

# **Creation of a Pricing Tool in a B2B Glass Industry**

*Diogo da Silva Dias*

**Master Thesis**

Academic advisor: Jonas André Rodrigues Henriques de Lima

Company advisor: Elser Oliveira



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*“I have no idols. I admire work, dedication, and competence.”*

## Abstract

BA Glass is a multinational corporation that manufactures glass bottles and jars producing approximately 10 billion containers. It is one of the industry leaders in the world. Sales are split based on the product segment (Beer, Food & Oils, Softdrinks, Wine, Sparkling wines and Spirits & Porto).

We are currently seeing a global environment of conflict, particularly in Ukraine and Russia, which greatly instabilizes every market but, most crucially, leads to a cost-related issue with energy prices. It is yet unclear if the effect of energy costs on our finished product will continue to expand in the coming year or come to an end shortly. This circumstance compelled us to continuously analyze our costs and adjust our client prices.

The purpose of this project is to develop an intelligent platform capable of delivering the best price by taking into account both our clients' willingness to pay and our ability to meet production and business targets. This is done by defining rules and correlations between different variables in order to maximize value for BA. The goal with that is to lighten the workload, especially for smaller clients, have equivalent costs for comparable supplies, a quicker and smoother process, and faster prices to enhance acceptance rates. The company's current business model is based on an analysis that integrates historical price comparisons for the same client and the same material in the past, while also making a quick run over costs and merchandising accuracy checks.

In order to make an expressive comparison with the prices that were being charged at the time, a customer and market segmentation analysis was used. At the same time, a pricing model based on the market and the product itself was chosen. Or, to put it another way, a number of variables were developed in conjunction with the sales managers, pricing team, and product implementation team in order to provide us with the ability to present the customer with a specific product's identity and, from there, add specific product characteristics based on the customer's desires, if possible, in order to target at a final price. In addition to that, it was also necessary to do a general analysis of all prices that were in effect in 2022 in order to understand the capacity of each client category and market in particular to determine the best price that could be charged while still maintaining a desired profit.

In conclusion, the present dissertation leads to a proposal for a new automatic tool for assigning prices to each material. This tool would increase the ability to set prices more effectively, raising the average selling price as well as the client acceptance rate of those same prices for new business ventures. Through the implementation of this new tool, it will also be possible to provide more accurate prices that sales managers can propose to the client and, with all of this, increase the results and profitability of the company.

## Acknowledgments

This master thesis concludes my academic work for this last five years, between Faculdade de Engenharia da Universidade do Porto and Instituto Superior Técnico. I was able to develop many skills that will now live with me forever, not only knowledge wise but, most importantly, I grew as a man, a friend, a son, and a human being.

Firstly, I would like to thank everyone who was involved on the construction of this document. It was a long and fulfilling work that couldn't be possible without a few important people that include all my colleagues at the Pricing & Marketing department at BA Glass, especially Elser, that demonstrated an all-time effort to help me in any way possible.

Then, it is mandatory to give a huge credit to my most close friends.

Finally, I would thank to the BA Glass company that trusted in me since the beginning and gave me everything that was necessary to accomplish this project and continue it in the future, that I believe that made a big difference in their way of thinking about prices!

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## Abbreviation

ASP – Average Selling Price

BA – BA Glass, SA

B2B – Business to business

CE – Central Europe

CEO – Chief Executive Officer

CRM – Customer Relationship Management

DOP – Demand Oriented Pricing

ERP – Enterprise Resource Planning

IB – Iberia

IS – Individual Section

KAM – Key Account Manager

KPI – Key Performance Indicators

PPT – Price per Ton

SaaS – Software as a service

SEE – South-East

SM – Sales Manager

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a main key to every company but its importance gets higher with cost increases that reduce the net margin. With this, less and less companies are able to produce which makes possible for those who can to grow their market share.

This master thesis is about a project that had as main objective, the creation of a pricing platform that could, as better as possible, output the price that the company could give to a certain customer, regarding a specific material, color, incoterm, quantity, etc.

## 1.2 BA Glass as a company

Raúl da Silva Barbosa and Domingos de Almeida formed BA Glass, SA, also known as BA, in 1912 under the name "Barbosa & Almeida, Lda." to produce bottles in Seixal and Marinha Grande. Later, in 1930, the establishment of a plant in Campanhã marked the start of the company's industrial activities. Bottles were made at this plant, which operated for 39 years, using semi-automatic technology. This time was characterized by steady advancements that, in Portugal, were novel. An automatic feeding system and an automatic molding machine were introduced to produce bottles in 1947. The purchase of an automatic machine, on the other hand, in 1965 allowed for a six-fold increase in weekly production compared to what was previously possible.

A few years later, production started in 1969 in a new facility in Avintes (Vila Nova de Gaia), which had two furnaces equipped with cutting-edge technology compared to the conventional melting process. These furnaces were regenerative furnaces, which are furnaces equipped with heat recovery systems. The first machine, Individual Section (IS), was installed a few years later, which significantly increased the installed manufacturing capacity.

Aside from the fact that BA became public in 1987, it underwent several changes throughout the years that were prompted by the development and purchase of new production complexes as well as by the arrival and leave of partners. As will be seen, such changes were crucial to its ruthless expansion. In Spain, it was constructed the Villafranca de los Barros factory from the ground up. We must include CIVE (Companhia Industrial Vidreira, SA, in Marinha Grande), which was bought in 1993, Vilesa (Vidreira Leonesa, SA, company with a plant in León - Spain), which was acquired in 1999, and the SOTANCRO Group, which was acquired in 2008 and has two units, one in Venda Nova and the other in Xinzo de Limia, the latter of which has since been shuttered and is not now a part of the group.

Finally, BA bought the Polish Warta Glass business in 2012, and it marked a significant turning point for the group's internationalization as well as the growth of its client and product base. The business didn't stop there, either, and in 2016 it acquired the German maker of glass packaging HNG Global (located in Gardelegen), which was growing into central Europe. BA was able to improve service to its foreign clients and achieve operational efficiencies because to a greater grasp of the market. To complete the acquisition cycle, in 2017, BA purchased the Yioula Group, which consists of 4 plants spread across 3 nations: Greece (Athens), Bulgaria (Sofia and Plovdiv), and Romania (Bucharest). With these new additions, the group currently produces more than 20 million units daily.

Figure 2 (BA Glass, 2022) lists all of BA's plants, which are spread throughout 7 nations. The corporate headquarters are in Avintes, Portugal. Twelve factories, five of which are on the

Iberian Peninsula, are located around Europe: at Gardelegen, Sieraków, Jedlice, Bucharest, Sofia, Plovdiv, Athens, León, Avintes, Marinha Grande, Venda Nova, and Villafranca de los Barros.



Figure 2 - Map with BA plants (BA Glass, 2022)

The company currently has 3992 workers, and its values are based on transparency, humbleness, rigor, ambition, and emotion (BA Glass, 2022) while its six pillars are its Customers & Consumers, its Shareholders, its People, its Environmental Responsibility and Social Accountability (BA Glass, 2022). Last year turnover surpassed 1 billion Euros, which make it the best year yet for BA. Sales are divided according to its product segment (Beer, Food & Oils, Softdrinks, Wine, Sparkling wines and Spirits & Porto) and Food represents 35% of sales making it the biggest segment and Spirits & Porto 11%, which is the smallest in sales. Total investments in 2021 were EUR 101 million, 9.8% less than in 2020, or 9.9% of sales, which is in line with the average for the sector.

This project was made under the Pricing & Marketing department. This department controls all pricing requests that are made from the Sales Managers, conducts a yearly study to customers regarding satisfaction and improvements to be done as well as being responsible for negotiations for next year and price increases/decreases that are necessary, while conducting several studies and KPI's analysis to establish the best performance possible. The team has currently 10 people that are divided under each BA division (Iberia, Central-Europe, South-East and Export).

### 1.3 Main goals

BA Glass produces billions of glass bottles and jars each year. Most of the sales start with a price request from the potential customer and the company pricing team has to check each individual request to assure it's viable for the company to sell it and which is the price aligned with the company standards' and the client willingness to pay.

To do this, a criterious work needs to be done for each type of material, which includes comparing the suggested price with the Average Selling Price for this material, other sales for the same customer, other sales for the same material, macro-economy factors, production costs, transportation costs, decoration costs, molds costs and so on. This analysis needs to be different considering the client size, the product segment, the market and the plant of production itself. This is a demand task that needs time to learn and improve skills and know-how of the external factors and competitors model of business that can be a crucial to make a better decision.

Obviusly, this translates in a huge time lost in the team and not every request ends in a sale. Most of requests are made by small clients that have no expression in the company size. To deal with this problem, it was mandatory to create an effective platform that could give fast and trustable results to most requests.

### 1.4 Method followed in the project

The project in issue carefully adhered to a methodology that was established and based on Pricing teams' inputs and needs. There are several stages, as follows:

- **State-of-the-art:** An in-depth grasp of the company's offering was possible in this early phase, along with preliminary research on consumer segmentation, pricing strategies and other past projects already done within this theme. Problem analysis and state-of-the-art reviews were also possible.
- **Analysis of BA's pricing model:** comprehension of the company's past and present pricing models, identification of weak areas, and identification of strengths to be included in the ensuing research. Additionally, there was an introduction to the SAP and Salesforce systems, which are essential in the business for accessing databases and are required for the project's execution. Understanding the sales ordering process required meetings with the Planning, Prices & Marketing, Front Office, Product Implementation, Energy, and Decoration departments.
- **New “smart-pricing” approach:** According to the state-of-the-art evaluation reviewed, the technique deemed most appropriate in this phase was followed. First, via meetings with the BA advisor and the rest of the team, the objectives intended with the new system were identified. Clarifying the goal was essential because the project's subsequent phases largely rely on it. With the aim of determining the most pertinent variables to be included in the analysis, a significant brainstorming session was carried out, which included the BA advisor, based on the goal specified in the previous phase. Meetings with the Prices & Marketing team took place during the variable selection and families creation phase. A search for the best model and a series of statistical studies were then conducted, commencing with the variables chosen in the previous phase. To

give a periodic contextualization of the model design and evolution process, fortnightly meetings were conducted and, in order to properly model the pricing tool as intended once the model was created, certain modifications were required. These adjustments were determined based on the analysis of the data acquired (such as current ASP for each market and segment as well as targets for next year). Understanding the company's internal statistics was crucial for defining these goals since it helped identify the most important strategic elements.

- **Conclusions:** In this final phase, a compromise was reached on the planned project, outlining the subsequent steps for upcoming adjustments and new tool capabilities. Although the new model has not yet been implemented, several evaluation criteria and KPI's have been proposed to gauge the model's effectiveness.

These are just a few steps that were considered important to take into consideration during the review of this document. They refer to the most important steps and methodology that was developed during the construction of this new pricing tool.

## 1.5 Structure

There are six separate chapters in the dissertation. The basic structure of the project, presentation of the topic, introduction to the firm, the key goals, and the technique used in the project were all explained in the first chapter. This chapter's purpose is to give a somewhat in-depth introduction that sets the stage for the subsequent chapters.

The concepts, techniques, and tools to be employed in the examination of the present state of pricing workflow as well as in the final approach and ultimate platform for automatization of pricing are theoretically analyzed in the second chapter. In order to do this, books and academic publications were analyzed on the core concepts of pricing strategies, market segmentation, added-value characteristics and, more particularly, B2B pricing.

The third chapter, which focus on BA's present pricing workflow, explains the current system and the key characteristics that brought BA to it while also outlining the workflow flaws. Based on the needs of the firm and taking into consideration the shortcomings of the prior pricing methodology, which are discussed in the fourth chapter, the new smart-pricing tool and capabilities is offered in the fifth chapter.

