straightforward to implement. It requires only precise knowledge of its own costs, not extensive market research or customer surveys. This data can be used in a variety of ways across departments in the company and must also be recorded in part due to legal regulations. It only requires precise knowledge of the own costs, but no extensive market research or customer surveys. This method is often considered fair because the price is based on actual costs. In addition, cos-based pricing provides effective cost control as it provides an accurate overview of the costs incurred, making it easier to take measures to reduce costs (Lepkowska, 2023). Cost-based pricing provides some flexibility in price adjustment due to changes in production costs. As*

*the cost of raw materials or labor increases, companies can adjust prices accordingly. Cost-based pricing promotes transparency by clearly showing customers the breakdown of the costs included in the price of a product or service. This transparency can trust and build credibility with customers because they can see that the price is based on actual costs and not arbitrary figures. By sharing cost information, customers can also better understand the value they receive for their money (FasterCapital,2024).*

*The cost-based pricing strategy has a few disadvantages that should be considered. One of the main points of criticism is the lack of consideration of customer benefit. This method is based exclusively on its own costs and neglects the value or benefit that the product or service offers to the customer. This may result in the price not corresponding to the perception of the customer. Another disadvantage is the potentially lower competitive advantage. Since the perceived value of the product or service is not considered, this pricing strategy can be less effective to stand out from the competition (Lepkowska, 2023). Cost-based pricing does not necessarily lead to profit maximization. When companies focus solely on covering costs, they may miss opportunities to gain additional value from their customers (FasterCapital,2024). **

### 4.4. Discussion on Applicability and Effectiveness

Before a supplier can offer his product for sale, he must calculate the price for it. With the cost-oriented approach, the question arises as to how high the supplier's costs are that he has to incur in advance for the purchase or consumption of resources in order to manufacture the product and put it into a saleable condition. To answer this question, the provider must know all the costs incurred in its business, i.e. the value of the raw materials and supplies consumed (material costs), the wages paid to employees (labor costs), the royalties paid to third parties for the use of intellectual property rights (usage costs), the fees paid to third parties for the use of certain services, the interest paid to third parties on loans and the expense or cost taxes and duties paid to the tax authorities. In the context of so-called cost unit accounting, the operating costs of a period are to be recorded separately according to the individual products or the quantity units of the individual products (cost units). The more extensive and heterogeneous the supplier's product range is, the more complex its cost accounting becomes as a basis for price calculation.

In the simplest case (addition costing), the supplier produces only one unit of a product in a period. Only the stated costs have to be added in this period.

If the supplier only manufactures one product in a period, but in several units of measure, the calculation of product costs is just as simple. Only the above-mentioned cost types need to be added together and the total divided by the number of units produced (division costing).If a supplier produces several products in a period, but which are very similar in their manufacturing process and whose costs are in a constant relationship, the equivalence number calculation is used.

The most complex aspect is the price calculation for a supplier who produces multiple heterogeneous products with different quantities over a period. Here, the surcharge calculation is utilized. In some cases, costs will be directly attributable to the different products (so-called cost unit direct costs). This applies to all the consumed resources used that enter directly into the product or are caused only by this product, for example raw materials, the work performance of workers or depreciation of consumer goods used exclusively for the development, manufacture and distribution of a single product. A distinction is usually made between material costs, direct production costs and special direct sales costs. However, many product-unspecific costs (so-called cost unit overheads) are incurred during operation, which can only be assigned to entire divisions as a location of resource consumption (= cost center). These overheads are assigned directly to individual cost centers as far as possible as part of cost center accounting. Costs that cannot be assigned directly to individual cost centers or that are received as input into the service of another cost center will have to be distributed as part of an internal cost allocation.
In this case, the costs of these cost centers are calculated according to the cost calculation or the share of the use of services to downstream cost centers.

Usually, the cost centers are grouped into material, manufacturing, sales and administrative cost centers. In a final step, the overheads of the material cost centers (material overheads) are calculated as a percentage of the material specific costs and the manufacturing overheads as a percentage of the total of the production direct costs of the operation. Similarly, a surcharge rate is usually calculated on the basis of the sum of the production

costs for the distribution overheads and administrative overheads. The manufacturing costs are understood to be the sum of: material costs + material overheads + direct production costs + production overheads. The total cost of a product (prime costs) results from the production costs being increased by the surcharge rates for the sales and administration costs.

Generally speaking, a provider will not be satisfied just with the cost recovery. He will therefore calculate a profit markup on the prime cost of the product. This profit markup ensures that an appropriate remuneration for the service provided (entrepreneur’s wage) as well as compensation for the risk taken (risk premium) is obtained. The cost of the product plus the profit markup will usually determine the price floor for a product. This lower price limit can now be reconciled with the price willingness of consumers and the price of comparable competitor products (Wildt, 2022).

