

## Developing a product recommendation platform for real-time decisions in the direct sales environment

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### ABSTRACT

The applying product recommendation solutions for the final customer in e-commerce is already a known practice. By crossing consumer profile information with their behavior, the trend is to generate results that are more than satisfactory to the business.

Natura's challenge was to create the same kind of solution for its sales representatives (consultants) in a web platform developed for ordering. As these consultants are not buying for their own consumption, but to meet a demand from their customers, there is no information about the behavior and preferences of the final customer.

Through the creation of a shopping basket concept for its consultants, Natura can develop a new recommendation solution. For this, it created an algorithm using association analysis (Basket Market) and implemented this algorithm directly in the ordering platform through a real-time decision solution (RTD). The measurement of the application of this solution indicated that the inclusion of indicated products, when suggested is greater compared to a standard offer, besides increasing the volume of items and increasing the total request of the consultant Natura.

### INTRODUCTION

Founded in 1969, Natura is a 100% Brazilian cosmetics company present in 7 countries in Latin America and France, in addition to being present in 14 countries under the brand Aesop. In essence, it is a relationship company with a strong focus on sustainability, internationally recognized as the first publicly traded Latin American company to become B Corp, as well as composing the Dow Jones Sustainability Index (DJSI). With 2016 revenues of R\$ 10.9 billion (approximately US\$ 3.3 B), it has 7 thousand employees and offers about 1,500 different products at each sales cycle, grouped in more than 30 sub-brands.

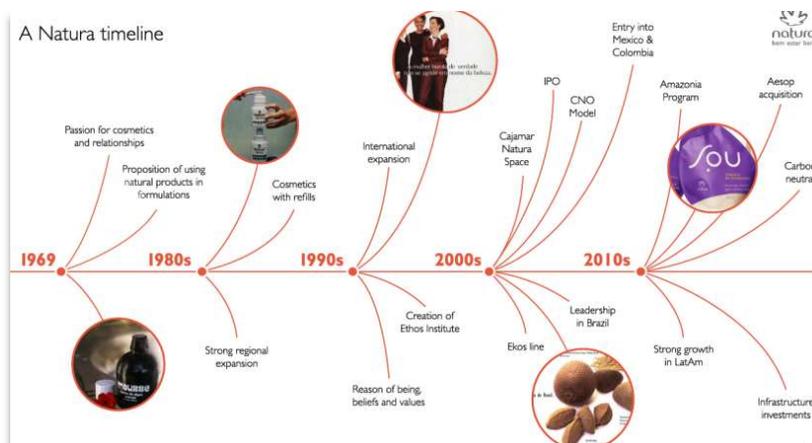


Figure 1. Main milestones in Natura's time.

It is the market leader in Brazil in cosmetics, fragrances and personal hygiene in direct sale. With revenues of R\$ 7.7 billion, it has 5,200 employees and serves 100% of the territory. It has a multichannel model in the country, with sales growth through electronic commerce and more recently, it started to operate in physical retail, with openings of its own stores. However, Natura's main commercial model is direct sales, which represent 98% of the country's revenue. Its sales force is made up of more than 1.3

million representatives (CNs - Natura Consultants), distributed in eight major regions. The period in which commercial stimuli take place, such as offers, promotions, trainings and launches are called Cycles and have an average duration of 21 days. For each cycle, Natura makes available a printed catalog (Espaço Natura).



Figure 2. An example of the printed catalog

With the availability of the catalog, consultants come to know the offers, capture the demand of their network of end customers, and take advantage of the promotions to create their personal stocks. With aggregate demand that meets the volume requirement for an order, the consultant accesses a web platform, very similar to an e-commerce site, where she makes her request (Capta).

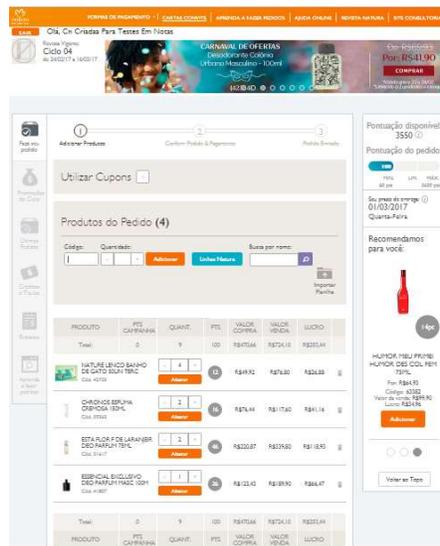


Figure 3 – Capta main screen.

