

## **Tool 15. A/B testing: Product testing**

This tool seeks to publicize what A / B testing is, how to calculate it and why it is key in the design of products and services. It presents a high level of complexity, and its management requires advanced knowledge of Power BI and knowledge of statistics.

✓ **Tool 12. Data analytics for my company, from lens 3, is an introduction to data analysis or data analytics.**

This guide explains what A / B testing is and why it is key when designing products and services with a gender perspective. The tool is explained on two levels: a first general level, with the aim of guiding product design teams to understand the relevance of this tool in the design phases; and a second specific level, with the purpose of guiding those who occupy technical positions in the step-by-step application of these tests. For the technical profile it is necessary to have knowledge of inferential statistics and advanced use of Power BI.

Growing or consolidated companies that are designing new products or services are challenged to know which changes or innovations are the ones that have the best results for their customers. For this case, being able to implement A / B testing in the design process of those products or services can provide concrete evidence about what works best and for whom. There are women and girls who do not have access to various products and services and many companies are designing new value propositions in order to reduce gender gaps. In such a way that when introducing products and services to customer profiles who were not previously accessing them, it is key to be able to verify what works best in order to reach more people.

### **Tool benefits**

Using A / B tests with the parameterization of relevant / interest variables such as sociodemographic variables is a key aspect if products or services are being designed with a gender perspective. This is because it allows to quickly know the level of response to the design or the way of communicating a product or service based on the sex and age of the clients.

A / B tests are particularly useful if the company designs products that are sold online or provides services on web platforms, since they are quick to implement and the benefits of carrying out this test are visible in the short term.

In terms of the gender approach, it is key to be able to design products or services that are tailored to the people we want to reach. For example, if we are designing a new product or service aimed at women and we want to verify which communicational message works best in terms of sales conversion, then performing an A / B test will allow us to test different messages and select the one that worked best with the profile of desired women. Another ideal situation to

use these tests is when it is known that some products or services are not reaching the profile of women who are wanted to be considered. In this case, a test can be designed that compares the performance of different messages or characteristics in both men and women, and then compares which ones work better in each group.

As postulated by the gender approach, people are not a homogeneous group. Women and men have different needs, perceptions and realities. For this reason, A / B tests allow the design of products or services that adapt to the various characteristics of both groups.

### What are A / B tests?

It is known as A / B testing or A / B testing, the creation of two (or more) versions of a product or service to determine which of them best meets the objectives that have been set. It is widely used for the development of web pages and applications, where communication messages, page layout, the inclusion or not of certain elements can improve the achievement of objectives.

In an A / B test, content “A” is randomly shown to half of the users and content “B” to the other half, to then measure and analyze the results of each one of them based on certain variables, such as conversion, engagement and / or rebound.

In the web application development environment, A / B testing is commonly used when the objective is to:

- **Dispense valuable information about what people prefer.** The first goal of A / B testing is to find out what users prefer. That is, what type of elements or messages make them more likely to click on an ad, become potential customers, make a purchase or stay on a website. In terms of the gender approach, it is used to verify if there are preferences based on the sex of the people for the different elements or messages to be piloted.
- **Increase the conversion rate.** A / B testing is one of the main tools of the CRO or Conversion Rate Optimization, which refers to a series of systematic improvements so that a content generates more leads, subscriptions, conversions, clicks, etc. In terms of the gender approach, the obstacles that prevent women and girls from having full access to the products and services offered can be identified. From this analysis, it is possible to compare what changes should be introduced to a sales, communication or positioning process to generate greater arrival or loyalty to the product / service among women.
- **Improve the user experience.** Finally, A / B tests allow us to perfect the content that we offer to those who visit us so that their user experience is more and more personalized and according to their expectations and needs. In terms of the gender approach, it is possible to compare what changes should be made to the value proposition to generate higher levels of satisfaction among women.

The following table explains in a conceptual way three examples of design and pilot of products with a gender perspective in which the use of A / B tests is key.