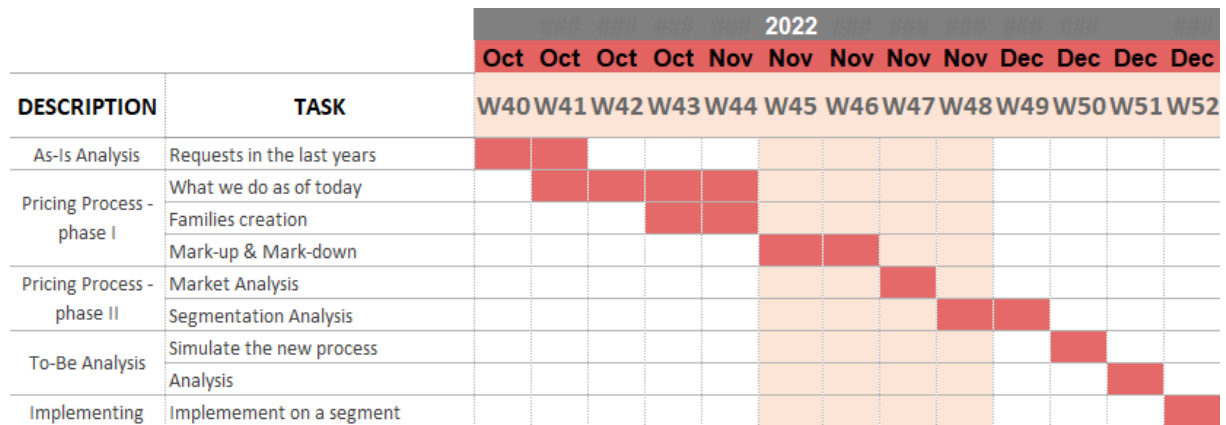


Figure 3 - Weekly planning

## 2 Literature review

This chapter covers the literature review that will be extremely useful for the development of the tool. It starts by making a summary of what a pricing strategy should be. After that, the ERP and its potentialities are considered, both in Salesforce and SAP, followed by a description of several methodologies and pricing strategies. Finally, a market analysis and customer segmentation that will be important to consider in the idealization of the project is addressed and ends with the identification of the different types of existing Incoterms.

### 2.1 Pricing strategy

Manufacturers must effectively estimate a fair market price or worth, for ever evolving items, which presents its own set of special pricing issues. Profit maximization should be the aim for a manufacturer (Peter Hill, 2013). Although some manufacturers believe that higher sales volumes are necessary for higher profitability, volume does not always equate to higher profits. Costs, selling price, and unit sales volume are the components of profit. To get the intended profit, they must all be in the correct ratios. No pricing method or formula will consistently result in the highest profit. The manufacturer must comprehend the various sorts of costs and how they function in order to price for optimum profit. A current understanding of market circumstances is also crucial because the "correct" selling price for a product under one set of circumstances may differ from the price at another point in time (Tom Nagle and John Hogan, 2016).

The price at which a product will sell the most units is not always the "optimal" price. Additionally, the pricing isn't necessarily going to generate the biggest stack of cash. Instead, the "optimal" pricing is one that will increase the company's earnings. The "best" selling price should be focused on both the market and the expense. The selling price must be high enough to turn a profit while also covering expenses. Additionally, it must be low enough to draw clients and increase sales.

### 2.2 ERP

A form of software known as enterprise resource planning (ERP) is used by enterprises to manage routine business operations like accounting, purchasing, project management, risk management and compliance, and supply chain management (Ross, 2006). Enterprise performance management software, which aids in planning, budgeting, forecasting, and reporting an organization's financial results, is also a component of a full ERP suite.

ERP systems enable the exchange of data between numerous corporate activities and tie them all together. ERP systems avoid data duplication and ensure data integrity with a single source of truth by gathering an organization's shared transactional data from several sources and access information in real time (Soh, 2000; Nah and Lau, 2001).

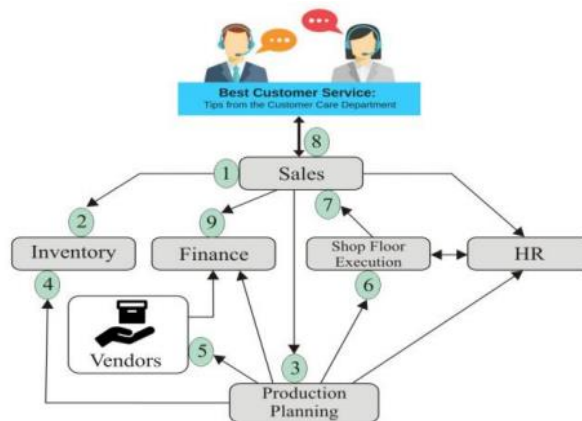


Figure 4 - Business processes in ERP system

Enterprise resource planning (ERP) systems are comprehensive, integrated platforms that may be installed on-premises or in the cloud and are used to manage every part of a production- or distribution-based firm. ERP systems also assist basic accounting function along with all facets of financial administration, human resources, supply chain management, and manufacturing (Yen, 2002).

In order to accurately monitor and depict all expenses, ERP also makes sure that these data fields and attributes roll up to the appropriate account in the business' general ledger. The central collection of data for widespread distribution is a fundamental ERP premise. ERP systems offer order to chaos so that all users—from the CEO to accounts payable clerks—can produce, store, and use the same data derived through similar procedures, as opposed to several independent databases with an unlimited supply of unconnected spreadsheets (Chen, 2001). Everyone inside the business may feel assured that the data is accurate, current, and full thanks to a secure and centralized data repository. Without relying on error-prone spreadsheets, data integrity is guaranteed for every task carried out across the organization, from a quarterly financial statement to a single outstanding receivables report.

Software for enterprise resource planning is referred to as an "enterprise application," which is a kind of software made to meet an organization's software requirements and enhance operational efficiency. To remain competitive, a business must not only define its information demands, but also make sure that its information infrastructure is capable of supporting the business, its clients, and its suppliers. It runs the risk of becoming detached and shut out of opportunities down the road if it doesn't (Siriginidi, 2000). Today's ERP systems come in a wide range of options depending on the demands, functions, and size of a firm. The terms "types of ERP systems" relate to various deployment models, such as cloud ERP, on-premises ERP, and hybrid ERP (some systems in the cloud and some on-premise) in order to deliver e-business capabilities (Scheer and Habermann, 2000).

Each ERP solution system is frequently customized to serve various business functions, satisfy the operational needs of a company, and offer a variety of deployment options (Holland and Light, 1999). For complete management, support, and ownership of the whole system once established, on-premises ERP software is implemented onsite and maintained in actual office space within a business. It is hosted on the company's own computers and servers. A company may access and save data on any device with an internet connection using cloud-based ERP software, which is a web-based solution known as Software as a Service (SaaS). This is often

accomplished through the payment of a subscription. Supported by the software vendor are updates, training, support, and flexible modifications (Stefanou, 2001). ERP software that combines on-premises and cloud-based deployment is referred to as "hybrid" software. Each provider has a different hosting and deployment service combination. These models can give ERP users the freedom to choose between delivery paradigms or incorporate advantages not present in the current system.

## 2.3 Salesforce

Salesforce, Inc. is a San Francisco-based cloud computing and social business software-as-a-service (SaaS) company. Salesforce's major goal is to provide accessible CRM software as an internet service. Prior to Salesforce, the majority of businesses either used local resources or housed CRM software on their own servers, which required a significant time and cost commitment. All of the data is stored in the cloud by Salesforce, which has a pay-as-you-go subscription model, making it available from any internet-connected device.

Salesforce is a customer relationship management (CRM) platform that helps businesses manage and analyze customer interactions and data throughout the customer lifecycle. The platform includes a range of tools and features for sales, customer service, marketing, and commerce, such as a customer database, marketing automation, analytics, and e-commerce capabilities (A. Manchar and A. Chouhan, 2017).

Salesforce was founded in 1999 and has become one of the most popular and widely used CRM platforms in the world. It is known for its cloud-based architecture, which allows businesses to access and use the platform from anywhere with an internet connection, and its wide range of customization options, which enable businesses to tailor the platform to their specific needs and workflow. It offers a range of subscription plans for businesses of different sizes and industries, as well as several specialized products and integrations for specific sectors, such as healthcare, financial services, and non-profits. The platform is designed to help businesses automate and streamline their sales, marketing, and customer service processes, and to provide insights and analytics that can help them better understand and engage with their customers.

With the help of Salesforce, businesses of all sizes and sectors can better understand their target audiences, establish stronger connections with them, and expand their client bases. Salesforce is frequently included into businesses' ecosystems so that staff members may exchange customer perspectives from any device, regardless of their department or location (Sleep, S., Dixon, A.L., DeCarlo, T. and Lam, S.K., 2020).

## 2.4 ERP in SAP

With each company function keeping its own operational data in a separate database, traditional business models frequently decentralize data management. Employees from various company departments find it challenging to access each other's information as a result. Data duplication across several departments also raises the cost of IT storage and the chance of data inaccuracies (Lau, Linda K., 2005).

SAP software offers numerous business operations with a single view of the truth by centralizing data management. By providing employees from many departments with simple access to real-time data throughout the whole firm, this aids businesses in better managing complicated business processes. Consequently, companies may quicken workflows, boost productivity, increase operational effectiveness, improve customer experiences, and ultimately boost revenues (Jacobs, F. Robert, and D. Clay Whybark, 2000).

## 2.5 Pricing methodology

There are several common pricing strategies that businesses use to set the price for their products or services. Some of the most common pricing strategies include:

- **Cost-plus pricing:** This strategy involves setting the price of a product or service by adding a markup to the cost of producing it. The markup is typically a percentage of the cost, and the final price is determined by adding this percentage to the cost.
- **Competition-based pricing:** This strategy involves setting the price of a product or service based on the prices of similar products or services offered by competitors. The goal is to remain competitive and attract customers by offering a similar product at a similar or lower price (Xing, Wei, Shouyang Wang, and Liming Liu, 2012).
- **Value-based pricing:** This strategy involves setting the price of a product or service based on the perceived value it offers to customers. This can be based on the product's quality, features, brand reputation, or other factors that customers consider when making a purchase decision.
- **Price skimming:** This strategy involves setting a high initial price for a product or service, and then gradually lowering the price over time as demand decreases or new competitors enter the market (Farres, Rafael, 2012).
- **Psychological pricing:** This strategy involves setting prices in a way that takes advantage of psychological factors that influence customer perception and decision-making. For example, a business might use odd-numbered prices or prices ending in "9" to create the impression that a product is cheaper than it actually is.

These are just a few of the many pricing strategies that businesses use. The best pricing strategy for a particular business will depend on several factors, including the nature of the product or service, the target market, and the competitive environment (Indounas, Kostis, 2020).

### 2.5.1 Cost Oriented Pricing

The most basic type of pricing approach is cost-oriented or cost-based. In this pricing strategy, a specific portion of the targeted profit is added to the product's cost to determine the final price. The sum of all expenses incurred during the product's manufacture is its cost.

Cost-oriented pricing is a pricing strategy in which a company sets the price of a product or service based on the cost of producing it, rather than on market demand or competition. This means that the company determines the price of a product or service by calculating the costs

associated with producing it, including the cost of raw materials, labor, and overhead expenses, and then adding a profit margin on top of those costs (Farrés, Rafael, 2017).

The goal of cost-oriented pricing is to ensure that a company is able to recover its costs and earn a profit on each sale. This approach can be useful for businesses that have a high degree of control over their costs and can accurately predict how much it will cost to produce a product or service. However, it can also be risky, as it may not consider market demand or competitive pricing, which could result in prices that are too high or too low.

There are several factors that can impact the effectiveness of cost-oriented pricing, including the level of competition in the market, the level of demand for the product or service, and the costs associated with producing and distributing the product or service. It is important for businesses to carefully consider these factors when setting prices using a cost-oriented pricing strategy (Peter Hill, 2013).

### **2.5.2 Competition Oriented Pricing**

A competition-oriented pricing strategy is another name for the market-based pricing strategy, also known as the market-oriented pricing strategy. In a pricing strategy that is focused on the market, the price of goods and services is determined based on the state of the market.