Capta underwent a redesign, so that it had an experience of use closer to an e-commerce site, facilitating the insertion of requests by the consultant. In this reformulation, a lateral space has been made available to make available up to three offers (which are viewed in sequence).

With the availability of this web platform, the challenge was to create and make available product suggestions for visualization of the consultants, related to their purchasing profile, thus reflecting the profile of their customers, mainly seeking the increase in sales of products without discounts.

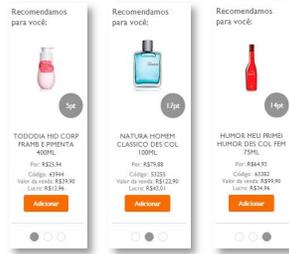


Figure 4. Examples of offers in Capta.

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## DEVELOPED SOLUTION

### NBO ALGORITHM – NEXT BEST OFFER

In order to meet this goal, the Commercial Modeling team developed an algorithm through Basket Analysis, using SAS Enterprise Miner and SAS Enterprise Guide. For this, some concepts and premises were defined:

- **Basket of products:** As a consultant attends a set of customers, who do not have recurrence of purchase every cycle, it was defined that all items purchased in the last 4 cycles would compose the shopping basket of each consultant. This criterion is based on the tacit knowledge that the consultant takes at least 4 cycles to meet all the people who could buy an item.
- **CNs segmentation:** The purchasing profile of each consultant also differs, so a division was made considering the region that the consultant was interested in, the value of their requests and the lifetime, seeking the best adherence of the algorithm. Using this analysis, the consultants were divided into 12 segments, considering:
  - 2 regional divisions, grouping more similar regions in relation to the participation of each category of product;
  - 3 divisions by level of purchase (high, medium and low);
  - 2 divisions by the lifetime (more or less than 8 years);

For each of the 12 segments the analysis of association in the baskets of the consultants belonging to that group is carried out. The result of this analysis are the four basic measures of association, assuming A and B two distinct products.

- ✓ **Support:** Defined as the probability of occurring A and B together;
- ✓ **Confidence:** It is the measure of how reliable this rule represents the probability of buying B, since there was the purchase of A;
- ✓ **Expected Confidence:** It is the probability of acquiring B, considering it not dependent on the purchase of A, representing the probability of occurring the consequent action independent of the other actions;
- ✓ **Lift:** It measures the likelihood of the rule, that is, the increase in the chances of the customer making the purchase of B, since he made the purchase of A, in relation to an independent event.

SEGMENTO	ITEM_A	ITEM_B	SUPPORT	CONF	EXP_CONF	LIFT	PROFIT	COUNT	RULE
111	6417	6435	0.60	18.48	4.61	4.01	0.7989409269	141.00	6417 ==> 6435
111	6435	30459	1.80	39.11	2.30	16.97	1.6012299983	422.00	6435 ==> 30459
111	6435	9959	0.50	10.75	1.35	7.95	0.2480350434	116.00	6435 ==> 9959
111	6435	9961	0.73	15.85	2.64	6.01	1.1545555911	171.00	6435 ==> 9961
111	6435	30454	0.57	12.42	2.51	4.95	0.7004542458	134.00	6435 ==> 30454
111	6435	6417	0.60	13.07	3.26	4.01	1.8615963035	141.00	6435 ==> 6417
111	6435	65078	0.56	12.14	6.45	1.88	0.9432739873	131.00	6435 ==> 65078
111	6435	26389	0.62	13.53	7.54	1.79	0.6657035804	146.00	6435 ==> 26389
111	6435	62521	0.55	12.05	8.98	1.34	0.6147040703	130.00	6435 ==> 62521
111	8182	8188	1.14	27.02	2.37	11.39	1.4332088524	267.00	8182 ==> 8188
111	8182	50118	0.67	15.99	1.80	8.88	0.7051383835	158.00	8182 ==> 50118
111	8184	8188	0.51	57.21	2.37	24.11	3.0341621866	119.00	8184 ==> 8188
111	8188	8184	0.51	21.40	0.89	24.11	1.0611677656	119.00	8188 ==> 8184
111	8188	29923	0.48	20.14	0.88	22.91	0.9087290317	112.00	8188 ==> 29923
111	8188	37830	0.50	21.04	1.15	18.26	1.3033347377	117.00	8188 ==> 37830

Table 1. Indicators of association between products

According to this table, for the segment 111, 60% of baskets that have product 6417 also have product 6435. The probability to acquire the product 6435 is 4,6% while the probability to purchase the 6435 once the product 6417 was acquired is 18,5%, with 4,01 of lift.

