# Pernalonga Recommendation System:
# Increasing Sales of Heineken Branded Products by Targeting Customers Who Currently Buy Super Bock Products

Group 3
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# Executive Summary

| Customer segment | Total customers targeted | Product id | Incremental volume | Incremental Revenue | Discount redeemed | ROI |
|---|---|---|---|---|---|---|
| Loyal customers | 205 | 999682638 | 586 | $487 | $139 | 3.5 |
| | | 999159921 | 3.5 | $67 | $27 | 2.5 |
| | | 999939106 | 56 | $58 | $10 | 5.8 |
| Cherry pickers | 110 | 999682638 | 828 | $689 | $293 | 2.4 |
| | | 999159921 | 24 | $458 | $184 | 2.5 |
| | | 999939106 | 8 | $8.6 | $3 | 2.7 |
| Middle of the road | 211 | 999682638 | 563 | $468 | $154 | 3.0 |
| | | 999159921 | 28 | $529 | $168 | 3.1 |
| | | 999939106 | 42 | $43 | $19 | 2.2 |
| Product wise total | | 999682638 | 1,977 | $1,644 | $586 | 2.8 |
| | | 999159921 | 56 | $1,054 | $379 | 2.8 |
| | | 999939106 | 106 | $110 | $32 | 3.4 |
| | | **Total** | **2138** | **$2807** | **$997** | **2.8** |
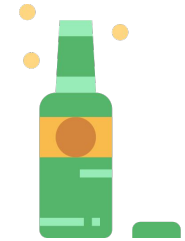
Heineken should promote their products to customers who buy SuperBock, since the purchase profile of majority of Super Bock users is similar to Heineken users.

# **Agenda**

- Business Context

- Data Exploration

- Similarity Measurement

- Naïve Bayes for Personalized Promotions
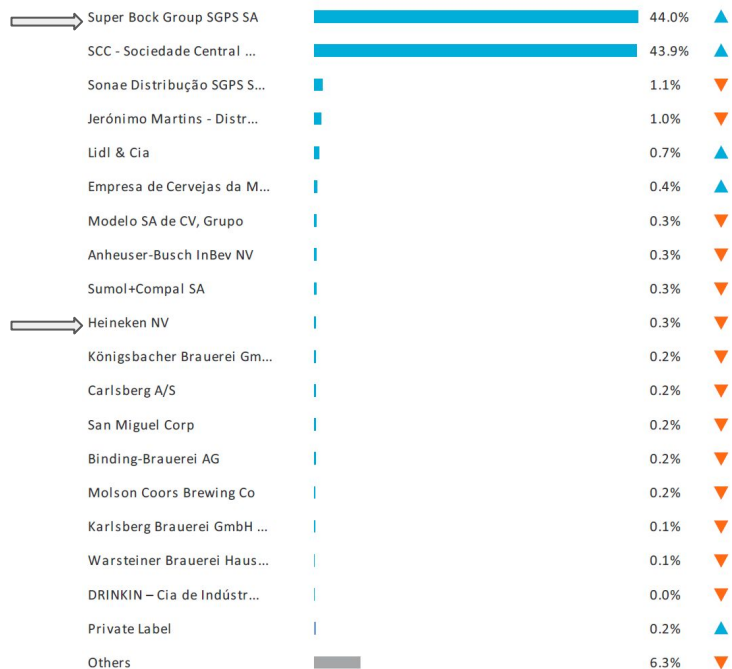
- Incremental Revenue Estimation

# Heineken has ~1% beer market share in Lunitunia and could improve with targeted promotions
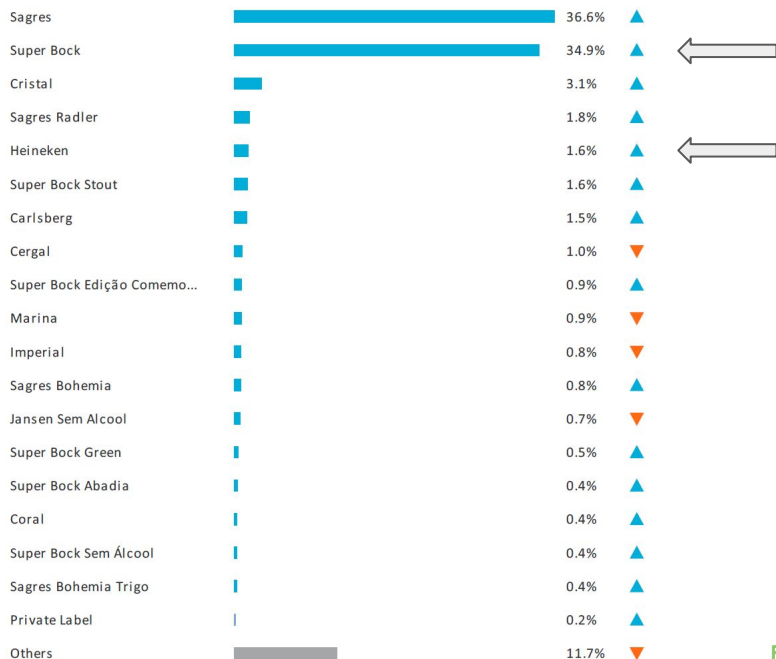
## Competitive Landscape

