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Abstract

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Keywords

market segmentation, positioning, market structure analysis, competition

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Abstract

Perceptions based market segmentation (PBMS) is a simple framework for market structure analysis integrating the issues of segmentation and positioning. The only requirement is the availability of three-way data (numerous respondents evaluate numerous brands according to numerous attributes). The implicit consideration of interrelations between positioning and segmentation prevents unharmonized strategic marketing decisions and enables managers with clear strategic goals to analyze market information in depth and arrive at a profound basis for segmentation and positioning decisions. In this study, PBMS is applied to deodorant data. The simultaneous treatment of all three data dimensions enables insights into deodorant brand images (among men) that go far beyond analysis of average perceptions for each brand over all respondents.

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Why PBMS?

How are brands perceived? Are brands subject to competition (and in what ways)? Are brands associated with a unique selling proposition? Which target segments are best for marketing action? These and other questions are typical for strategic marketing work. But they oversimplify the problem when isolated from each other. Further questions arise (Is there only one way of perceiving a brand? If there is more than one way, how many relevant ways are there? Knowing the `brand-image' in the customers' minds, can target segments be chosen without taking the different ways of perceiving the brands into account? Is the perception of a brand independent of the images evoked by other brands? Can competition be measured by means of market share or is the similarity of individual `brand-images' - being the cause of market share - more interesting for determining competitive threat?)

Some of the questions are typically answered by conducting a multidimensional scaling study (MDS), resulting in a two- or three-dimensional perceptual map. This map might suggest that the brand that is located far away from the others is perceived as very distinct and thus not endangered by competition. Even if the perceptual map included ideal segment values (indicating the most desirable perception of a brand for a specific segment), the brands would be evaluated in the same manner as before, assuming that each one of the brands evokes ONE association in the mind of ALL potential tourists. This last assumption turns out to be a pitfall, as it is not considered that different people might have systematically different feelings about brands. In the latter case, competition of perceptions might occur within segments of tourists.

PBMS avoids this fundamental assumption and reduces recommendation uncertainties by using all available information throughout the entire process of analysis. PBMS investigates the questions of market segmentation, product positioning and competition simultaneously, thus reckoning with the interrelatedness of all topics under investigation, requiring one single thing: the availability of tree way data.

The PBMS approach

PBMS is a stepwise framework, which allows different methods and algorithms to be used. The basic steps include (1) answer pattern compression, (2) perceptual competition analysis and (3) segment evaluation/formation.

Step 1: Answer pattern compression: In PBMS, variation across both consumers and brands forms the basis of market structure analysis. In order to arrive at results useful to the

manager as a decision basis for strategic orientation, both these data directions have to be reduced in complexity. This leads to a thorough understanding of differences in the perception of the products in general on the one hand (which kinds of images exist in the marketplace) and differences in the perception of brands on the other hand (which brand is perceived in which manner).

In the simultaneous market segmentation and product positioning approach framework, both directions of information are analyzed in the same step of analysis, as the data compressed consists of individual answer patterns, ignoring the brand information. The resulting partition thus reflects in which way brands can be perceived in the industry (prototypical product images). By analyzing the distribution of the brands over these prototypical positions, brand image can be evaluated. Market segments can then be defined in many ways based on the data set of reduced complexity, e.g. as groups of customers with similar images of the same brands.

The goal of reducing data complexity can be achieved using a multitude of approaches within the PBMS framework. Most of them are known as clustering or vector quantization methods, other possibilities include unsupervised neural network techniques such as the self-organizing feature map (Kohonen, 1997) or the less rigid topology representing network (Martinetz & Schulten, 1994). Problems typically arising when partitioning methods are applied (number of clusters, proximity measure, etc.) remain, depending on the partitioning method chosen[2]. The answer pattern compression step leads to a number of *perceptual classes*. Each perceptual class represents all answer patterns (person-brand-combinations) that were assigned to this particular group. Four pieces of information can be derived at this stage of PBMS: (1) The average value of all answer patterns in a perceptual class forms a *perceptual position.* It exhibits generic `product-images' existing in the minds of potential customers. These perceptual positions are not market segments, as three way data is used. (2) By revealing the brand information in the data and analyzing the distribution of every brand over the perceptual positions, `brand images´ can be determined. (3) Conclusions about the similarity of perceptual positions can be drawn from the neighborhood of prototypes. A good impression of the neighborhood relations is provided by the PBMS perceptual charts. A more precise technique is supplied by the concept of statistical neighborhood (Mazanec & Strasser, 2000). (4) Finally, adding additional information (preference, choice, etc.) not used in the partitioning step allows attractiveness evaluation of the perceptual positions.