Table 1. Cases of application of A / B tests with a gender perspective

| Sector Theme                  | Health  | Education  | Finance  |
|-------------------------------|---|--|--|
| <b>Context</b>                | A company has a product aimed at managing feminine hygiene that has proven benefits on women's autonomy, is environmentally friendly, and is cheaper than other commonly used alternatives. The company offers the product in different cities of a country.  | A company offers programming training courses to people aged 18 and over. The only requirement to enroll is to have completed middle school (secondary level). The proportion of women enrolled in the courses is considerably lower than that of men. They want to expand the scope of the courses by getting more women to enroll and thus reduce the gender gap in their courses.   | A company offers loans to companies. He has noted that the proportion of organizations led by women applying for credit is lower than those led by men. She wants to expand the scope of her loans and reach more businesses led by women. After several attempts to promote products aimed at businesswomen, it has not been able to increase the proportion of women applying for loans, at the same time that official data from the country where the product is offered indicates that there is an unsatisfied demand for credit. |
| <b>Challenge</b>              | The product has been successfully incorporated in some cities, however, the company faces challenges in successfully inserting the product in other cities with a different demographic context. The company needs to implement a communication campaign about the benefits of the product and wants to verify which messages are the ones that best convey the benefits of the product to women. | Get a higher proportion of women to enroll in its programming courses. The company has launched several ads targeting young women, but has failed to improve enrollment rates. She has decided to make an alliance with a social organization that has proposed working with reference models: cases of successful women who managed to develop their professional careers in programming. These types of campaigns have been developed successfully in other countries and the organization wants to verify what type of model they should choose to achieve higher enrollments in the country where it offers the courses. | Design a product that is attractive enough geared towards the needs of these women. In such a way that the businesswomen request it and grow their business.   |
| <b>Why use an A / B test?</b> | The company can use A / B tests to test multiple communicational messages simultaneously and select the one that obtains the best receptivity among women in  | The company can use A / B testing to test various benchmarks and see which women they target have the most empathy and drive the most enrollments.   | Two products have been designed with minimal differences in terms of payment conditions and flexibility. They want to test which one is the most attractive to businesswomen   |

|                                     |  |   |   |
|-------------------------------------|--|---|---|
|                                     | the cities where the product is to be inserted.  |   | before launching a massive nationwide campaign.   |
| <b>How to design the experiment</b> | <p>At least two messages must be defined to be tested. It can be more than two messages and the test will compare multiple cases at the same time. You must select a sample of women on whom to do the communication experiment. It is important that the sample is representative of the population of women in the cities where the product is to be inserted. Then demographic information that characterizes the women participating in the experiment should be recorded. It is important to be able to interpret the results. You must define the variable on which you want to measure the effect of the message. For example, we could define that the message is displayed on the web together with a button that invites you to explore more about the product. You could define the number of clicks on that button as a target variable. The women in the sample to whom the messages are shown are randomly selected.</p> | <p>The reference models on which to carry out the experiment must be defined. Where and how the promotional campaigns for the courses based on the models should be designed. If they are disseminated in the later years of middle schools, a random selection should be made of the schools where the campaign is going to be introduced and make sure that the people who attend the schools are representative of the population of women to whom you want to offer them. the courses. The objective variable on which to measure the effect of the experiment must be defined. In this case it may be the number of registrations per school. For this, it is key that when the registration information is recorded, information is obtained from the schools and thus validated which reference model of the experiment was the one they saw. Likewise, it is key that demographic information is recorded on those who enroll in order to interpret the results based on that data.</p> | <p>The A / B test allows the company to verify which of the two products generate the largest credit applications. You can verify this before launching the campaign to promote your credits nationwide and thus be able to make sure that they will offer the product that best suits the needs of your potential clients.</p>   |
| <b>How to use the results</b>       | <p>After running the experiment, we are going to analyze with which message the most clicks were obtained on the button to explore more about the product. In addition, the women who clicked the most on one message versus the other should be demographically characterized. This is necessary to interpret the results with greater context. As the experiment was applied on a sample, we will use the selected message to scale it to the entire population of women targeted by the communication campaign.</p>   | <p>The experiment may end with a higher percentage of female enrollments in some schools versus others. It is key to interpret the results knowing the sociodemographic characteristics of the people who attend the schools.</p>   | <p>The two products offered must be clearly defined. They must be aimed at the same client profile, so that the comparison of A / B tests is valid. The objective variable of the experiment must be defined, in this case it may be the loan application. If the experiment is carried out in a web campaign, it is decisive that the product offered to each person is recorded, along with their sociodemographic characteristics, such as sex, age, level of education of the person requesting the loan, as well as some characteristics basic organization, such as productive sector, size and seniority. The allocation of products to offer in the</p> |