Competition-oriented pricing is a pricing strategy in which a company sets the price of a product or service based on the prices of similar products or services offered by competitors. This means that the company will monitor the prices of its competitors and adjust its own prices accordingly in order to remain competitive and attract customers.

The goal of competition-oriented pricing is to ensure that a company is able to remain competitive in the market by offering prices that are similar to or slightly lower than those of its competitors. This approach can be useful for businesses that operate in highly competitive markets or that have a large number of competitors offering similar products or services. It can also be useful for businesses that do not have a strong brand or reputation and need to rely on price to attract customers (Tom Nagle and John Hogan, 2016).

There are several factors that can impact the effectiveness of competition-oriented pricing, including the level of competition in the market, the level of demand for the product or service, and the costs associated with producing and distributing the product or service. It is important for businesses to carefully consider these factors when setting prices using a competition-oriented pricing strategy

That means businesses factor in the cost of their rivals' goods and services when determining the pricing of their own goods and services. They set their prices to be either identical to or somewhat near to those of their competitors' items.

### **2.5.3 Demand Oriented Pricing**

Demand-Oriented Pricing (DOP) is a pricing technique where the seller seeks to establish the price at a level that the intended customers are willing to pay.

In other words, demand-oriented pricing refers to a pricing strategy where a business adjusts its price in reaction to changes in demand. This approach is effective with a wide range of cyclical or seasonal commodities.

Numerous industries, including retail and transportation, adopt this approach. Companies must first determine the customer's financial capacity to purchase any good or service. Prices are higher when there is a great demand; lower when there is a low demand. A high service fee is maintained at peak times, for example (Beldona, Srikanth, and Francis Kwansa, 2008).

#### 2.5.4 Customer Oriented Pricing

Pricing is a significant decision that businesses must make. This model's underlying presumption is that a consumer will pay a particular amount when the value they receive outweighs the cost. Customer-driven pricing can be successful when a good or service is customized rather than commoditized because there will be a wide range of possibilities if there are many companies competing to offer something comparable.

The pricing approach can also be used in various regional marketplaces where the forces of supply and demand favor the supplier and the customer may be prepared to pay more than a customer in another location (Parasuraman, Ananthanarayanan, 1987).

Customer-oriented pricing is a pricing strategy that focuses on the needs and preferences of the customer, rather than the cost of the product or service. This type of pricing strategy is based on the belief that customers are willing to pay a higher price for a product or service that meets their specific needs and provides value to them. In customer-oriented pricing, businesses take a number of factors into consideration when setting prices, including:

- **Customer demand:** How much customers are willing to pay for a product or service, based on their perceived value.
- **Competition:** The prices of similar products or services offered by competitors.
- **Cost:** The cost of producing or providing the product or service.
- **Customer segment:** The specific group of customers the product or service is targeting.

Customer-oriented pricing can be a useful strategy for businesses that want to differentiate themselves from competitors and create a loyal customer base. By focusing on the needs and preferences of their customers, businesses can create value and charge a higher price for their products or services (Chakravarty, Anindita, Alok Kumar, and Rajdeep Grewal, 2014).

## 2.6 Client segmentation

Client segmentation is the process of dividing a group of clients into smaller, more homogeneous subgroups based on certain characteristics or attributes. This process is typically used in marketing or customer relationship management (CRM) to tailor marketing campaigns or customer service strategies to specific subgroups of clients.

Dibb and Simkim (2001) claim that businesses frequently struggle with the issue of trying to find target markets that align with their current marketing initiatives. The best technique to attempt to build effective processes with the goal of identifying the most suitable segments that permit considerable consumer differentiations. The size of the groups deserves to be considered as another factor. Ayantunji (2019) claims that creating segmentations that are too broad, where

clients connected with the same country or with roughly the same size are treated equally, and creating market segments that are too narrow, which results in revenue losses for businesses, are two common blunders.

Ongoing segmentation monitoring is advised to keep up with market developments (Dibb & Wensley, 2002). However, such a measure is expensive, time-consuming, and does not clearly provide information on how to foresee changes or recommendations on how to react, which explains why most businesses do not embrace it (Cortez, Clarke, & Freytag, 2021). However, because segmentation is an "emergent and interactive modeling process" (Harrison & Kjellberg, 2010), it is known that it is susceptible to the interaction and instability of industry markets (Boejgaard & Ellegaard, 2010). As a result, it is important to review the segments and gather information about potential changes.

There are many ways to segment clients, and the specific criteria used will depend on the business and its goals. Some common ways to segment clients include:

- **Demographic segmentation:** dividing clients based on factors such as age, gender, income, education level, and location. Demographic segmentation can be a useful way to understand and target specific consumer groups, but it is important to recognize that it is just one aspect of a person's identity and should be considered in combination with other factors such as behavior, values, and interests.
- **Behavioral segmentation:** dividing clients based on their past interactions with the business, such as their purchase history, website activity, or response to marketing campaigns.
- **Psychographic segmentation:** dividing clients based on their values, attitudes, interests, and lifestyles.
- **Firmographic segmentation:** dividing clients based on characteristics of the organizations they represent, such as industry, size, or location.

Client segmentation can help businesses better understand their clients and create more effective and personalized marketing and customer service strategies.

## 2.7 Market characteristics

To begin with a brief explanation of the backdrop, there are three main types of purchasers in a customer market: direct buyers, intermediates, and end consumers (Christopher, Payne, & Ballantyne, 2002). Those who purchase a product directly from the producer are under the first group. The middlemen, sometimes referred to as retailers, are those who purchase goods directly from the direct buyers and then resale them to the final consumers at the end of the supply chain.

Our work builds upon and adds to a number of literary streams. We contribute to the relatively scant body of knowledge on B2B pricing and marketing (Grewal, 2015; Lilien, 2016). Nearly \$9 trillion worth of transactions were reported in the B2B market in 2018. More and more, retailers must deal with business customers that favor using e-commerce for communication and placing orders (Forrester, 2015, 2018). Examining the potential for

automating price decisions in a B2B scenario is therefore quite interesting. B2B price decisions are still a topic that hasn't been explored all that much in the literature. (Bruno, 2012), who investigate how reference prices in business-to-business transactions affect pricing and demand behavior, and (Zhang, 2014), who investigate how pricing dynamics can impact client relationships in contexts similar to those studied by (Bruno, 2012).

These studies demonstrate the potential for econometric models to help B2B salespeople make better pricing decisions. According to Morgan and Hunt (1994) and Lam (2004), buyer-seller connections in B2B are frequently long-term and relationship-based. In B2B transactions, pricing variations among clients and purchases are frequent (Zhang, 2014). As a result, an integral element of the job of the B2B salesperson when it comes to setting prices is establishing relationships with clients, attending to clients' demands, and comprehending their mindset. Despite the fact that automation has made great strides in mimicking human behavior, "the real-time recognition of natural human emotion remains a demanding problem, and the capacity to respond intelligently to such inputs is even more difficult" (Frey and Osborne, 2017). Therefore, it is uncertain what benefits might result from automating B2B price decisions.

Applying this to BA, a manufacturer and business-to-business organization, reveals that its clients fall into two different types. Customers who are dealers fall into the category of direct buyers, while customers who are not dealers are middlemen who sell their items to the final consumer directly.

## 2.8 Incoterms

Incoterms (International Commercial Terms) are a set of standardized terms and definitions that are used in international trade to define the responsibilities of the buyer and seller in relation to the delivery of goods. Incoterms provide a common language for buyers and sellers to use when negotiating the terms of a sale and can help to reduce misunderstandings and disputes. There are 11 Incoterms, which are grouped into four categories (Ramberg, Jan, 1999):

- **E (Ex Works) terms:** These terms define the minimum level of seller's responsibility and require the buyer to arrange for the transportation of the goods from the seller's premises. The use of Ex Works (EXW) as a delivery term is relatively uncommon in international trade, as it places a significant burden on the buyer to arrange for and pay for the transportation of the goods (Ağaoğlu, Cahit, 2020).
- **F (Free Carrier) terms:** These terms define the seller's responsibility for delivering the goods to a carrier nominated by the buyer.
  - **FCA (Free Carrier)** - When the products are delivered to the care of the international carrier designated by the buyer at the designated location, ready for export, the seller has fulfilled his responsibilities under the FCA clause
  - **FAS (Free Alongside Ship)** - The seller completes his obligations when he delivers the ready-for-export items in the hands of the designated international carrier at the designated location. Alongside the carrier ship at the designated

port of shipment, the seller delivers the products that are prepared for export (at the quay or in vessels used for loading).

- **Free on Board (FOB)** - The seller completes its obligations when the items cross the rail of the ship at the designated port of shipment, and the buyer then bears full responsibility for any losses and damages.
- **C (Cost and Freight) terms:** These terms define the seller's responsibility for delivering the goods to a named port of destination and for paying the cost of transporting the goods to that port.
  - **CFR (Costs and Freight)** - The seller is responsible for covering all shipping expenses, freight to the selected port of destination, and port of destination and export clearance.
  - **CIF (Costs Insurance and Freight)** - In addition to the obligations imposed by the CFR Incoterm, the seller is additionally responsible for the principal's insurance premium.
  - **CPT (Carriage Paid To...)** - The seller hires and pays the freight to convey the products to the designated site of destination and is in charge of their dispatch for export.
  - **CIP (Carriage and Insurance Paid to...)** - In addition to the duties outlined in the CPT Incoterm, the seller is also responsible for contracting and paying for insurance up till the destination.
- **D (Delivered Duty Paid) terms:** These terms define the seller's responsibility for delivering the goods to a named place of destination and for paying all costs and duties associated with the delivery.
  - **DAP (Delivered At Place)** - The vendor is responsible for making the goods available to the buyer, prepared for unloading, at the designated terminal of destination or at a different location, free of the costs and risks associated with the transport to the place of destination.
  - **DAT (Delivered at Terminal)** - The vendor relinquishes responsibility when it places the goods at the buyer's disposal at the designated terminal of destination, not handling the importation formalities, and taking on the costs and risks associated with the transport up to the port of destination and with the unloading of the goods.
  - **DDP (Delivered Duty Paid)** - is the Incoterm that sets the seller's greatest level of commitment since the seller bears all risks and expenses associated with transporting and delivering the goods to the specified location. Delivering the items to the buyer while taking care of the import procedures at the designated destination is the seller's responsibility.