The following exemplary calculation is intended to illustrate this with concrete figures:

| **Cost Accounting** | | |
|---|---|---|
| Manufacturing material: | | 25,00 |
| +Material overheads in %: | 10,00% | 2,50 |
| =Material costs: | | 27,50 |
| Direct production costs: | | 10,00 |
| +Manufacturing overheads in %: | 2,00% | 0,20 |
| =Manufacturing costs: | | 10,20 |
| =Production costs: | | 37,70 |
| + Administration costs in %: | 10,00% | 3,77 |
| **= Total Costs:** | | **41,47** |
| + Profit mark-up | | |

Figure 2: Exemplary cost accounting

A cost-oriented pricing strategy can be a good strategy and many companies use it. However, this pricing strategy can best be considered as a starting point in the pricing process. Companies should ideally combine it with other strategies. A value-based pricing

strategy or a competitive pricing strategy can take the cost-based pricing strategy to another level and help it consider more price-influencing factors (sympsons).

# 5. Arbitrage Pricing Theory

## 5.1. Definition and Basic Principles

“Arbitrage pricing theory is a multi-factor asset pricing model based on the idea that an asset’s return can be predicted using the linear relationship between the asset’s expected return and a number of macroeconomic variables that capture systematic risk” (Hayes,2024). It differs significantly from the cost-and value- based approach and is a little more difficult to apply in practice.

The formula for the calculation is as follows:

$$E(R)_i = E(R)_z + (E(I) - E(R)_z) \times \beta_n.$$

Where:

$E(R)_i$= Expected return on the asset

$R_z$= Risk-free rate of return

$ß_n$= Sensitivity of the asset price to macroeconomic factor *n*

$E_i$= Risk premium associated with factor *i.*

From the formula it can be seen that risk and macroeconomic factors determine the expected return on the assets. External factors and risks are taken into account in this theory. “These macroeconomic and financial factors include, for example, risk exposure, exchange rates, retail sales, unexpected inflation, money supply, commodity prices and further the market portfolio of the arbitrageur” (Hekele, 2021, p. 20). The core of this theory is the assumption of imperfect markets. To profit from these fluctuations from the correct market value is the aim of arbitrageurs (Hayes, 2020 cit. in Hekele, 2021). “The assumption of this pricing strategy, especially the presence of imperfect markets, can be transferred from the financial markets to other sectors and industries” (Hekele, 2021, p.20).

In 1976 the arbitrage price theory was developed by the economist Stephen Ross. The arbitrage pricing theory assumes that markets every now and then misprice securities,

before the market eventually corrects and moves back to fair value. Investors are assuming that the model is correct and making directional trades, so this is not a risk-free operation in the classic sense of arbitrage (Hayes,2020).

Arbitrary pricing often occurs in connection with new and innovative products, in practice. The lack of knowledge of customers is exploit by companies in order to achieve the highest possible markup on the price of a good/service. “A higher price premium can even lead to customers perceiving the new product as particularly desirable and therefore perceiving the price as fair” (Wathieu and Bertini, 2007 cit. in Hekele, 2021, p.20).

Intentions and behavior of customers differ in practice that’s why arbitrary pricing is also made possible. Individual economic subjects do not always act completely rationally in contrast to the economic consumption theory developed by Gosser. For the average consumer it is almost impossible to carefully think about the anticipated benefits of purchasing a good one. “Instead, the price shown at time of purchase is seen as an indication of the value of a product and thus influences the purchase decision of customers. Therefore, a high price may be associated with high benefit” (Wathieu and Bertini, 2007 cit. in Heleke,2021).

### 5.2. Example of How Arbitrage Pricing Theorie Is Used

“For example, the following four factors have been identified as explaining a stock’s return and its sensitivity to each factor and the risk premium associated with each factor have been calculated:

- Gross domestic product (GDP) growth: *ß* = 0.6, RP = 4%
- Inflation rate: *ß* = 0.8, RP = 2%
- Gold prices: *ß* = -0.7, RP = 5%
- Standard and Poor's 500 index return: *ß* = 1.3, RP = 9%
- The risk-free rate is 3%

Using the APT formula, the expected return is calculated as:

- Expected return = 3% + (0.6 x 4%) + (0.8 x 2%) + (-0.7 x 5%) + (1.3 x 9%) = 15.2%" (Hayes,2020)

### 5.3. Advantages and Disadvantages

The main advantage of arbitrage price theory is its ability to provide investors with a tailored analysis. This is made possible by a detailed consideration of various influencing factors on the investment value. By providing a variety of sources of information and the ability to analyze specific sources of risk, APT offers a flexible and individualized approach to the valuation and management of investment risks. This can help make more informed and informed investment decisions, ultimately leading to better risk management and potentially higher returns.