Step 2: Perceptual competition analysis: Owing to the three-way data structure a change of the aggregation level is necessary for the purpose of perceptual competition analysis, as it is essential to investigate how often it occurs that ONE single respondent assigns two or more brands to the same perceptual position. Competition in this sense is thus defined for individuals, because perceptual similarity is judged on an entirely disaggregate level. Only if one person has the same internal picture of two brands, they become substitutes in a decision process, and the state of substitutability includes competition at an early and fundamental stage of the choice process.

The basis for perceptual competition analysis therefore are simple tables of counts of respondents for pairs of brands. Basically two procedures are applied: (1) a competition coefficient between each pair of brands can be calculated by summing up the values located at

[2] The number of clusters problem can be weakened by going through a two step compression procedure: first any paritioning algorithm is applied to roughly divide the data and in a second step other criteria (exogeneous variables) are included to merge the centers arising from the first compression step. This approach is similar to the one recommended by Krieger & Green (1996) and has been demonstrated by using statistical neighborhood and brand preference as criteria for the second stage compression by Dolnicar (Buchta, Dolnicar & Reutterer, 2000).

the main diagonal of the table of counts. This gives the proportion of respondents assigning two brands to the same perceptual position and thus indicates the extent of similarity competition or potential substitutability of brands (called ICI by Dolnicar, Grabler & Mazanec (1998) and `Kappa-coefficient' by Strasser (1998)). It ranges from 0 to 1 with higher value denoting higher similarity competition. [3]

In addition it can be tested (by means of a simple Chi-square test) if the entire table of counts is heterogeneous. Heterogeneous tables suggest the existence of interaction and thus make it interesting to locate single significant cells. Here non-parametric permutation tests as suggested by Strasser (Mazanec & Strasser, 2000 and Strasser & Weber, 1999) can be applied, preventing implicit and possibly inappropriate distributional assumptions. Due to the fact that information on brand-mode has been ignored in the answer pattern compression step, significance testing is allowed at this stage of PMBS, enabling precise identification of competitive situations at single perceptual positions.

Step 3: Segment formation: The range of segmentation possibilities within the PBMS framework is huge. This results from the fact, that the issue is not resolved automatically when a positioning decision is taken. Numerous possible and plausible segments exist, most of them taking into account the interrelatedness with perceptual partitioning. As a systematic classification of possible segmentation strategies with recipes is not available, the decision has to be taken in an objective-oriented manner. Some possibilities are given for the deodorant market.

Using PBMS for analysis of the deodorant market

The survey data set was provided by a large consumer product company.[4] Respondents were asked to state, whether six attributes apply to the twelve brands listed in the questionnaire. Two items reflect the fundamental motivation to use deodorants ("prevents body odor" and "blocks perspiration"). The remaining items are: "attractive fragrance", "does not disturb skin", "makes me feel safe" and "good quality for money". The data used has three way data format, with 925 respondents evaluating twelve brands according to the six given criteria in a dichotomous manner ("applies", "does not apply"). In addition to these items which are used to identify the prototypical deodorant images, it is also known, which brand was bought by which respondent. This variable is used as height of preference criterion.

The descriptive data results are omitted here due to page restrictions. Only two central findings need to be mentioned: (1) although most of the demographic and sociodemographic information is insignificant for deodorant usage or preference, being male of female makes an enormous difference. Therefore data has been analyzed separately (here only the results for the men are described), (2) based on the total average values on the six attributes for every brand it seems that no image differences exist between the brands at all.

As starting point for PBMS, k-means analysis (also known as LBG algorithm, see Linde, Buzo & Gray, 1980) with seven clusters was conducted, as the seven cluster solution rendered the most stable results in prior simulations with the data set under consideration. The result were 7 perceptual positions, with one position representing all answer patterns including zeros only. The remaining six positions can be briefly described as follows: the *wonder-deodorant* (38 % of all non-zero perceptions, 36 % among men) is characterized by offering everything, the average value of every single variable is near 1. 14 % (men: 10) of all perceptions represent the *fragrance-deodorant*, which is seen to smell excellent. Also it is rather strongly perceived to prevent body odor. The *odor blocker* (15/22 %) prevents body odor and that is it,

[3] This coefficient varies very little over partitioning solutions, thus making the decision on the optimal number of clusters or the identification of the optimal partitioning solution a less crucial element of analysis.

[4] Respecting the companies wish to keep the results secret, company name and deodorant brands are treated anonymously.

all other attributes are not associated with this position. The *antiperspirant* (12/11 %) is perceived to block perspiration in the first place, but also in terms of odor prevention, non-disturbing of skin, secure feeling and good value for the price this perceptual position is seen to offer slightly more than the average deodorant. The *wonder-deodorant not blocking perspiration* (10/11 %) is very similar to the wonder-product except for absolute non-assignment of the antiperspiration effect. Finally, the perception as *compromise deodorant* (12/11 %) mainly depends on the value-for-money-relation, although this position also reflects pleasant fragrance, not skin-disturbing and odor prevention to a higher extent than it is the case for the average deodorant perception.