|  |  |  |   |
|--|--|--|---|
|  |  |  | experiment must be random, that is, each person who sees the message has the same probability of seeing either of the two messages. The experiment must ensure that the products were offered to similar profiles of women and companies. |
|--|--|--|---|

### Example of the technical calculation of the A / B test

The following explains how the calculations are performed in order to verify the results of an A / B test. The video explains step by step how to do the A / B experiment calculation using Power BI. For this, it is recommended that those who carry out the technical exercise have advanced knowledge of Power BI and knowledge of inferential statistics.

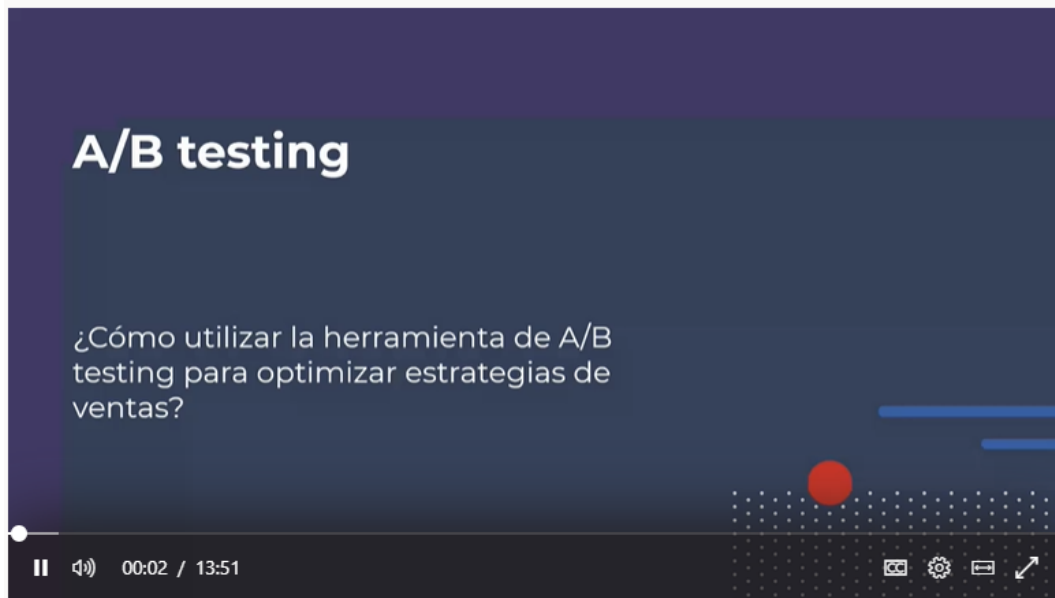
To simplify the explanation, the case of an advertising campaign via Facebook is used. You are going to promote a product from the catalog and, before launching the campaign, you want to pilot which content is the one that will generate the most conversions (clicks on the buy button). To do this, they design an A / B test, where they will show an advertisement for their product to a group of users and another advertisement to another group. The selection of which advertisement to show to each user is random, that is, each one has a 50% probability of seeing either of the two advertisements to be piloted.