Incoterms are used in conjunction with sales contracts and other documents related to international trade. It is important for buyers and sellers to understand the specific terms and responsibilities defined by the chosen Incoterm in order to avoid misunderstandings and disputes.

|                                        |                                                                                   |                      |                                                                                   |                      |                       |                                  |                                                                                    |                                      |                            |                                     |                                                                                     |
|----------------------------------------|-----------------------------------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------|----------------------|-----------------------|----------------------------------|------------------------------------------------------------------------------------|--------------------------------------|----------------------------|-------------------------------------|-------------------------------------------------------------------------------------|
|                                        |  |                      |  |                      |                       |                                  |  |                                      |                            |                                     |  |
| Types of Transport                     | Any Mode or Modes of Transport                                                    |                      | Sea and Inland Waterway Only                                                      |                      |                       |                                  | Any Mode or Modes of Transport                                                     |                                      |                            |                                     |                                                                                     |
| INCOTERMS 2020                         | EXW                                                                               | FCA                  | FAS                                                                               | FOB                  | CFR                   | CIF                              | CPT                                                                                | CIP                                  | DAP                        | DPU                                 | DDP                                                                                 |
|                                        | Ex Works (place)                                                                  | Free Carrier (place) | Free Alongside Ship (port)                                                        | Free On Board (port) | Cost & Freight (port) | Cost, Insurance & Freight (port) | Carriage Paid To (place)                                                           | Carriage & Insurance Paid to (place) | Delivered At Place (place) | Delivered At Place Unloaded (place) | Delivered Duty Paid (place)                                                         |
| Transfer of Risk                       | At Buyer's Disposal                                                               | On Buyer's Transport | Alongside Ship                                                                    | On Board Vessel      | On Board Vessel       | On Board Vessel                  | At Carrier                                                                         | At Carrier                           | At Named Place             | At Named Place Unloaded             | At Named Place                                                                      |
| Responsibilities & Charges             |                                                                                   |                      |                                                                                   |                      |                       |                                  |                                                                                    |                                      |                            |                                     |                                                                                     |
| Export Packaging                       | SELLER                                                                            | SELLER               | SELLER                                                                            | SELLER               | SELLER                | SELLER                           | SELLER                                                                             | SELLER                               | SELLER                     | SELLER                              | SELLER                                                                              |
| Loading Charges                        | BUYER                                                                             | SELLER               | SELLER                                                                            | SELLER               | SELLER                | SELLER                           | SELLER                                                                             | SELLER                               | SELLER                     | SELLER                              | SELLER                                                                              |
| Delivery to Port/Place                 | BUYER                                                                             | SELLER               | SELLER                                                                            | SELLER               | SELLER                | SELLER                           | SELLER                                                                             | SELLER                               | SELLER                     | SELLER                              | SELLER                                                                              |
| Export Duty, Taxes & Customs Clearance | BUYER                                                                             | SELLER               | SELLER                                                                            | SELLER               | SELLER                | SELLER                           | SELLER                                                                             | SELLER                               | SELLER                     | SELLER                              | SELLER                                                                              |
| Origin Terminal Handling Charges       | BUYER                                                                             | BUYER                | SELLER                                                                            | SELLER               | SELLER                | SELLER                           | SELLER                                                                             | SELLER                               | SELLER                     | SELLER                              | SELLER                                                                              |
| Loading on Carriage                    | BUYER                                                                             | BUYER                | BUYER                                                                             | SELLER               | SELLER                | SELLER                           | SELLER                                                                             | SELLER                               | SELLER                     | SELLER                              | SELLER                                                                              |
| Freight Charges                        | BUYER                                                                             | BUYER                | BUYER                                                                             | BUYER                | SELLER                | SELLER                           | SELLER                                                                             | SELLER                               | SELLER                     | SELLER                              | SELLER                                                                              |
| Insurance                              | Negotiable                                                                        | Negotiable           | Negotiable                                                                        | Negotiable           | Negotiable            | SELLER                           | Negotiable                                                                         | SELLER                               | Negotiable                 | Negotiable                          | Negotiable                                                                          |
| Destination Terminal Handling Charges  | BUYER                                                                             | BUYER                | BUYER                                                                             | BUYER                | BUYER                 | BUYER                            | SELLER                                                                             | SELLER                               | SELLER                     | SELLER                              | SELLER                                                                              |
| Delivery to Destination                | BUYER                                                                             | BUYER                | BUYER                                                                             | BUYER                | BUYER                 | BUYER                            | BUYER                                                                              | BUYER                                | SELLER                     | SELLER                              | SELLER                                                                              |
| Unloading at Destination               | BUYER                                                                             | BUYER                | BUYER                                                                             | BUYER                | BUYER                 | BUYER                            | BUYER                                                                              | BUYER                                | BUYER                      | SELLER                              | BUYER                                                                               |
| Import Duty, Taxes & Customs Clearance | BUYER                                                                             | BUYER                | BUYER                                                                             | BUYER                | BUYER                 | BUYER                            | BUYER                                                                              | BUYER                                | BUYER                      | BUYER                               | SELLER                                                                              |

Figure 5 - Incoterms table (Guided imports, 2020)

### 3 “As - Is” situation

This chapter sets the reader's understanding of how the firm operates, beginning with a contextualization at the level of BA's sales ordering process (the process that occurs from the time an order is placed until it reaches the client). The primary duty of pricing team is to use quantitative and qualitative methods to analyze proposal pricing, assess market share and margins, and track customer engagement to reach maximum value possible. This is done by accessing data from a variety of sources and using it to derive insights into pricing strategies and market trends.

#### 3.1 Glass as a packaging

Despite being a relatively ancient packaging material, glass has a lot of room for creativity. Depending on the application of design, modern technology has enabled the development of novel and surprising forms of glass packaging for product display. These solutions have also been expanded by information technology, allowing glass to effectively compete with other materials. Glass packaging is claimed to give liquid contents structure, and this shape is significant when interacting with consumers since container design is what first entices people to buy products. Additionally, glass has chemical advantages because it is an inert material that does not contaminate the packaged goods, pollute the environment as waste, and is fully recyclable - qualities that are crucial in terms of public health and the environment at a time when there is heightened awareness of these factors as components of a sustainable society.

Technically speaking, glass is made from a sodium calcium silicate, which contains around 70% sand in its initial manufacturing and 30% soda ash, limestone, and dolomite. The combination is heated to 1500° C, at which point colorants and fining agents are added. Naturally, as technology advanced over time, this manufacturer's operational chain changed from manual to mechanized, to automatic. Today, the heated liquid slurry from the furnace is circulated through feeders, and at the end of each channel, a pair of scissors is used to cut the glass drop that will eventually fall into the molds by gravity. The bottle or flask is then heated up and cooled, finally decorated, and then kept in storage until it is delivered to the customer. A manufacturing process that has long since supplanted human involvement with totally automated ones.

The employment of new technologies in its design and manufacture, as well as the growth of the organizational configurations in which the market game between producers and consumers takes place, cause the history of glass packaging to refresh itself and take on new subtleties.



Figure 6 - BA production glass colors (BA Glass, 2022)

### 3.2 Price requests procedures

Generally, in BA, prices are not fixed and there isn't a price list. Every case needs analysis. We need to take into consideration the market value, the willingness to pay, the customer, the segment. Different customers and different segments mean different ideas of value, and as a result, different prices. Evaluation of the value vary based on season, geography, demographics, or certain product attributes or immediately needs.

In order to get a comprehensive view of the entire sales ordering process, meetings with several departments were organized (Prices & Marketing, Planning, Product Implementation, Front Office, Transport and Decoration). The background and knowledge gained from these sessions allowed for the step-by-step construction of the method outlined in the following paragraphs.

Either side may begin the first communication between the business and the client. If a consumer wants to get in touch with BA, he can do so through the sales representatives by phone or email (Front Office team). To respond to each customer's inquiries, these assistants are well equipped with the knowledge and materials required. The corporation could also get in touch with the client if they are one of BA's key clients or if they have specific expansion plans. The sales managers in this situation are the best qualified to make contact because of their position.

The negotiating processes begin following this interaction. First, a pricing request is submitted in Salesforce (as previously mentioned, by the sales managers or the sales assistants) in order to create a proposal for the client. The Prices & Marketing division must respond to this by creating quantitative and qualitative assessments to back up its suggested price. In reality, they do so in order to gather knowledge on pricing tactics and industry trends. They do cost studies, among other things, and assess market pricing as well as historical prices used for the same client. It should be noted that cost evaluations include several elements, such as constant and variable costs, costs associated with raw materials such as molds and other materials, as well as transportation and packaging expenses.

The pricing will next be reviewed by the decision-maker (in charge of a specific division, such as Iberia, Central Europe, or Southeast), who will either accept or reject it. Depending on the circumstances, this procedure may be brief or extensive. It is up to the Sales Manager, or the sales assistant, to transmit it to the client when it has been authorized and entered the system. This time, the consumer has the option to accept or reject the offer. When the consumer accepts the price, the negotiation is over.

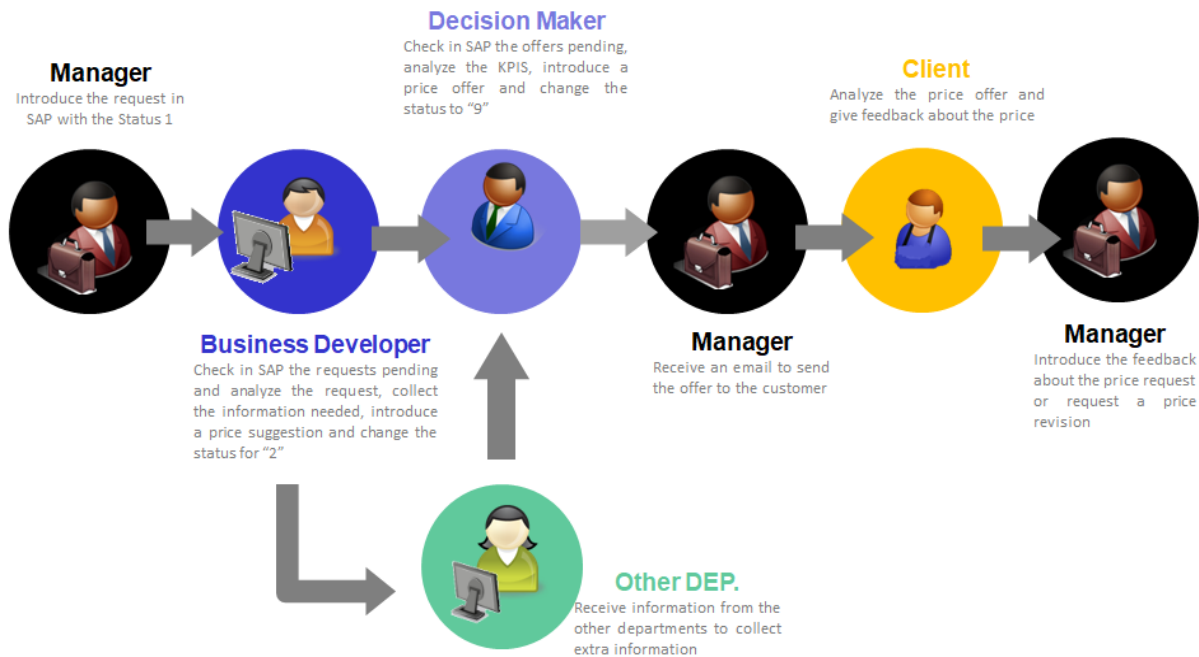


Figure 7 - General pricing workflow (BA Glass, 2022)

If the customer approves the agreed-upon pricing, we move on to the order management stage of the sales ordering process. After creating the order, the sales associates must check it by verifying delivery locations, the code of the materials the client requested, among other details. When required, they may also get in touch with the customer to explain anything that is unclear. On the other side, getting in touch with the customer may be necessary to make any revisions to the order. It should be noted that there may be a number of roadblocks during this phase, including insufficient stock to fill the order; the customer's ordered quantities being outside the planning department; and the customer's desired delivery date not falling within the company's realistic deadlines.

There is now no prioritization in the reaction to the blockages observed, thus the sales assistants must call the departments required to fix the issue for each blockage. Since the company's resources must be allocated effectively, there are areas of order management where it makes sense to concentrate.

The system provides an automated confirmation that is delivered to the consumers through email if the order is fully in compliance with the parameters examined by the assistants. Additionally, the transport crew is alerted when needed to arrange for the delivery of the order. The transport crew will then go ahead and plan a transfer for a certain day and time. They will also deal with all the paperwork required to move the vehicles and enter all the relevant data into the system. The assistants provide this information to the customer as soon as it is available.

The assistants must communicate with the required departments up until it is handed to the customer in the case that issues arise, and the client must constantly be updated and notified of any change or mistake. When a client wishes to return anything they purchased due to a complaint, the sales assistants handle the process by coordinating the best day with the customer and contacting the transport crew.

In conclusion, the finance division oversees the invoices sent to clients.

### 3.3 Client segmentation and Exclusivity

The division or classification of clients into groups is based on Margin, Price per Ton, Growth Potential, and Workload. It consists of two parts: the letter that designates the client's sales revenue group (A, B, or C); and the second part, which identifies the individual cluster for each customer, which might be "1" (cluster 1) or "2." (cluster 2).