### Company Shares of Beer
% Share (NBO) - Total Volume - 2017

| Company | Share | Trend |
|---|---|---|
| Super Bock Group SGPS SA | 44.0% | ▲ |
| SCC - Sociedade Central ... | 43.9% | ▲ |
| Sonae Distribução SGPS S... | 1.1% | ▼ |
| Jerónimo Martins - Distr... | 1.0% | ▼ |
| Lidl & Cia | 0.7% | ▲ |
| Empresa de Cervejas da M... | 0.4% | ▲ |
| Modelo SA de CV, Grupo | 0.3% | ▼ |
| Anheuser-Busch InBev NV | 0.3% | ▼ |
| Sumol+Compal SA | 0.3% | ▼ |
| Heineken NV | 0.3% | ▼ |
| Königsbacher Brauerei Gm... | 0.2% | ▼ |
| Carlsberg A/S | 0.2% | ▼ |
| San Miguel Corp | 0.2% | ▼ |
| Binding-Brauerei AG | 0.2% | ▼ |
| Molson Coors Brewing Co | 0.2% | ▼ |
| Karlsberg Brauerei GmbH ... | 0.1% | ▼ |
| Warsteiner Brauerei Haus... | 0.1% | ▼ |
| DRINKIN – Cia de Indústr... | 0.0% | ▼ |
| Private Label | 0.2% | ▲ |
| Others | 6.3% | ▼ |

### Brand Shares of Beer
% Share (LBN) - Total Volume - 2017

| Brand | Share | Trend |
|---|---|---|
| Sagres | 36.6% | ▲ |
| Super Bock | 34.9% | ▲ |
| Cristal | 3.1% | ▲ |
| Sagres Radler | 1.8% | ▲ |
| Heineken | 1.6% | ▲ |
| Super Bock Stout | 1.6% | ▲ |
| Carlsberg | 1.5% | ▲ |
| Cergal | 1.0% | ▼ |
| Super Bock Edição Comemo... | 0.9% | ▲ |
| Marina | 0.9% | ▼ |
| Imperial | 0.8% | ▼ |
| Sagres Bohemia | 0.8% | ▲ |
| Jansen Sem Alcool | 0.7% | ▼ |
| Super Bock Green | 0.5% | ▲ |
| Super Bock Abadia | 0.4% | ▲ |
| Coral | 0.4% | ▲ |
| Super Bock Sem Álcool | 0.4% | ▲ |
| Sagres Bohemia Trigo | 0.4% | ▲ |
| Private Label | 0.2% | ▲ |
| Others | 11.7% | ▼ |

▲ Increasing share   ▼ Decreasing share   — No change

# Heineken sales were lagging SuperBock even though their products were cheaper

**Assumption:**

Three types of Heineken products are sold with median price listed

- Case ($18.99)
- Big single can ($1.03)
- Small single can ($0.83)

**Basic Profile Comparison:**

| Measures/Brand | Super Bock | Heineken |
|---|---|---|
| Total sales (rounded to nearest dollar) | $706,459 | $12,580 |
| Quantity (CT) | 310,597 | 8,594 |
| Total Customers | 6415 | 563 |
| Discount Frequency (% of transactions bought on sale) | 56.64% | 68.76% |
| Discount Amount ($ per sale) | $0.357 | $0.269 |
| Average Price | $2.27 | $1.46 |

**At Customer Segment Level:**

| Segment /Discount frequency | Super Bock | Heineken |
|---|---|---|
| Loyal customer | 38.56% | 59.44% |
| Cherry pickers | 73.59% | 74.69% |
| Middle of the road | 60.68% | 69.76% |