#### Video-tutorial (in Spanish)

In the following links you can see a tutorial that explains step by step how to perform an A / B test using Power BI:

- Part I
- <https://www.youtube.com/watch?v=iNmPyD7abxo>
- Part II

- <https://www.youtube.com/watch?v=sUKPYhRrgCE>

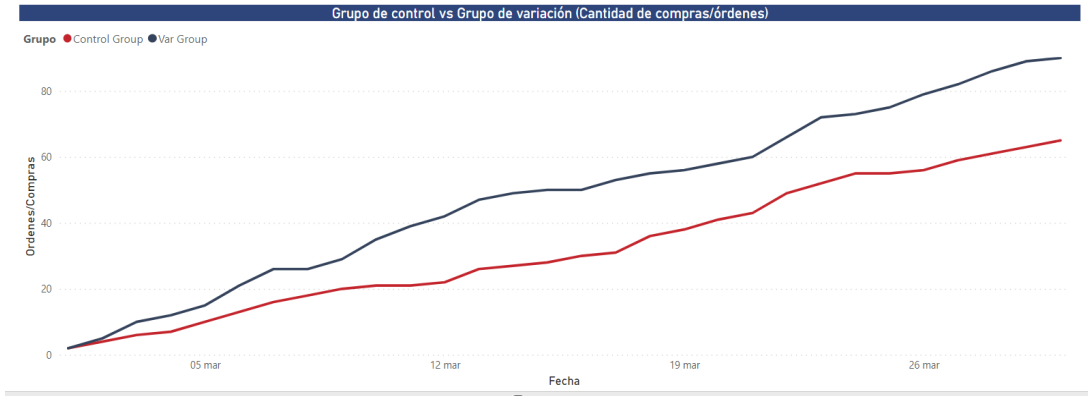


Board used in the video tutorial:

**Test A/B para evaluar estrategia publicitaria**

| Grupo         | N vistas    | N Ordenes  | Conversion % | Error Estándar | Conversion Rate Max | Conversion Rate Min |
|---------------|-------------|------------|--------------|----------------|---------------------|---------------------|
| Control Group | 3036        | 65         | 2,14%        | 0,26%          | 2,66%               | 1,63%               |
| Var Group     | 3142        | 90         | 2,86%        | 0,30%          | 3,45%               | 2,28%               |
| <b>Total</b>  | <b>6178</b> | <b>155</b> | <b>2,51%</b> | <b>0,29%</b>   | <b>2,90%</b>        | <b>2,12%</b>        |

|                        |                                   |                       |
|------------------------|-----------------------------------|-----------------------|
| <b>0,03</b><br>P-value | <b>0,97</b><br>Nivel de Confianza | <b>0,34</b><br>Uplift |
|------------------------|-----------------------------------|-----------------------|



To access the dashboard:

<https://app.powerbi.com/view?r=eyJrljoiZTY5ODU5NzEtZjQ1Mi00YmNjLTgyZGYtNjU4NWM4ZmQ4MG10IiwidCI6IjRmYW5MTAxLWRIOWItNGI4Ny1iZDQ2LTA2OTYyNDk5MTRhYSJ9>

**Steps for the implementation of A / B testing in the design of products / services**

Here is the code to be able to perform an A / B testing in Power BI:

## Databases

In the following link you can access the databases used in the example:

[https://docs.google.com/spreadsheets/d/e/2PACX-1vQQWBcYKD\\_aY3mqRY9nnO4yYKtp9A-PSrAllkiUVy13JiYxIP9ueKNlqDpYkDZX0Sm8K4OmPQ3l2\\_al/pub?output=xlsx](https://docs.google.com/spreadsheets/d/e/2PACX-1vQQWBcYKD_aY3mqRY9nnO4yYKtp9A-PSrAllkiUVy13JiYxIP9ueKNlqDpYkDZX0Sm8K4OmPQ3l2_al/pub?output=xlsx)

- **Calculation of the number of orders (purchases)**

*Nb Order = calculate(COUNTROWS(AB\_testing),AB\_testing[IsConvert]=1)*

- **Calculation of the number of views (visits)**

*Nb Views = countrows(AB\_testing)*

- **Calculation of the conversion rate**

*conversion% = AVERAGE(AB\_testing[IsConvert])*

- **Calculation of the conversion rate per group**

*Ctrl Group Conversion % =*

*CALCULATE (  
    [conversion%],  
    AB\_testing[test\_assignment] = "Control Group"  
)*

*Var Group Conversion % =*

*CALCULATE (  
    [conversion%],  
    AB\_testing[test\_assignment] = "Var Group"  
)*