Customers in the first cluster enjoy higher margins and comparable pricing per ton, but they have a smaller room for expansion. They are, in other words, clients with higher associated profitability, meaning they increase BA's profit. Additionally, improved negotiations have been achieved in this initial cluster, allowing clients to purchase tons at rates higher than the average for BA. However, during the course of the previous four years, they have been losing sales.

The second cluster, which has consumers with lower related profitability and prices that are below average, is plainly the reverse. This particular client base has shown a favorable growth tendency throughout the years by purchasing more tons. In respect to growth potential, it is crucial to note that there are disparities between the averages of each cluster, although these variances are considerably less pronounced when compared to margins and prices per ton.

It should be noticed that there are two distinct graphs that make it possible to distinguish between dealers and other clients. The chart on the right of this illustration shows dealers. As observed, segment F is not separated since it represents clients with sales below the extremely low sales revenue criterion.

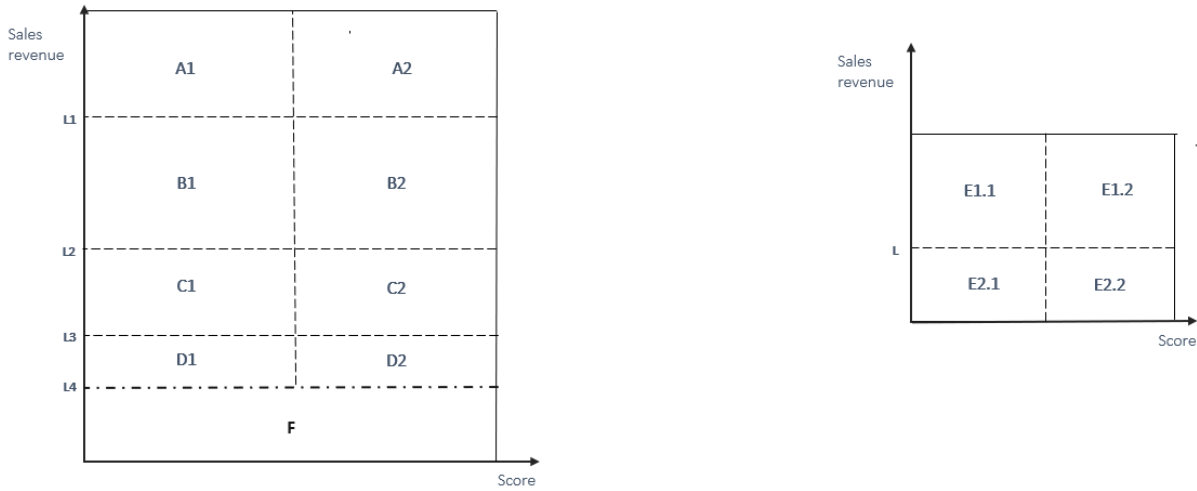


Figure 8 - Client segmentation representation

This number represents the total annual revenues from a certain customer, starting with the sales revenue variable on the y-axis. Equation below illustrates how this variable was calculated.

$$SR_k = \sum_{i=1}^N \text{Price per ton}_{k,i} * \text{Tonnes sold}_{k,i}$$

Where:

$SR_k$ : Sales Revenue of client  $k$ ;

$Price\ per\ ton_{k,i}$ : Price per ton of material  $i$ , bought by customer  $k$ ;

$Tonnes\ sold_{k,i}$ : Tons sold of material  $i$ , to client  $k$ .

When examining the number of tons of glass sold for each type of segment, the graph reveals that segments A and B have the highest percentages (they account for around 72% of the tons sold). Finally, segments D and E2 are those with the lowest number of associated tons sold, followed closely by segments C and E1 (with 13% and 9% of associated tons).



Figure 9 - Tons sold per client segmentation in 2022 (YTD)

### 3.4 Price Requests

As said in chapter 3.1, when a customer wants to place an order, this can follow two paths depending on the size and interest for the company of that same customer. Regardless of being attended by the Front Office team or referred by a sales manager, if the customer wants to buy a material for which there is no price defined yet, that price request will have to go through the Pricing team and be analyzed, as previously explained. In other words, each customer has a specific price for a specific material, and that price is variable from customer to customer.

Therefore, it was necessary to analyze the current status of those price requests, and for that, the amount of price requests made in the last three years was studied, as well as the most significant material segmentations and segments. With this, we intended to have a better global notion of which segments make the most price requests, which market is the most competitive and which product segment. From there, it was possible to gather all this data, which will be relevant for a first approach to the project solution.

Regarding the number of price requests in the last three years, it is possible to verify that in 2020 and 2021 this value is practically the same and that in 2022 the value is lower, which can be explained by the fact that at the date of this report the year has not yet ended and by the extraordinary situation of the current market, where there is not enough supply capacity in

relation to demand. Regarding the percentage of orders accepted by the client, it remains relatively stable over the years, as well as the overall weight in BA's sales.

Table 1 - Number of requests vs acceptance rate vs sales

|                   | 2020  | 2021  | 2022  |
|-------------------|-------|-------|-------|
| <b># Requests</b> | 3 893 | 4 059 | 2 430 |
| <b>% Accepted</b> | 46%   | 46%   | 48%   |
| <b>% Sales</b>    | 11%   | 16%   | 11%   |

Regarding markets, it should be noted that the greatest number of requests for prices are concentrated in Spain (24%), followed by Portugal (18%) and the export markets (16%). About the most expressive product segment, wine should be highlighted, with 39% of the price requests, but also the food & oils segment (29%).

As briefly translated above, all the price requests made and accepted by the team during this year, represent only 11% of the company's global sales, which is little indication of any associated reason because, naturally, most sales are already previously negotiated with clients and these price requests only represent new quotations for other types of materials that clients do not normally buy, or for completely new material projects. Nevertheless, it is of all interest that this value can increase and demonstrate that the current model can be improved, representing a greater volume of business for the company.

Analyzing the situation by customer segmentation, it can be seen that F customers are those who make the most requests for prices. This is due to the fact that they are smaller customers and do not normally fit into the company's sales plan. These are followed by customers E1 and C2. One of the biggest problems with the current model is that it takes a lot of time to analyze each order. F segmentation clients represent 19% of price orders - by number of orders - and only 0.5% of overall sales – in tons.

### 3.5 ASP comparison

The influence on the ASP (average selling price) calculates the absolute difference between what was predicted (either in the budget or sales strategy) and what was actually sold. It is also used to assess differences between the budget and sales. The impact on the ASP is often examined at the customer or customer-material level, with the divisional or worldwide ASPs as the possible scopes. For instance, the following formulation can describe the impact on the global ASP at the customer level:

Having stated so, the impact on the ASP may be divided into the following categories:

- **Sell +, +:** The outcome of selling more expensive items in total than anticipated. This kind is given when both the impact on the ASP and the quantity variation are positive (more tons were sold to the client than what was anticipated).

- **Sell -, -:** The result of selling fewer units of inexpensive materials than anticipated. When the impact on the ASP is favorable and the quantity variation is negative (i.e., fewer tons were sold to the client than anticipated), this category is assigned.
- **Sell +, -:** The result of selling more inexpensive materials in total than anticipated. When the quantity variation is positive and has a negative impact on the ASP, this category is issued.
- **Sell -, +:** The result of selling less expensive materials than anticipated or at a higher price. When the quantity variation is negative and has a negative impact on the ASP, this category is assigned.

In relation to new price requests and what currently happens, it is possible to verify that not all price requests accepted by the team are above the ASP of that material/segment. This happens for various reasons, including a mere commercial and strategic interest of the company at that moment, but also for market reasons at the time the request is made, which determine that, the way the requests are analyzed at the moment, it is possible to accept that request. Moreover, more specifically, the segment which is most often accepted above the ASP is Sparkling wine (87%) and the one which is most often below the ASP is Spirits & Porto (65%).

Table 2 - Price requests above ASP and difference to ASP (per segment)

| SEGMENT                    | Above ASP | DIF to ASP |
|----------------------------|-----------|------------|
| <b>Beer</b>                | 74%       | 17%        |
| <b>Food &amp; Oils</b>     | 77%       | 8%         |
| <b>Others</b>              | 50%       | 12%        |
| <b>Softdrinks</b>          | 72%       | 3%         |
| <b>Sparkling Wines</b>     | 87%       | 5%         |
| <b>Spirits &amp; Porto</b> | 65%       | -3%        |
| <b>Wine</b>                | 79%       | -2%        |

Taking the above into account, although it is not the segment which is most often above the ASP - in terms of the number of orders - beer is the segment which most likely affects positively the ASP, with the prices of the new orders accepted being 17% above the ASP

### 3.6 Detail output: important information

Statements for each customer and material are included in the output, where we may view information on all the materials the client has purchased as well as information on all the customers who have purchased materials in the past. Price requests are typically made by sales managers to analyze prices. Usually contains information on the client, the whole material specification, transportation, the state of the molds, etc.

There is a transaction in SAP that allows us to search all negotiated prices, pricing fluctuations between years, sold tons, and the sales manager's ability to export offers to send to clients, per customer. Depending on how much information we want to evaluate, we may filter the Detail Output by a variety of fields. The material, the segment (automatic), the country, and

the client are filled out in the normal search. For brand-new materials, you must then fill in with information like the segment, the material weight range, the average capacity range, the country, etc.

### 3.7 Variables in analysis

The variables deemed most pertinent were reviewed in meetings with the BA adviser following an examination of the context and a literature review on those to be included in the pricing tool, making them the subject of an analysis, and could be further used in testing this tool. This brainstorming was crucial in that it revealed, for instance, that it wasn't always possible to take certain elements into account. The factors that were discussed at the meetings and the issues that were raised in regard to each one are illustrated in the following points, to which we should pay attention:

- **Sales Revenue:** The total annual revenue from a certain client. Used to determine how losing the customer will affect accounting and to provide the BA an idea of the magnitude of the business;
- **Geographic Location:** The sector or region that a specific client is a part of. The geographical area and the sector could both identify specifics on the needs of their respective customers and essential price variances;
- **Margin (comparative):** Each customer's average margin in relation to other customers present in the same circumstances. Since customers in BA always begin with individualized and tailored pricing negotiations, they have varying margins. Due to BA's global presence, it is important to keep in mind that a good margin will vary depending on the location and even in issue. Because of this, it is important to compare each customer's margin to the average margin for the area in which they are located;
- **Price per ton (comparative):** Each customer's average price per ton, compared to other customers present in the same circumstances, allowing for the identification of customers who have higher sales prices. In respect to the previous variable, the measurement and analysis of prices per ton would adhere to the same general rule regarding the uniformity of conditions that should be confirmed, while comparing various prices. To compare each client's pricing to the average price of the setting in which the consumer is put is the idea, in other words. In light of the current BA's rising energy prices and the need to identify clients whose bills are much below the average, this variable may be highly important.

## 4 New Pricing tool

The new price order analysis proposal followed the steps described in the methodology, starting with the model building phase regarding the materials themselves, whose focus is the definition of their characteristics. This is followed by the analysis of the model and capacity depending on the customer segmentation that we are going to sell and, furthermore, an analysis of variations per market. Finally, it is necessary to make some adjustments to include certain costs that are not associated with the other variables in the process.

According to the studied literature, this first stage serves as the starting point of a conventional pricing analysis process. Understanding the context and overall picture of the business is necessary to establish a purpose that will act as the cornerstone for the new segmentation model. As was already indicated in the project's framing section, the company operates in an environment marked by an energy crisis and extremely high energy prices relative to the norm, both of which had a significant impact on BA due to the company's extreme energy usage. In addition, there is a dispute between Ukraine and Russia, which has forced rival companies with factories in Ukraine to shut down or demolish them. In reality, many of these factories' clients turned to BA for help, which significantly increased demand for the business.