# Considering the rationality to recommend Heineken to latent customers who already bought Super Bock

- Target at the customers who already bought Super Bock without buying Heineken
- Compare the purchasing behaviors of those who bought Heineken brand products with the target customers
- Jaccard similarity score was applied to measure the similarity between two groups of customers
- Customers are identified to have similar tastes to the other group of customers with a Jaccard similarity of above 0.2

| Customer Cluster | Similarity score |
|:---:|:---:|
| 1 | 0.264 |
| 2 | 0.318 |
| 3 | 0.299 |

# Finding the "offer level" of each customer

- To make personalized offers to current Super Bock customers, we need to first understand how they currently buy beer
- Calculate the "offer level" of each customer to see their beer buying behavior
  - a customer's average discount percentage for all of their transactions involving Super Bock products

- The offer levels are grouped into 5% buckets (Bucket 1 is 0-5%, Bucket 2 is 5-10%, etc.)

| Cust_ID | SB quantity purchased | Discount Rate (when buying SB) | Offer level |
|---------|-----------------------|--------------------------------|-------------|
| 29568   | 2                     | 0.40040                        | 9           |
| 29909   | 14                    | 0.31825                        | 7           |
| 39774   | 5                     | 0.33872                        | 7           |
| 109693  | 122                   | 0.29765                        | 6           |
| 769883  | 780                   | 0.16296                        | 4           |

# Preparing for Naive Bayes by building the customers' profile

- The next step is to build the customer's profile and figure out whether they had bought Heineken in the past
  - It will enable the use of Naive Bayes
- The top 5 Super Bock's co-purchased brands/products are:
  - "Perecãvies Carne"(perishable meat)
  - "Mimosa" (milk)
  - "Compal" (soft drinks)
  - "Terra Nostra" (cheese)
  - "Activia" (yogurt)

# We implemented Naive Bayes conditional probability to find the probabilities of customers buying Heineken at various offer levels

- As we have P(Heineken), P(No Heineken) and customer profiles (**x**), we can now use conditional probability and Bayes Theorem to find P(H|**x**)

- We used the normal distribution to find the probability that a customer would buy an item given they bought Heineken

- The result is the probability displaying how likely each customer is to buy Heineken at their offer level

| cust_id | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 6079731 | 3.332757e-03 | NA | NA | NA | NA | NA | NA | NA |
| 6079933 | 9.821546e-02 | NA | NA | NA | NA | NA | NA | NA |
| 6099813 | NA | NA | NA | NA | NA | 0.004516611 | NA | NA |
| 6129636 | 2.566487e-01 | NA | NA | NA | NA | NA | NA | NA |
| 6149849 | NA | NA | 8.210519e-01 | NA | NA | NA | NA | NA |
| 6209836 | NA | NA | 6.132682e-01 | NA | NA | NA | NA | NA |
| 6209912 | NA | NA | NA | NA | NA | NA | NA | 0.0637939612 |
| 6239809 | NA | NA | NA | NA | NA | NA | NA | NA |
| 6259653 | NA | NA | NA | NA | NA | 9.369502e-02 | NA | NA |
| 6389560 | NA | 1.947313e-02 | NA | NA | NA | NA | NA | NA |
| 6409834 | 1.203745e-02 | NA | NA | NA | NA | NA | NA | NA |
| 6419953 | NA | NA | NA | NA | NA | NA | NA | 0.0152361766 |

# Finding targeted customers with personalized discount offer & Calculating ROI within each customer segment

| Select customers to offer personalized discount | Calculate incremental quantity | Calculate incremental revenue | Calculate ROI |
|---|---|---|---|

Target customers that show probability of purchasing Heineken products greater than **50%** with corresponding discount rate

For each customer and each type of Heineken product:

$$\text{Incremental Quantity of Heineken} = \text{Quantity of Super Bock this customer bought} \times \frac{\text{Quantity of one type of Heineken sold}}{\text{Quantity of Super Bock sold}}$$

*The ratio is calculated based on customers who have purchased both Heineken and Super Bock before

For each customer and each type of Heineken product:

$$\text{Incremental Revenue of Heineken} = \text{Incremental Quantity} \times \text{Median Product Price}$$

For each Heineken product:

$$ROI = \frac{\text{Total incremental revenue}}{\text{Total discount amount given}}$$

**Total incremental volume = 2,138**
**Total incremental revenue = $2,807**
**ROI = 2.8**

Thank you!
Questions?