This theory has a central limitation, because it does not specify any specific factors for a particular security or asset. This means that the arbitrage price theory does not provide a standardized list of risks to be taken into account when evaluating an individual security. Instead, the theory assumes that different stocks react differently to different risk factors. *For example, one stock may be more responsive to changes in interest rates, while another may be more sensitive to fluctuations in commodity prices. This variability requires investors to be able to identify the relevant risk factors and understand the sensitivities of individual stocks to these factors (Hayes,2024). **

## 6. Ethics, Justification and Outlook on Future Developments

### 6.1. Ethics and Justification

According to its guiding principle, the market economy is based on competition and pricing according to supply and demand (Hübner,1990). In a so-called "ideal market", there are many customers. They know what kind of products the companies sell and what prices they charge. The companies have free access to the market. In such markets, prices should then be quite close to the marginal costs of a goods/service production (Kiesenhofer,2021). We would rate this scenario as fair, and as informed consumer, we have the choice between different providers.

In an imperfect market (e.g. monopoly), there are a few producers, each of whom has a certain market power. The managers of a company with market power have a more difficult task than those whose company operates in a completely competitive market. A company on a competitive product has no way of influencing the market price. A company that has market power must address the particular characteristics of demand. In addition, companies can often work much more profitably if they apply a complex pricing strategy and, for example, calculate different prices for different customers for the same product. All of these pricing strategies aim to capture consumer rents and turn them into profits. This goal can be achieved through price discrimination. There are three forms of price discrimination, referred to as first, second- and third-degree price discrimination. Ideally, a company wants to calculate a different price for each individual customer. If they could, they would charge each customer the maximum price they are willing to pay for each unit purchased. This maximum price is called the customer's reservation price. Complete price discrimination of the first degree is the result of a company calculating the reservation price for each customer. Second-degree price discrimination refers to the calculation of different unit prices for different sales volumes of the same good or service. The granting of volume discounts is an example of this price discrimination. In third-degree price discrimination, consumers are divided into two or more groups with different demand curves, with each group charged different prices. Examples include senior citizens or student discounts (Pindyck and Rubinfeld, 2018).

Today, these price discriminations can be easily calculated based on our available data with the companies of AI and thus the topic of data protection cannot be ignored. The requirements for the use of personal data from the GDPR seem clearly formulated at first glance. However, there are still some uncertainties in the interpretation of the legal interpretation when using AI (Stiftung Datenschutz 2021, Hoerer and Niehoff, 2018 cit. in Müller-Quade et al. 2023). Consent must be obtained from the data subject at the time of data collection or generation if personal data is involved. The data subject must ensure that data subjects are sufficiently informed (principle of information), how and for what purpose the data is used and that the data is used exclusively for the corresponding purpose. The legal requirements therefore specify the conditions under which the collection of personal data must take place. However, their practical implementation and thus interpretation is

less clear. (Müller-Quade et al.2023). If personal data is processed by an AI-based system, it must first be clarified who is responsible for data processing. This results in different rights and obligations. The following variations are possible:

1. Sole responsibility: If, for example, an AI-based system is developed by a company itself or integrated into its own processes, the corresponding company is also responsible for data processing.
2. Shared responsibility: When two or more parties (such as companies and AI providers) share common objectives and decide on the purposes and means or are inseparable from each other in terms of processing operations there is a shared responsibility. In this case, an agreement on joint responsibility must be concluded.

For companies, it is therefore advisable to consider data protection aspects in the development, implementation and use from the outset (TÜVIT).

Personally, I don't think it's fair that companies use our data, some of which we provide them involuntarily, in this way and then use it to our disadvantage. Especially when it comes to first-degree price discrimination. It's important for everyone to be conscious and enlightened when making purchase decisions, particularly on the internet. Maybe not reveal everything online and thus manipulate his buying behavior from the algorithm.

### 6.2. Outlook on the Future

In the analysis of the digital influence on pricing, it is important to distinguish between the following influences: the ability to use existing, but without digitization not promising possibilities and new possibilities of price management created by digitalization. An example of the latter is a service portal for customers who can manage their contract directly and without sales support. In the background, autonomous price management systems written by AI or big data can provide and adapt the offers for special customers. In addition, an additional offer specifically provided for the customer can also be proposed (Binckebanck et al., 2023).

For many companies, the only constant in these times is change. In the light of major megatrends, such as digitization & big data, machine learning, climate change & energy transition or even concrete, current technological developments, such as Industry 4.0, smart home, 3D printing or virtual reality, many decision-makers ask themselves the question: How can I prevent my sales or, in the worst case, entire business models from breaking away due to sleepy trends and developments? It is clear that megatrends cannot be stopped. Existing business models should therefore be continuously and proactively put to the test and further developed along megatrends. However, newly developed business models almost always involve new pricing approaches. This is often completely overlooked or included too late. Three promising pricing models for the business types of the future are: usage-oriented pricing models, individualized pricing models, performance-oriented pricing models. The core idea of use-oriented pricing models (also called pay-per-use pricing models) is not to price the physical product itself, but to demand a price for the actual use from the customer. The business model is already successfully converted by car-sharing services. One advantage for providers: one-off payments can be converted into recurring payments.