- **Calculation of the standard error**

*std\_Error = SQRT ( ( [conversion%] \* ( 1 - [conversion%] ) / [Nb Views] ) )*

- **Calculation of the standard error for each group**

*Ctrl SE =*

*CALCULATE (  
    [std\_Error],  
    AB\_testing[test\_assignment] = "Control Group"  
)*

*VAR SE =*

*CALCULATE (  
    [std\_Error],  
    AB\_testing[test\_assignment] = "Var Group"  
)*

- **Calculation of the confidence interval**

*Conversion Rate Max =*

*[conversion%  
    + [std\_Error] \* 1.96*

*Conversion Rate Min =*

*[conversion%  
    - [std\_Error] \* 1.96*

- **Calculation of the z-score**

Z Score =  
 VAR ctrl\_Conv = [Ctrl Group Conversion %]  
 VAR test\_Conv = [Var Group Conversion %]  
 VAR ctrl\_SE = [Ctrl SE]  
 VAR test\_SE = [Var SE]  
 RETURN  
 ( test\_Conv - ctrl\_Conv )  
 / SQRT ( POWER ( ctrl\_SE, 2 ) + POWER ( test\_SE, 2 ) )

- **Calculation of the uplift**

Var vs Ctrl % Diff =  
 DIVIDE ( [Var Group Conversion %], [Ctrl Group Conversion %] ) - 1

- **Calculation of the p-value and the confidence level**

P-value = 1 - ABS ( NORM.DIST ( [Z Score], 0, 1, TRUE ) )  
 Nivel de C = 1- [P-value]

- **Calculation of accumulated orders / purchases**

Cumulative Orders =  
 CALCULATE (  
 [nb Order],  
 FILTER (  
 ALL (AB\_testing[EventDate]),  
 AB\_testing[EventDate]<= MAX ( AB\_testing[EventDate])  
 )  
 )

## Resources

Presentation about A / B testing:

[https://docs.google.com/presentation/d/17aiYgngCfmaMqm69AgF5ErN2O\\_tkLuZzMQD8LIF-MG0/edit?usp=sharing](https://docs.google.com/presentation/d/17aiYgngCfmaMqm69AgF5ErN2O_tkLuZzMQD8LIF-MG0/edit?usp=sharing)

AB Tasty. The AB testing guide

[https://www.abtasty.com/es/ab-testing/?creative=262961936353&keyword=a%2Fb%20tests&matchtype=p&network=g&device=c&qclid=CjwKCAiAu\\_LqBRBdEiwAkovNsGdfmOdcsWfHYxEpxZio-T5lKzdLVvt6PIZBRePE1SLOj8eGtiEz8RoCPJwQAvD\\_BwE](https://www.abtasty.com/es/ab-testing/?creative=262961936353&keyword=a%2Fb%20tests&matchtype=p&network=g&device=c&qclid=CjwKCAiAu_LqBRBdEiwAkovNsGdfmOdcsWfHYxEpxZio-T5lKzdLVvt6PIZBRePE1SLOj8eGtiEz8RoCPJwQAvD_BwE)

Optimizely. Otipedia – Optimization Glossary. A/B Testing:

<https://www.optimizely.com/optimization-glossary/ab-testing/>

Standard normal table:

[https://en.wikipedia.org/wiki/Standard\\_normal\\_table](https://en.wikipedia.org/wiki/Standard_normal_table)

**Google Optimize**

<https://marketingplatform.google.com/intl/es/about/optimize/>



In case of A / B tests on a web page, Google has a free product called Optimize, which is part of the Marketing platform for companies. With Google Optimize, A / B tests can be designed without the need for advanced statistical knowledge as other tools do.

For example, if an organization has designed a shopping cart for its products on a website and would like to test which sales messages generate the most purchases, then it can test various messages using this tool. The main advantages of using this tool is that it allows you to configure the entire A / B test from one place and the results are generated automatically with the Google tool.

The statistical knowledge required to use the tool is minimal and is only required to analyze the results, since Google Optimize performs the calculations automatically. Also, there is no need to design and host two web pages in parallel. From the tool itself you can edit the site and Google takes care of showing the different versions randomly to the different users.