

A Cooperative Approach To Product Optimization

Investigating the Single Ideal Assumption Using Ideal Profile Method

WORCH Thierry¹, & ENNIS John²

1: OP&P Product Research, Utrecht, The Netherlands

2: The Institute For Perception, Richmond, Virginia, USA

Corresponding author: thierry@opp.nl

INTRODUCTION:

- Consumers are the final judges of product success: understanding what is important for them is primordial for product developers.
- With this in mind, many methodologies combining product descriptions and liking data have been developed (PrefMap, LSA, Unfolding, etc.).
- Some of these methodologies consider that consumers use internal ideals in their hedonic evaluation of products and try to estimate these ideals.
- However, the calculation procedure is often done under the assumption that consumers have one unique ideal.

OBJECTIVES:

- To propose a methodology using the Ideal Profile Method to check the unique ideal assumption.
- To give an example illustrating the methodology and showing how to use conjointly the IPM with other methodologies.

The IDEAL PROFILE METHOD (IPM) [1]

- Profiling techniques performed with consumers;
- The consumers is asked to rate both the perceived and ideal intensity for each product on a list of attributes.
- The consumers also rate the products on overall liking.
- At the end of the test, consumers provides the **sensory profiles** of the products (*what they perceive*), their **ideal profiles** (*what they want*) and their **hedonic ratings** (*what they like*).

SINGLE vs. MULTIPLE IDEAL PROCEDURE [2]

1. Create the **product space** by PCA on the averaged sensory profiles;
2. Project the **averaged ideal profiles** of each product (*i.e.* one ideal per product)
Note: such ideals are meaningless and are only used to find a systematic shift across consumers in their ideal ratings
3. Use the **consumer variability** to create **confidence ellipses** around each ideal product by using partial bootstrap technique.
4. Perform the **Hotelling T²** test to find significance differences between the ideal products

DATASET USED FOR ILLUSTRATION

The dataset used for illustration concerns 77 Dutch consumers who tested 8 different coffees according to the IPM.

They were asked to rate the products on both perceived and ideal intensity on a list of 16 attributes.

They also rate the products on overall liking.

DECISION RULES:

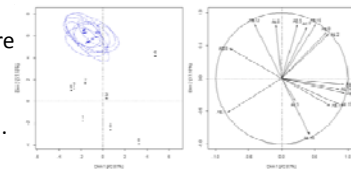
If confidence ellipses overlap, it usually means that the products are not significantly different at the 5% level.

Since the differences might be highlighted on further dimensions, the Hotelling T² test is performed to confirm/refute the results.

The interpretation of the result involves a good knowledge of the products as well as some objectivity from the user.

RESULTS: 1ST IMPRESSION

On the first two dimensions, it seems that all the ellipses are overlapping, meaning that the consumers associated the products to a unique ideal.



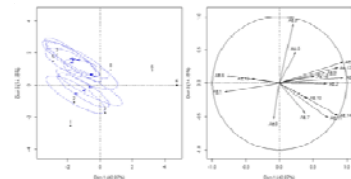
RESULTS: HOTELLING T² TEST

	1	2	3	4	5	6	7	8
1	1,000							
2	0,656	1,000						
3	0,163	0,736	1,000					
4	0,003	0,045	0,316	1,000				
5	0,003	0,017	0,070	0,401	1,000			
6	0,000	0,001	0,005	0,098	0,382	1,000		
7	0,001	0,004	0,024	0,327	0,854	0,760	1,000	
8	0,000	0,001	0,007	0,203	0,857	0,742	0,997	1,000

The Hotelling T² test shows that the products 1, 2 and 3 are significantly different from the others.

RESULTS 3: EXPLORING FURTHER DIMENSIONS

Investigating the ideal space on the third dimensions highlights differences between the products.



RESULTS 4: CONFIRMATION WITH TUKEY TEST

ANOVA with Tukey test confirms these differences for the attributes considered (Attr 3, Attr 5 and Attr 8).

	1	2	3	4	5	6	7	8
Id_Attr3	56.12 ^a	56.14 ^a	56.53 ^{bc}	56.19 ^a	58.23 ^{abc}	60.08 ^{ab}	61.34 ^a	61.03 ^a
Id_Attr5	46.72 ^{ab}	48.9 ^{ab}	49.24 ^{ab}	50.87 ^a	52.23 ^a	51.58 ^a	51.93 ^a	50.76 ^a
Id_Attr8	60.61 ^a	60.18 ^a	59.68 ^{ab}	57.62 ^{ab}	57.9 ^{ab}	56.31 ^b	57.64 ^{ab}	57.74 ^{ab}

The attribute associated to the same letter are not significantly different at 5%

CONCLUSIONS:

In this example, one could conclude that the consumers associated the product set tested with two different ideals. The optimization procedure should hence involve two different ideals, one for the products 1, 2 and 3 and one for the rest of the products.

GENERAL CONCLUSIONS:

The interpretation of the results implies part of objectivity and a good knowledge concerning the products. Moreover, one should be aware that when multiple ideals are considered, the dataset is separated in subgroups: such procedure should not alter the quality by unbalancing the design. For large homogeneous groups of products (*i.e.* associated to a unique ideal) the optimisation can be done using LSA. For smaller homogeneous groups, PLS on dummy variables or Fishbone method would be more suitable. Direct differences between the profiles of the products and the profiles of the ideal of reference can also be considered.

References:

- [1] Worch, T., Lê, S., Punter, P., & Pagès, J. (2012). The Ideal Profile Method (IPM): the ins and outs. *Food Quality and Preference*, in press.
- [2] Worch, T., & Ennis, J. M. (2012). Investigating the single ideal assumption using Ideal Profile Method. *Food Quality and Preference*, submitted.