With this result of association between products, two main results are used. By maintaining relationships with a degree of association above a lift level defined as strong, it is possible to create indication of additional products from the products included in the consultant's request.

However, for the moment that the consultant connects to the Capta and has not included any product, an initial list of items is necessary. For this, it is checked for each consultant which items are in your basket for the last 4 cycles and which products are most strongly related to those items but which were not purchased recently. The result is a list of products indicated for each consultant, which can be ordered according to the expected profit for the acquisition of the product.

*Profit = probability of including product x revenue generated*

CD_CONS_	ITEM_B	DESC_ITEM_B	PROFIT
86	63938	TODODIA SAB BARRA MACADAMIA 5X90G PRC	2.1894103403
86	63937	TODODIA SAB BARRA ALGODAO 5X90G PRC	1.5179114599
86	63939	TODODIA SAB BARRA ALECR E SALV 5X90G PRC	1.2825195931
86	63940	TODODIA SAB BARRA ORQUIDEA 5X90G PRC	1.0490642954
86	62521	TODODIA SAB BARRA SORTIDOS 6UN PRC	1.0227804214
86	63990	TODODIA SAB BARRA FRUT VERME 5X90G PRC	0.9670892365
86	63030	EKOS MULTIPACK CRM ESF CRM 4X100G APC	0.9252282379
86	64250	TODODIA SAB BARRA NOZ PEC E KAR 5X90G	0.746128977
329	64011	SOU HID DES CORP PE EX SECA 200ML REPACK	1.05167097
450	63937	TODODIA SAB BARRA ALGODAO 5X90G PRC	2.3565976461
450	56948	KAIK MASC DEO CORPORAL RF	1.8334188175
450	63940	TODODIA SAB BARRA ORQUIDEA 5X90G PRC	1.4398559084

Table 2. Example of NBO output– Consultants and recommended products

In order for these results to be used in Capta, it was necessary to create a technological solution of availability. This is to verify, at the time of the consultant's connection, which products would initially be listed in the space for nominations and, when items in your order were included, what were the items most related to these inserts, to change the indications made available.

## REAL TIME DECISION - RTD

The option was to use the SAS Real Time Decision Manager solution, integrating the Basket Market Analysis exits to Capta to manage what it offers as an indication for each consultant, as well as to adapt to the business premises and control the results, allowing the measurement of the adopted rules.

Through the adopted solution, it was possible to integrate the NBO outputs with transactional data, inventory information and cadastral data of the consultant, all in a cloud-computing environment with the availability of the web service.

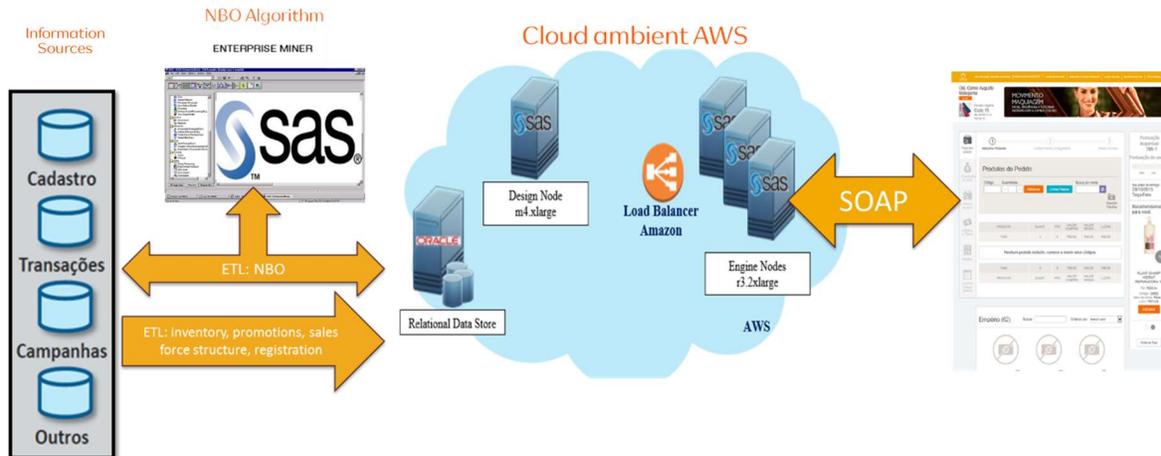


Figure 5. Solution architecture.