By adding the preference height, the PBMS perceptual chart (Fig. 1) summarizes all pieces of information except for the deodorant characteristics at the perceptual position (described in the preceding paragraph.

The perceptual positions are represented by the bubbles located in a map with two principal components, the number of brands bought at a certain perceptual position is indicated by the height of the bubbles, brand proportions are delineated by the bubble slices and the number of perceptions at each perceptual position is reflected by the bubble area.

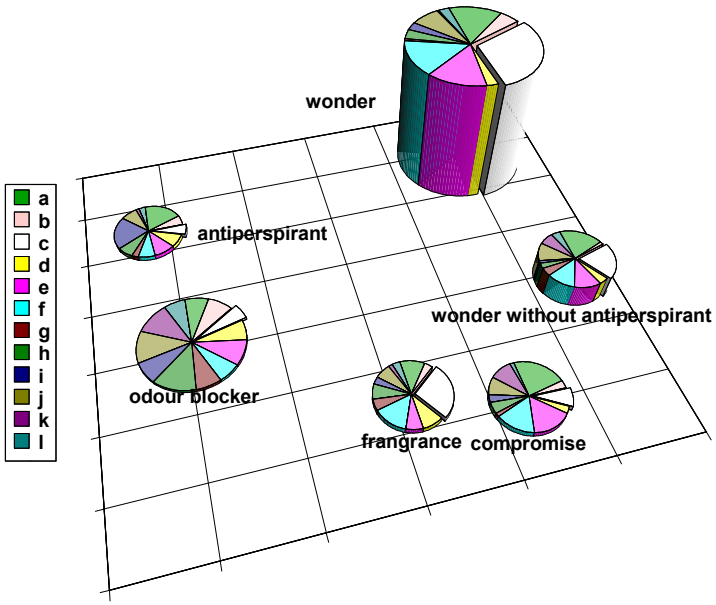

Figure 1: PBMS perceptual chart (male respondents)

As can be seen, perceptual positions differ in height of preference, although preference discrimination was not the criterion to be optimized. This is highly relevant management information: the higher the bubble, the more attractive the product image represented by the perceptual position. Also, positions differ in size, indicating how strongly certain deodorant prototypes are represented among customers. Brand images can be deducted from the representation of the brand at different positions. Finally, the location of perceptual positions functions as a cue about similarity relations of the brand images.

For the deodorant market the *wonder-deodorant* image is the most promising in the market, followed by the *wonder deodorant not blocking perspiration*. The antiperspirant image is underrepresented among men, whereas the odor blocking deodorant is strongly represented in the male customers‘ minds but unfortunately is not attractive enough to be bought. As far as brand differentiation is concerned, male customers do not have very differentiated internal pictures in general. The one exception is brand c. Brand c is `perceptual market leader´ at three positions: wonder deodorant, wonder deodorant without antiperspirant effect and fragrance position, indicating a distinct picture in the customers minds.

Strong competition as indicated by the Kappa coefficient can be identified for brand c at all three positions, with two other brands competing in all three positions: brands e and f. Only at the wonder without antiperspirant position also brand j is often perceived in the same manner as brand c by the same respondents (similarity competition).

The study of the deodorant market has two major limitations caused by the structure of the data: First, the items are not very emotional, therefore the wonder deodorant position

`offering it all´ is so highly preferred. With less technical items, the associations of respondents could be investigated in more detail. Second, the high number of zero answer patterns resulting from the high number of (not well known) deodorants to be evaluated in combination with the fact that men and women have to be analyzed separately makes it necessary to question large numbers of respondents in order to get sufficient data for testing purposes.

Nevertheless, by using PBMS among the male customers (which do not differentiate as strongly as women do) brands do show some typical image features, whereas classical analysis of average values does not reveal this fact.

The segment decision can be based on the information discussed so far. One possibility from the point of brand c management is to choose those respondents as customers, who perceive brand c as wonder deodorant and buy brand c. Other possibilities include a differentiated segmentation strategy including buyers seeing brand c in those three positions where brand c is „perceptual market leader". Also, choosing the fragrance position only, as it offers the only distinct USP and defining all respondents as segment, that buy any brand perceived this way, is a reasonable option. As mentioned before, the segment formation task in PBMS is not trivial, as most combinations of perceptions (answer patterns for every person: brand-combination), perceptual positions and choices (brands bought by respondents) make sense and the decision has to be made with a strategic goal in mind.

Conclusion

PBMS represents a simple and highly flexible framework for market structure analysis that allows insights from multiple perspectives and consequently impedes simple recommendations and instead motivates managers to evaluate numerous strategic alternatives on the basis of thorough data understanding. The only requirement is availability of three-way data, as even binary-scaled data can be handled. Especially the implicit consideration of interrelations between positioning and segmentation issues prevents users from making strategic decisions in a non-integrative manner.

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