Innovative pricing also often means moving away from standardized calculation approaches and considering a stronger individualization of pricing. In this way, the goal of price setting, the absorption of the individual willingness to pay customers, can be better achieved. The targeted development of data warehouses, systematic data mining and software-based price optimization with modern pricing methods are decisive success factors to effectively differentiate price levels. Probably, the models based on price individualization will increase in importance due to the increasing data availability. The basic idea of performance-oriented pricing models is to change the price base in an innovative form. In principle, the performance of companies can be measured in very different units. So it is conceivable to measure the price, for example, by time, by result, by availability or, quite conventionally, by the number of products purchased. When designing performance-oriented pricing models, it is crucial that the actual value from the customer’s point of view is not always created by the core product, but often also by other factors such as the actual quality or risk minimization through guaranteed product availability. It is important to align the price metric with these factors (Prof.Roll & Pastuch).

### 6.3. Added Value and Opportunities from the Perspective of Companies

*New technologies create significant added value for companies and customers, which I would like to elaborate on and thus also give a potential outlook on the future. By using innovative technologies, companies can increase their efficiency, reduce costs and open up new business areas. Customers benefit from improved products/services that better meet their needs and wishes. A look into the future shows that technological advances will continue to be key drivers of economic and social change. Therefore, it is crucial to follow the development closely and actively participate in its design (Binckebanck et al., 2023).**

In the early days, the focus was on cost considerations, but over time, the design component of a customer-supplier relationship was also incorporated. Due to the numerous collected customer data, the companies have a great information advantage. Information and its systematic evaluation represent a sustainable advantage for analyzing and interposing markets and customers. Despite the increase in price transparency caused by digitization, there are still chances to gain price advantages by knowing users' preferences.
New technologies can reduce process complexity and help sales to place products on the market faster, respond more quickly to customer requests, shorten the creation time of offers and accelerate distribution and billing.
Digitalization can reduce costs and thus also small and medium-sized companies can participate in the market. Cost reduction potentials include outsourcing, shortening or eliminating processes.

The numerous new technologies and the resulting opportunities make it possible to expand customer loyalty and interaction. The company, which is able to better retain customers, can escape price transparency and build more profitable customer relationships (Binckebanck et al., 2023).

### 6.4. Added Value and Opportunities from the Perspective of Customers

Customers can obtain numerous information about the products through the new media. From the customer’s point of view, there is also the use of different sources of information. Offers and reviews from different suppliers can be easily compared

Today, the Internet is the largest expected product catalog and thus there is an offer expansion. Through this transparency and interchangeability, the increased competitive pressure on suppliers in favor of consumers, unless supply monopolies are emerging.
Due to the increased transparency combined with a facilitated access to even small suppliers can customers exploit price advantages. Out of stocks, which can drive prices, are virtually no longer available and even end customers can now order directly from the manufacturer via various platforms and thus possibly bypass the price surcharges of the trading levels. Customers' search and transaction costs are reduced because various transactions are only a mouse click away. Access routes and parking fees in the city are not included when buying something new, which makes it possible to compensate for the delivery costs.
The digitalization allows customers to receive simplified support in the service area even in the post-purchase phase. Meanwhile, companies are already using AI chatbots to support customers with their concerns (Binckebanck et al., 2023).

## 7. Conclusion

*In summary, pricin theories in the digital age represent a dynamic landscape in which traditional economic principles merge with emerging digital possibilities. In this digital era, value-based pricing has become more important as companies try to align prices with the perceived value they offer to their customers. Digital technologies enable companies to capture, analyze and respond to customer preferences and behavior in real time, enabling more accurate pricing decisions that reflect the value customers receive from products or services. In contrast, cost-based pricing strategies remain relevant, especially in industries where production costs are a main determinant of price decisions. However, the digitalization of production processes has led to increased efficiency and reduced costs. Furthermore, the introduction of digital platforms and marketplaces has introduced a new paradigm of arbitrary pricing, where algorithms and dynamic pricing mechanisms adjust prices in real time based on factors such as demand, supply and competitive prices. While this approach provides flexibility and responsiveness, it also raises concerns about transparency and fairness in pricing practices.*
*Regardless of the method chosen, an in-depth analysis of market conditions, customer needs and competitive situation is necessary for determining a reasonable price.*

*In a steadily changing economic environment, it is important to remain flexible and continuously adapt to new trends and developments. Ultimately, a balanced combination of different pricing approaches and a proactive response to market changes can help ensure long-term success and competitive advantage in the highly competitive market.**

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# 9. Appendix

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