Calls to the service take place both at the consultant's login and throughout the interactions at Capta. The built decision flow considers information from the consultant (registration), information about the cycle for the sales force structure for the consultant, which is the commercial region and the products in their request. This identifies the best recommendations of the algorithm. Before displaying the recommendations for the CN, the RTD performs some verifications:

- If the recommended product is not promotional;
- If it is not part of a kit (package with several products of the same brand or category);
- If there is stock availability;
- If the product has already been included in the currently order.

## PRODUCTION IMPLANTATION

The algorithm was put into production, being updated at all times when a business cycle is ended, adding a point to the transactional history. With this, every association rule is re-evaluated and a new output is generated. This output feeds the RTD environment, which manages the rules and makes the suggestions available. For this flow, suggestions for products that did not originate from the NBO were considered for a part of the consultants, in order to measure the effectiveness of the model.

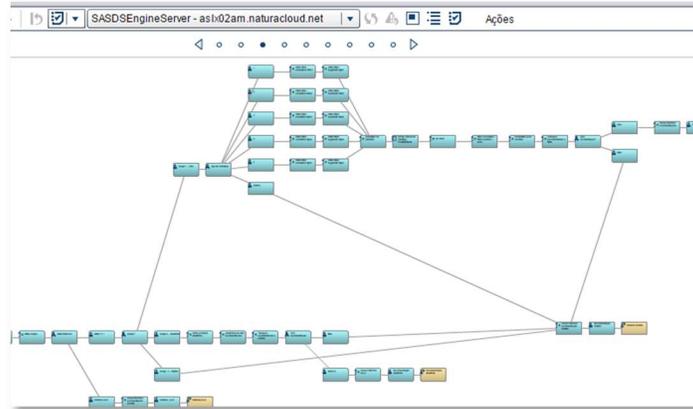


Figure 6. Example of decision flow.

## RESULTS

Applying the flow in the last cycle of 2016 (201618) and in the first cycle of 2017 (201701), a comparison was made dividing the consultants into two groups:

- **Group 1:** Received product offers not from the NBO (Standard offer);
- **Group 2:** Received offers as indicated by the NBO;

The following indicators were evaluated:

- **Conversion** - Percentage of CNs that included the item suggested in your order.
- **Added items** - Average amount of items, by volume, added by suggestion;
- **Average basket** - Total average value of the requests, in points, of the consultants. In addition to the price, to each Natura product is assigned a value in Points as an index that allows the comparison over time and the amount of purchase of a consultant, eliminating the effect of discounts and promotions.

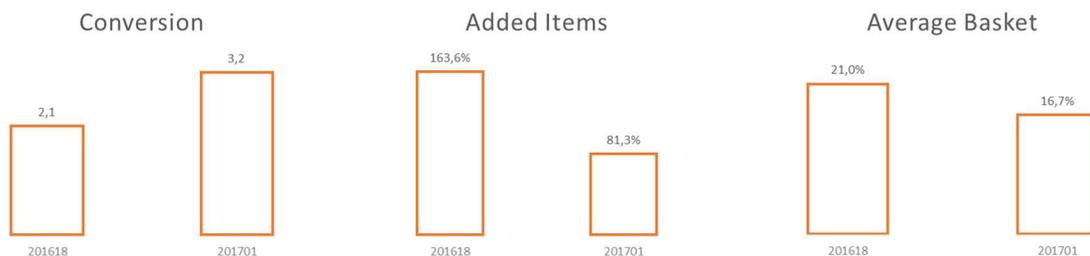


Figure 7. Results graphs of the increasing evaluated.

The conversion measured for the group that received the offer from NBO was 3,2 times greater than the group that received standard offer at cycle 201701. At cycle 201618 this increasing was 2,1 times higher.

The increase of the volume of items added using the offer from NBO was 163% higher at cycle 201618 and 81% at cycle 201701 comparing with the group 2. These increments reflect in the average basket. The value of requests to CNs from group 1 was 21% higher to cycle 201618 and this increase was 17% at cycle 201701.

## CONCLUSION

The recorded results show that the implanted solution has successfully met the intended objectives with success. Considering the consultants according to their profile, analyzing the buying behavior of the groups and replicating the results individually, it was possible to generate offers that brought significant gains in the consultant's orders. It should be noted that these increases are generated in purchases of products that do not have price discount in the commercial cycle, which adds a healthier financial value to the company.

## EVOLUTION

In addition to what was already implemented, a new stage of the algorithm is being developed, with the application of optimization models through SAS Marketing Optimization, where it will be possible to list the suggestions for the best combination that brings the desired result, respecting the restrictions of each period. Besides that, with the multichannel context Natura has a set of opportunities to complement the information about the behavior of the final client and implement similar solutions for the others sales channels.

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