In light of this, the new model's goal was established. This phase could not be skipped because it isn't possible to choose pertinent variables in the absence of a clear objective. Following consultations with the BA supervisor and the theme's promoter from the Prices and Marketing division, it was determined that the primary goal of the new pricing tool is to boost BA's profitability and reduce the workload in the team that is currently focused on lower valuable clients. As was already established, BA has a very high demand and must comprehend each consumer in detail and have access to as much relevant information as possible. In practice, and with the help of the pricing tool, it should be possible to improve the acceptance rate that the company currently has, give prices faster and better, which means that is necessary that these prices are higher and follow the company interests.

With the model created, some phases of project implementation are described and, finally, its evaluation criteria and some associated KPIs.

### 4.1 Product analysis

As previously mentioned, BA materials are divided into segments, which include Beer, Food & Oils, Softdrinks, Wine, Sparkling wines, Spirits & Porto, and others. These materials are quite distinct from each other and have unique characteristics. Therefore, it became necessary to analyze these materials in detail separately.

#### 4.1.1 Product families

Initially, the idea was to create families of products that were only identical to each other in shape to the naked eye, but it proved more relevant to separate them by other basic characteristics, choosing the most appropriate variables. Since each organization has unique qualities and objectives, it is not advisable to use pre-formatted ideas for the selection of key factors, as was stated in the chapter on the literature review. Instead, one should carefully

consider what makes the most sense. Considering the literature review, key variables must be in line with the objective of the tool itself, therefore the purpose had a significant impact on the majority in the importance of variables.

Having the above in consideration, the following were carefully analyzed:

- *Product Segment*
  - Definition: It is an internal BA variable that was already in use and, despite being associated with the content to be filled of the material, it is not the same.
  - Objective: Separate the product families by each segment to have different base prices for each product segment
  - Importance: It is important that this is one of the base variables of the family creation process because necessarily different segments will have to have different selling prices to the customer. This is also a very important variable in the sales and price analysis that is made in the company and that can be used to adjust some market or strategic intention.
  - Example code: For beer – “BE”.
- *Product Size*
  - Definition: Capacity of the material, on 3 levels.
  - Objective: This is a new variable that was created to separate materials by their size, more specifically, by their capacity. Three levels of capacity were created because it was shown to be the most appropriate to separate by capacity, it being irrelevant to analyze small variations in capacity. To choose the range of levels, a market analysis was made with the most common capacities. These levels will be different for each product segment.
  - Importance: This is a very important variable because naturally a material with a higher capacity will have, in principle, a larger size and therefore a larger quantity of glass by weight, which naturally implies a higher price.
  - Example code: Size “S”, “M” and “L”.
- *Product “Category”*
  - Definition: Product category regarding its appearance and identity
  - Objective: This is a new variable and feature that was created for this project. In fact, it aims to group materials that are similar in appearance with respect to their shape, height, diameter, and basic geometry. This allows similar materials to have similar prices.
  - Importance: It is shown to be of enormous importance to have similar prices for similar products for a marketing need to the customer. In other words, this variable makes it simpler to explain the price to the customer when comparing it with other materials he already buys, for example.
  - Example code: For beer – “B”, “NB”, “N”, “NN” and “W”. Five categories were created and following are drawings of each category. Within each category every material should be similar to those below.

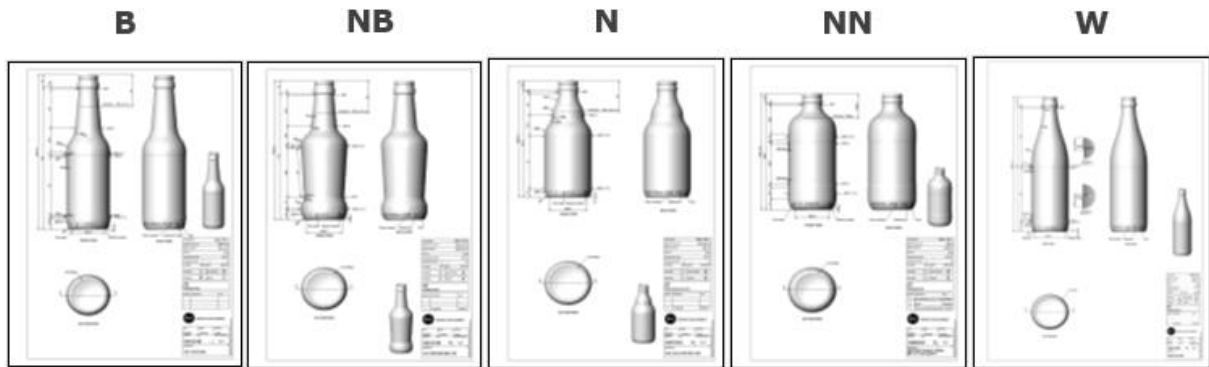


Figure 10 - Product "category" for beer segment

- *Product Shape*

- Definition: BA internal variable relating to the shape of the material, i.e. whether it is round or square in shape.
- Objective: This variable is very relevant in some segments, specifically in food. Where there are many different geometries.
- Importance: It allows the separation into different product families, materials that despite being similar and having relatively similar sizes, are framed in different families.
- Example code: "Ro" for round shape.

These four variables explained above allow the creation of a product code associated to each material that only corresponds to the product itself.

In the approach to this tool, it was shown that the technique that makes most sense for BA according to its historical business methodology and relationship with the customer would be a customer-driven pricing approach, where prices are done according to customers' perceived value of a company's goods or services. This model's underlying presumption is that a consumer will pay a particular amount when the value they receive outweighs the cost. For this to be possible, it is necessary to have enormous product knowledge and know how to transmit it to the client so that he can have the same perception.

#### 4.1.2 Mark-ups & mark-downs

As previously mentioned, up until this phase, a base pricing was established for every material family. This base pricing was determined using the most fundamental component of each family, or the one with the fewest qualities that may, in theory, boost the value seen by the client while also being easier and less expensive for BA to create. Since there was no database with this kind of big data at the time of this report, it had to be examined material by material.

In order to get at the most fundamental materials, it was required to comprehend which materials had qualities that customers would value and for which they historically would be prepared to spend more money. To do this, the commercial team gathered with the pricing team for a brainstorming session where the fundamental concepts for assigning these qualities were shared and arranged according to value for the consumer. Evidently, while though some elements are purely cosmetic and have minimal bearing on the bottle's value for BA in terms of

production costs, other traits that the customer assigns value to as a product also influence its production cost, as will be detailed below.

- **Mark-Ups**

- Exclusivity: This characteristic of the material refers to its exclusivity for sale, that is, for certain customers and certain materials BA undertakes to produce materials that can only be sold to one customer and are therefore said to be exclusive. These materials must naturally have a higher price because BA is restricted to selling them only to one client, which can be somewhat limiting. They are usually materials with formats characteristic of the brand that buys them or, for example, with its own engravings.
- Finishing: This is a very important material characteristic, especially in some specific segments, such as food. the portion of the container's top above the neck that is shaped to accept a particular closure. The final step of the bottle molding process is when the finish is created, which is how it acquired its name. This is because customers usually want specific finishes on the bottle that are related to the cap itself that they want to have, whether it be crown, cork, or screwcap, but beyond that, it is very dependent on their own filling machines and processes. The clients' factories are generally prepared for a certain type of finishing in relation to its diameter and, therefore, this is normally relatively identical in all materials for the same client. It is also important to characterize finishing as an add-in because some types of finishing involve a more careful production process.
- Engraving: This characteristic is especially due to an engraving of the brand that the customer wishes to have. Naturally, this feature is intrinsically linked to the fact that the bottle is exclusive because a material cannot have an engraving if it is not exclusive.
- Push-Up: At the center of the foundation is a dome that faces inward. The ring that forms around the perimeter of the bottom promotes stability and gives the bottle a level resting surface. On other bottles, like wine bottles, the pushup is oversized.
- Returnable: Glass works well for both one-time use and reusing repeatedly; a returnable glass bottle can be used more than 40 times. The controversy over packaging's effect on the environment is driving up demand for this particular type of glass container. These reusable containers are typically employed in the catering business and in specialty beverage retail, where amber glass beer bottles represent the largest returnable glass market. Returnable glass packaging is put under a lot of stress because it is constantly being refilled and washed. This type of bottle is becoming more and more usual and have specific production characteristics that need to be considered.

- Color: "Soda-lime glass," which is mostly made of silica, soda, and lime, makes up most of the conventional bottle glass. Glass that has a minimum of 99.9% pure silica would be colorless. The excessive cost of obtaining pure silica in its pure state plus the significantly higher temperatures required to properly melt it make it impractical and commercially unviable to produce glass from it. The final color of the glass depends on managing impurities that cause off-coloring and reaching the intended hue from this point on in the glass-making process. To achieve this, specific chemical kinds and amounts are added to a batch of glass. For this reason, our production costs of producing certain colors of glass are higher than others. This led us to introduce a mark-up in some colors to differentiate its price. This is also due to the client perception over some colors that are historically considered more premium.
- Weight Add-in: This was a variable made to distinguish between bottles with various densities. This problem arose because, despite classifying materials according to their internal volume capacity, we did not classify bottles according to their weight. Initial thoughts focused on separating materials based on weight, but this presented challenges for categorizing the weight of the materials we needed to separate because it would have an impact on this variable and cause us to be penalized twice for the same issue. For this reason, he decided to calculate the ratio of weight to capacity, allowing us to know the density of our own jar without having to use our own weight. It became clear that this variable had to be created since, by necessity, it is necessary to distinguish between materials that are more densely packed, heavier, and/or made of more glass (which results in higher production costs). It was then decided in the team that this should have an impact of 10% relatively to its ratio, as demonstrated in the following equation.

$$WtA_x = 10\% * \left( \frac{Weight}{Capacity} \right)$$

Where:

$WtA$  : Weight Add-in of material x

$Weight_x$ : Weight of material x (in grams).

$Capacity_x$ : Capacity of material x (in milliliters).

- Out of stock: This variable proved to be very intriguing to include in the project at a later stage. A product is said to be "Out of Stock" when there are more orders in the sales forecast than the production forecast can keep up with. For the same reason, as well as the incompatibility of having many materials available in this circumstance, it became apparent that it was necessary to include a variable that was directly related to the plan and might affect the price if any materials were discovered to be "Out Of Stock."

- **Mark-Downs**

- Color: As previously said, the color of the actual material is related to how it is produced and affects how much it costs to produce. Additionally, the client's perception of this more expensive cost and the price charged corresponds roughly in the same way. Naturally, the color of the material depends on one of three factors: it may be chosen solely on the basis of the client's preferences; it may be a historical trait of the material that has previously featured that color; or it may be related to a segment-specific characteristic, such as the fact that a beer bottle is typically amber to facilitate identification as well as for protection reasons. For all of these reasons, color may also be a markdown since some colors, like color change lots, are more affordable to produce. These lots relate to the quantities of materials produced when a change in color is being made to a line that is still not completely defined. Due to the fact that it falls short of all established requirements, this should be more affordable for the eventual customer.
- Quality control stock: There is no one definition of quality. Quality control is the process through which goods and services are tested and evaluated to make sure they adhere to a standard, regardless of the relative meaning of the word "value." A company can assess, maintain, and enhance product quality through this method. To ensure that products are as uniform as possible and to reduce errors and inconsistencies within them are the two main objectives of quality control. Normally, quality testing is incorporated into each step of the production or operational process. A lot of the time, workers start testing with samples they've taken from the production line, finished goods, and raw materials. Testing across the different production phases can assist in determining the root cause of a production issue and the necessary corrective steps to ensure it doesn't happen again. In terms of quality control at BA, the same is included in fundamental BA standards of quality but must also guarantee certain client-specific characteristics. In addition, a strong bet must be made on the product's safety because it is made of a substance that is used in the food industry and must adhere to strict rules. As a result, even while all security guarantees are in place, there are some lots of materials that don't adhere exactly to the BA's standards and are therefore typically sold to specific customers for a lower price. As a result, it became necessary to develop a variable that negatively affected the price in order to account for the unique cases that are sold as special and extraordinary operations.
- Production lines: This variable was added in conjunction with the last one and has to do with the company's capacity for production. In a situation where production is more flexible, prices need to reflect this trend to avoid

losing sales volume. This can also be a mark-up depending on the current situation.

- Stock with no sales plan: This is a crucial criterion that is already in use and will be part of the automated pricing process. In a company the size of BA, production planning is based on forecasted sales for the next months, but these forecasts are not always realized, leaving room for stock to accumulate that is not sold. This same stock causes numerous organizational and financial issues for the company, including the need for numerous primary and secondary armories to be hired to store the same stock, the need for transporters to be hired to distribute the same stock, and sustainability limitations that do not adhere to the fundamental business principles. For these reasons, it is necessary to set a lower price for a material that has been available for more than six months without a sales plan.

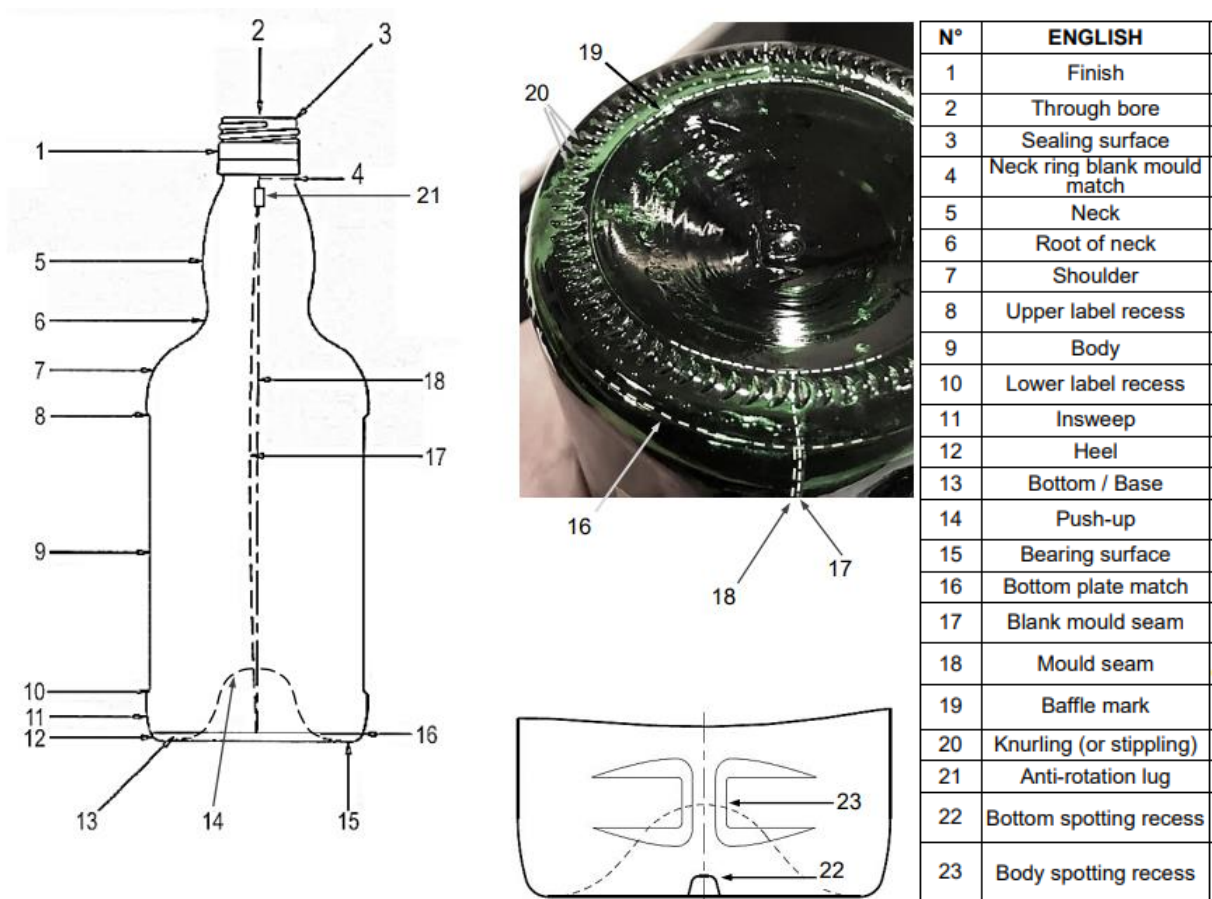


Figure 11 - Main characteristics of a glass bottle (also applied to jars) (CETIE, 2021)

One of the key factors in determining the price of a product are mark-ups and mark-downs, so it was necessary to determine which variation was most appropriate to execute. Based on bibliographical literature, the company's commercial intentions and regular meetings with the sales team that has better information of clients' willingness to pay for each characteristic we decided to study the prices of all goods this year with and without distinguishing characteristics to determine the general pattern of prices. From that point on, it was possible to

determine that the price variation hovered about 5% for each markup and markdown taken into account.

## 4.2 Market region

In the initial phase, a value for the material was created that only refers to its technical characteristics, and only a product analysis was performed. In this phase, the product was distinguished by the client-specific characteristics and some attributes that are no longer undervalued in light of the client's desires.

In this second phase, it's crucial to distinguish the business in relation to the type of market where it sells. As was previously stated, BA Glass is a global company with clients all over the world, making it necessary to distinguish between these same clients based on the intended use of the materials and the unique characteristics of each market. To this purpose, a historical analysis of the company's sales during the previous three years was conducted in order to understand the major market trends and the potential deviations from the course of events. It is obvious the differences between markets, so it is necessary to make the appropriate adjustments to avoid offering a customer a value that leads to fewer sales and, consequently, a loss of advantage. At the same time, it is crucial that this value follow the inherent capacities of the markets to prevent leaving any unnecessary capacity for purchase above the table. It is always the goal to obtain the greatest and best capacity from each and every client.

Finally, this analysis and the price adjustments that will be made for each market represent an opportunity for future adjustments that take into account the company's interests and the capacity of each market, both of which naturally change over time.

Table 3 - Pricing fluctuations according to each country

| <b>Country</b> | <b>Variation</b> |
|----------------|------------------|
| <b>PT</b>      | 1,00%            |
| <b>ES</b>      | -2,00%           |
| <b>PL</b>      | -5,00%           |
| <b>DE</b>      | 6,50%            |
| <b>GR</b>      | 4,00%            |
| <b>BG</b>      | 0,00%            |
| <b>RO</b>      | 3,00%            |
| <b>FR</b>      | 3,00%            |
| <b>IT</b>      | 4,00%            |
| <b>Others</b>  | 10,00%           |

There are some price changes that are already common for the markets, and it's important to note that, for instance, France and Italy have price changes that are more significant than one might anticipate because there are no BA factories in these countries, which causes the value to increase. The remaining values' alteration is caused by macroeconomically natural factors. These values were discussed with the sales team in those countries and are now being updated as a result of the analysis of the project's implementation conclusion and further results.

### 4.3 Client segmentation

Having reached the stage of the process when a price based on the material itself and differentiation for the customer may be reached, it is now crucial to differentiate by client in order to sell at prices that are equally appropriate in other countries.

The client segmentation in BA is divided into 6 groups, with 2 subgroups each (that we call clusters). As was said above, customers in the first cluster have more comparable pricing per ton and greater margins, but they also have less room for growth. In other words, they are clients with higher associated profitability, which means they boost BA's earnings. Additionally, in this first cluster, improved agreements have been attained, enabling customers to buy tons at prices higher than the average for BA. However, they have experienced a decline in revenues over the last four years.

The second cluster, which includes customers with lower related profitability and below average prices, is obviously the opposite. This specific clientele has demonstrated a positive growth trend throughout the years by acquiring more tons. It is important to note that there are differences between the averages of each cluster with regard to growth potential, even though these variations are noticeably less prominent when compared to margins and prices per ton.

Having this said, it was necessary to create a differentiation similar to the one created for the market region that could adapt the pricing that is done for different clients, but the same material. Obviously, an higher capacity client needs to have higher prices than one that smaller and has less buying capacity. In the table below, the Pricing & Marketing team and sales managers come to a conclusion to this price variations within each group segmentation.

Table 4 - Price variations according to client segmentation

| Segmentation | Variation |
|--------------|-----------|
| <b>A1</b>    | -6,00%    |
| <b>A2</b>    | -5,00%    |
| <b>B1</b>    | -4,00%    |
| <b>B2</b>    | -3,00%    |
| <b>C1</b>    | 0,00%     |
| <b>C2</b>    | 1,00%     |
| <b>D1</b>    | 2,00%     |
| <b>D2</b>    | 3,00%     |
| <b>E1</b>    | 6,00%     |
| <b>E2</b>    | 8,00%     |
| <b>F</b>     | 8,00%     |

As can be seen, these variations in price by segmentation are reasonably consistent with what was stated above and may be adjusted in accordance with the company's market strategy. Based on the segmentation C1 customers, it is possible to see that the larger customers (segments A and B) demand more competitive prices due to their size and negotiating power with BA, while the segmentation C1 customers who purchase the least amount of glass do so at higher prices.

## **4.4 Other costs**

After reaching this stage, where the price of the item is fully established, it is necessary to manually add certain additional costs depending on the material itself and some of its characteristics as well as the individual client to whom it is being sold.

### **4.4.1 Decoration costs**

Decoration is a significant factor that a growing number of customers want since it gives the material a more appealing appearance when it is exposed and makes it easier to convey the brand's vision. Additionally, it gives a brand a more premium and attentive identity that allows it to select the style of design it wants using a variety of viable techniques.

The most popular and readily available types of decoration include PSL (Pressure Sensitive Labels), screen printing, sleeves, painting, and frosting. Not all of these are carried out by BA directly; some may need to be outsourced. Due to these disparate values, it was necessary to create this variable so that the calculated cost of the decoration could only be included to the final cost.

### **4.4.2 Transport costs**

In the early stages of the project, it was intended to focus on total costs, including transportation costs. As was initially said, the customer is only concerned with the product's price when it is already available for them, not when it needs to be transported, decorated, or whatever. Even though it would be ideal, it became clear that it would be very difficult to create a tool without manually adding the costs of transportation. This is because there is no practical method for automatically estimating these costs, and not all materials are purchased with transportation costs included, leaving the customer responsible for this expense.

In light of this, it was decided during a meeting with the Pricing & Marketing and Transportation teams that these costs would only be added in the end to price requests that call for this value to be included.

## **4.5 Pricing simulator**

After taking all necessary adjustments into account and perfecting the tool, it became clear that it would be interesting to develop a tool that could test the entire process in an early stage. For this reason, a "simulator" is included that enables all inputs required for the attribution of a final price to be included.

In addition to that, a tool in VBA that makes it possible to see material drawings was developed so that all of a model's internal characteristics could be introduced. All of this is included in appendix A and appendix B.

## 4.6 Model evaluation

Since this is an ongoing project with approval to future development by BA Glass board, the new model has not yet been put into practice. It is crucial to consider how the model should be evaluated because the company's execution of it won't be far off. According to the literature studied, the model should actually be assessed via three different lenses: reduction on time spent per request, higher value of new price requests vs the average selling price, and finally, higher rate of acceptance.

During the year of 2022 each price request took an average of 7 days to be analyzed by the Pricing team. The future target is to reduce this number by a significant amount. Also, with this tool, the aim is to guarantee that each price request for new businesses has a higher price than our ASP for that market/segment. To conclude, the future is targeted to improve our capability to give fair prices to each customer and market. Easily access our market know-how and make sure that prices given are according to each client capability to pay the best price for both sides.

## 5 Project results

This section's goal is to show the statistical analyses that were deemed most important during the project's model-building phase, along with the final outcomes. Note that the results gained section has already been updated to reflect the changes deemed necessary during the implementation stage.

### 5.1 Analysis by client segmentation

The decision was made to evaluate the effectiveness of the tool by comparing the price per ton that was used during the year 2022 with the price per ton that the tool itself automatically assigns to these materials and customers. From the table below, it is possible to verify that the price per ton under the new system is quite similar to the one currently in use, if not slightly higher. By segmenting the data, it is possible to see that starting with segmentation D, the price per ton difference became more significant. This is due to the fact that we encountered an overbooking situation where it became clear that it was necessary to raise prices for segments that provide the company less value.

Table 5 - Price variations with new pricing tool (by segmentation)

| Segmentation       | DIF %  |
|--------------------|--------|
| A1                 | 0,66%  |
| A2                 | 1,29%  |
| B1                 | 3,54%  |
| B2                 | 0,58%  |
| C1                 | -0,05% |
| C2                 | 8,62%  |
| D1                 | 10,23% |
| D2                 | 9,66%  |
| E1                 | 16,19% |
| E2                 | 10,03% |
| F                  | 8,83%  |
| <b>Grand Total</b> | 1,37%  |

### 5.2 Analysis by market

Analyzing the output of the market tool allows for the detection of more pronounced variations within the market. Despite everything, this analysis does not point to a problem because different countries have different levels of purchasing power, making it challenging to obtain results with such uniformity. In addition, this was not the intended outcome, and some adjustments were made to the first market variation that showed promise in terms of trend and internal trade philosophy.

Table 6 - Price variations with new pricing tool (by market country)

| Country            | DIF %        |
|--------------------|--------------|
| PT                 | -6,47%       |
| ES                 | -3,65%       |
| PL                 | 19,38%       |
| DE                 | 11,72%       |
| GR                 | 10,23%       |
| BG                 | 1,56%        |
| RO                 | 1,58%        |
| FR                 | 15,13%       |
| IT                 | 7,13%        |
| Others             | 3,49%        |
| <b>Grand Total</b> | <b>1,37%</b> |

### 5.3 Pricing results

To test the tool and all of the added features, it was necessary to compare the prices that were manually calculated in the current year of 2022 with the prices that would be calculated automatically using the new tool.

The process started by determining that the majority of prices for the same material for each client are higher than those that were applied without the tool. This value was deemed appropriate since it represents a range of prices that were in use at the time, and when combined with the fact that the price per ton has increased by 1,37%, it makes sense that this will happen.

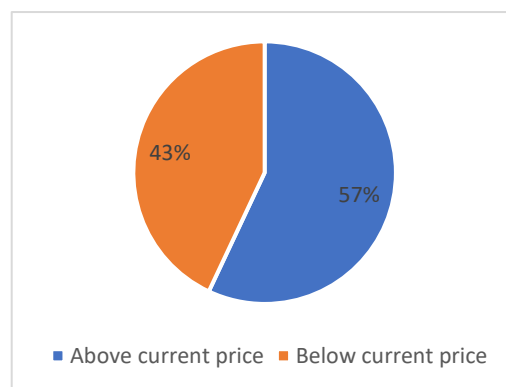


Figure 12 - Share of prices above ASP YTD with new pricing tool

In addition, in order to draw specific conclusions, it was decided to test the tool using two materials in the beer area. Then, for two of BA's top clients in this market, two models were chosen (the precise values of both cases will be kept confidential for business reasons).

In the first instance, one of BA's largest segmentation A1 customers purchased a 250ml-capacity, 20.658-ton exclusive model for the entire 2022 calendar year. Following observation, this material was added to a certain family and had the engraving mark-up with the company's logo added. The weight of the actual bottle and the engraving have an impact on the base price, as seen in the waterfall graph below. After that, the market factor is also taken into account,

along with the segmentation, where a significant amount of value is lost because it pertains to a very large client. Finally, transportation costs are added, resulting in a final price per ton that is 1,68% less than what was used during the year.



Figure 13 – Waterfall pricing chart for material x, sold to client a

This figure proved to be quite satisfactory for several reasons. As said before, this year was extraordinary from a business and pricing point of view. For that very reason the fluctuation was huge and there were constant changes and energetic corrections with the surcharge. Therefore, the fact that the tool gives a price that is almost similar to the average selling price YTD is very important and promising for the future. Energy costs remain very high and it is important that prices follow a cost and market pattern.

The second case refers to another bottle of the beer segment, with larger dimensions (330ml) and relatively the same sales volume. The segmentation of the customer that buys the material, one of the largest in the segment for the company, becomes segmentation A2, so the value is more affected by this variable. On the other hand, the location of this customer is further away from BA's factories and so transport costs are also a factor. Despite all this, the final sale value to the customer is 1.26% higher using the tool. This is one of the special cases where it can be seen that considering the transport cost in a separate step and manually is fundamental for this same price to be consistent.



Figure 14 – Waterfall pricing chart for material z, sold to client b

## 5.4 Implementation in the company

This project is still in development, and its conceptual phase is yet not fully defined. It's vital to remember that each segment will need to be examined separately in order for the tool to be appropriate for each in a unique but similar way. This is because not every sector caters to the same type of customer and, much less, has the same capacity to pay for a particular product.

After all the variables are well-defined with regard to a potential future implementation, it will be crucial to involve the IT team in the process to ensure that the tool is implemented as dynamically as possible in the company's current workflow, given what the level of price requests indicates.

Initial testing phases will need the Pricing & Marketing team to continue setting prices in the same manner that they have been doing so up until this point, with the tool only being used to check results. This phase will be very beneficial because it will allow for the ongoing development of the tool, with any necessary adjustments, and will help the team become familiar with the entire process.

Following confirmation, the tool will need to go into autonomous operation and initially only work for clients in the smallest segmentations. This will help reduce the workload on the team because these clients account for the majority of the task's time and represent lower profit margins for the company.

## 6 Conclusions and future works

### 6.1 New pricing tool

After conducting a thorough analysis of the current context in which BA is embedded and drawing on bibliographical literature pertaining to the various types of price orientation, a tool that could assign a good price to each material depending on the buyer for whom it is being sold and the location of its market was developed. The methodology for developing the model involved four steps, which were the definition of material categories, the identification of markups and markdowns, the differentiation of customer segments, and the differentiation of markets.

The project's first phase's variables included the product's segment, the "family," the material's capacity, and its shape since it was necessary to group the materials into categories in order to have a base price for each category. From this point on, it was possible to obtain product categories that were identical to one another at the same entry-level price.

Then, in a tactic of market orientation, it was decided which intrinsic general characteristics of the materials are valued by the customer and may cause them to have higher prices. These characteristics naturally cause the costs of the materials to vary in an internal business perspective; therefore, it would be necessary to include them in the analysis. To wrap up the process, the third and final phase identified the variations that needed to be applied to each market and customer segmentation.

Having said this, it is important to highlight that the main objective of this report was fulfilled: the creation of a tool capable of obtaining prices for each material of the BA. Regarding the results obtained, it is possible to highlight the results obtained based on historical data and those that, in the short period of this analysis, were possible to obtain. The tool is a substantially faster method than the one currently used, and it takes up a lot of time for the pricing team. Furthermore, it is possible to verify that the prices are in line with those that have been realized in the past, which is a good indication of its success. Naturally, in the future it is intended to understand if it is possible to extend these prices to higher values in order to increase the return for the BA, the objective being to never lose tons of production.

Regarding potential improvements to the model proposed in the current dissertation, it stands out that some product categories have few references included; thus, grouping them with similar categories might, in some circumstances, result in fewer categories and a simpler process. However, it was decided to keep everything as it was initially intended so that it could be tested in the beginning and, from there, any decisions about changes to make in the future could be made.

### 6.2 Future works

It becomes clear that it is essential for BA that every tool and idealization of the same may be thought about on a regular basis. In truth, there are many things to think about that need to be frequently reconsidered as well as updated with new solutions.

The inclusion or exclusion of new variables in the classification of mark-ups and mark-downs may prove to be extremely advantageous in light of customer desires because what may currently make sense to charge a customer more may already make no sense in the future. In addition to this, new metrics or customer-valued characteristics may show up and require analysis.

The KPIs should also be continuously examined because they are the best way to demonstrate the tool's capabilities; if the acceptance rate decreases, the tool is likely to be charging prices that are too high for its customers. Naturally, this acceptance rate shouldn't be overly expressive because it will indicate that prices are too low.

Additionally, it will be necessary to ensure that market and customer segmentation variations are regularly adjusted in accordance with external market conditions and internal corporate viewpoints. See the current situation, where BA is in overbooking; the company benefits most from betting on or investing in the most profitable clients. However, in the future, supposing that the company increases its production capacity or that there is a sharp decline in demand, it may be more sensible to invest in clients who have a significant chance of growth despite their lower margins and tonnage prices.

One suggestion for future variables is to study the variable known as "shelf pricing," which is the ultimate price customers of BA sell their products. This would allow us to understand which customer have greater margins than others with the same sold product. Consider as an example a container sold to one customer who would use it to sell a yogurt and another customer whose product is caviar sold in the same container - obviously, we are dealing with completely different customers who must purchase from BA at different prices. This variable couldn't be included right away but will be included as soon as the data base for these reports is finished.

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## APPENDIX A: VBA CODE TO PREVIEW MATERIALS DRAWINGS

```

Sub drawings()

Dim myPic As Object
Dim picpath As String
Dim UserName As String
Dim objI As Object
Dim rng1 As Range
Dim i As String
Dim a As Integer
Dim b As Integer
Dim c As Integer
Dim d As Integer
UserName = Environ("username")
i = "PicPath"
a = 5
b = 3

picpath = "C:\Users\" & UserName & i & "\" & Cells(a, b).Value & ".pdf"

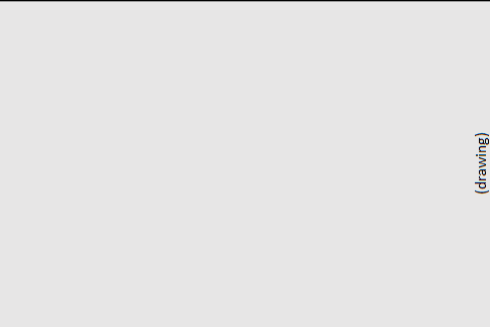
Set myPic = ActiveSheet.OLEObjects.Add(FileName:=picpath, Link:=False,
DisplayAsIcon:=False, Top:=Cells(6, 3).Top, Left:=Cells(6, 3).Left, Width:=10, Height:=10)

myPic.Left = Cells(6, 3).Left
myPic.Top = Cells(6, 3).Top
myPic.Height = Cells(6, 3).Height
myPic.Width = Cells(6, 3).Width
If myPic.Height > Cells(6, 3).Height Then
    myPic.Height = Cells(6, 3).Height
End If

End Sub

```

APPENDIX B: PRICING SIMULATOR

| PRICING SIMULATOR                                                                                            |        |        |       |                                                                                                                                                                                                                                      |        |                     |                       |                    |                     |                |
|--------------------------------------------------------------------------------------------------------------|--------|--------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------------------|-----------------------|--------------------|---------------------|----------------|
| Segment                                                                                                      | Size   | Family | Shape | Mark-ups                                                                                                                                                                                                                             | Colour | Decoration cost/ton | Ratio Weight/Capacity | Transport cost/ton | Client Segmentation | Target country |
| BEER                                                                                                         | <300mL | NB     | Round | <div><input type="checkbox"/> Push-Up</div> <div><input type="checkbox"/> Engraving</div> <div><input type="checkbox"/> Returnable</div> <div><input type="checkbox"/> Finishing</div> <div><input type="checkbox"/> Exclusive</div> | AM     |                     |                       |                    | B2                  | PL             |
| Insert model:                                                                                                |        |        |       | SIMULATOR PRICE DAP                                                                                                                                                                                                                  |        |                     |                       |                    |                     |                |
| <div>Show drawing</div> <div>Delete</div>                                                                    |        |        |       | <div></div> <div>(drawing)</div>                                                                                                                 |        |                     |                       |                    |                     |                |
| <div></div> <div>BA</div> |        |        |       |                                                                                                                                                                                                                                      |        |                     |                       |                    |                     |                |