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Introduction

This illustration of the usefulness of the dynPBMS approach resulted from collaboration with an international firm in chemical industry producing and marketing branded consumer goods. This company provided the data set analysed. Therefore the questionnaire could not be altered or modified in any way by the author. Respecting the confidential nature of the information used, the brand identity is not revealed.

The brand management of the company providing the data was interested in exploration of the market structure with regard to understanding how the own brand is perceived, gaining insight about the image of the competing brands as perceived by the consumers, obtaining a quantitative measure of competition the own brand encounters in this particular market and getting as much information as possible to build strategic decisions on (segment choice, position definition and level of competition to expect).

Numerous procedures are available to investigate empirical data of such kind in order to arrive at recommendations for segmentation and positioning decisions (Myers, 1996; Lilien and Rangaswamy, 1998). Despite the wide variety of alternative procedures, most of them treat the issues of segmentation, positioning and competition as sequential thus arriving at conditionally optimal solutions only. Perceptual based market segmentation (PBMS, introduced by Mazanec and Strasser (2000) and Buchta, Dolnicar and Reutterer (2000)) treats these questions simultaneously by conducting one single step of analysis and thus avoiding problems of caused by sequential procedures. Dynamic PBMS extends this approach be allowing tests for structural change over multiple periods of time.

This article illustrates the usefulness of dynPBMS by contrasting the results derived from dynPBMS to results derived from traditional analysis as conducted by the market research department of the collaborating company and highlighting the difference in managerial consequences. The illustration is bases on dishwashing brand survey data from the years 2000 and 2001 for an eastern European country. Respondents stated whether each of 25 listed product attributes applies to five dishwashing brands or not (forced choice, binary answer

format, questioned attribute by attribute). The three-way data includes 25 attributes. Five brands were evaluated in 2000 and four in 2001 (four brands are therefore available for analysis over a two-year period of time). The sample size is 517 in the year 2000 and 516 in 2001. Only women were questioned. The total row number in the data set consequently equals to 4649 (every respondents-brand-combination represents one row in the data set). A very large amount of missing data was detected: 1492 pure zero vectors indicating either a missing perception on the brand or a missing evaluation.

Results from traditional analysis

Brand image analysis

Analysis of variance was conducted, resulting in brand profiles where all attributes differ significantly at the 99.9% level. Table 1 gives the percentage of respondents stating that a particular attribute applies to a particular brand. Columns are thus typically interpreted as brand-specific perceptual profiles; the last column provides the overall average value.

Table 1: Percent of respondents perceiving each attribute to apply to each brand

	A	B	C	D	E	avg		A	B	C	D	E	avg
want to buy	64	26	77	29	12	46	refill av.	73	19	77	40	9	49
gentle to hands	67	25	78	28	11	46	trustworthy	70	33	82	34	13	51
removes grease	70	32	81	33	12	51	nice color	69	28	80	36	13	50
good cleaning power	70	32	81	34	13	51	lukewarm	64	27	75	30	12	46
dishes shiny	71	34	81	35	13	52	good handle	74	37	81	41	16	55
good smell	69	30	79	33	11	49	easy rinse	71	36	78	39	14	53
universal use	65	30	71	31	11	46	thick liquid	69	29	79	35	11	50
economic	64	28	69	33	14	46	easy to dose	73	38	81	43	15	55
good value for money	63	28	67	31	14	45	expensive	40	13	72	14	4	32
cheap	37	34	20	39	22	31	like in ad	42	9	51	15	3	27
a lot of foam	69	37	77	37	14	51	antibacterial	49	13	64	18	6	34
modern brand	70	21	81	36	12	49	vinegar	47	9	56	14	3	30
pleasant smell	68	27	78	33	11	48							

The value of brand profiles is rather low (no distinct characteristics can be deducted). Based on this traditional view, management would conclude the following about market structure: products are perceived as either very attractive offering most advantages of a top dishwashing liquid, but rather expensive (“A” and “C”) or low quality and cheap („D“, „B“ and „E“).

Descriptive information does not provide insights either. Neither income, nor education, city type or age help to reveal perceptual images of the brands. Not even the distinction between users of the brands and nonusers provides additional insights. The only effect of the latter approach is that users show a generally higher agreement level for all attributes with regard to “their” brand (mirroring the finding by Barnard and Ehrenberg, 1990).

Competition Analysis

Typically aggregated data (e.g. the market share) is studied to determine the main competitors in a market. Due to the lack of choice information in the data set used, the survey question

about frequency of use was taken as substitute. The distribution indicates that „C“ and „A“ emerge as toughest competitors in the market with 44% and 31% market share, respectively.

Changes over a two-year time period

Comparing the attributes assigned to each brand over two years does not result in clear image changes. Significance of results varies over attributes and brands not following any logic or being interpretable as result of advertising campaigns.

Managerial implications resulting from the traditional analysis

Traditional analysis suggests the following: the relevant image attributes on the dishwashing market are “quality” and “price”. Brands are perceived differently with regard to these criteria. Brands “A” and “C” are competing in the marketplace for the “high-quality”-image. No dramatic image changes have occurred over time. The only decision that can be made from the brand “A” management point of view is to differentiate from brand “C”, but no attributes can be determined to reach that goal as the position claimed by both brands seems similar. Segmentation decisions cannot be recommended.

Results from dynPBMS

Perceptions based market segmentation (PBMS) is a simple stepwise explorative process. A three-way data set functions as starting point with each row representing the information provided by ONE RESPONDENT with respect to ONE BRAND evaluating a number of VARIABLES (columns). First, the data is partitioned (using any appropriate algorithm) resulting in a grouping of perceptual patterns that allows insights into generic perceptions of dishwashing liquids as well as (once brand information is revealed) the strength of association of each brand with each particular generic image position. Next, the grouping is cross-tabulated on a brand-to-brand basis for determination of perceptual competition and finally underlying segments of individuals can be explored for strategic decision support (e.g. unique image position, low competitive pressure etc.). The dynamic version (dynPBMS) additionally monitors perceptual position chances over years where shifts between generic image positions are taken as indicative for image change in the marketplace.

The detergent data was partitioned using topology representing networks (TRN, Martinetz and Schulten, 1994). The most stable solution was chosen by comparing over repetitions.

Brand image analysis

The perceptual chart resulting from the partitioning step is given in Figure 1. The positions indicate the similarity relations although mapping in two-dimensional space is undertaken for charting only. The proportions of each pie give the relative number of perceptions of every brand included at each perceptual position, the pie diameter representing the relative number of all perceptions (size of the perceptual class). Height indicates attractiveness of the position, in this case the frequency of use. It can be seen that the brand distribution over perceptual classes varies. „C“ is well represented at positions p5 and p7, „B“ is often located at positions p3, p6 or p8, „A“ has the largest perceptual shares at positions p4 and p9, „D“ at p1 and p2 and finally „E“ is only almost only present at positions p0 and p3. Finally, the most attractive positions in terms of most often used detergents are positions p5, p7, p9 and p6.

Figure 1: TRN perceptual chart

In order to understand the images “hidden” behind these positions, profile charts have to be analysed. Figure 2 illustrates the profile chart for position p3, the bars indicating the level of agreement with the attributes and the reference line stands for the overall sample mean value.

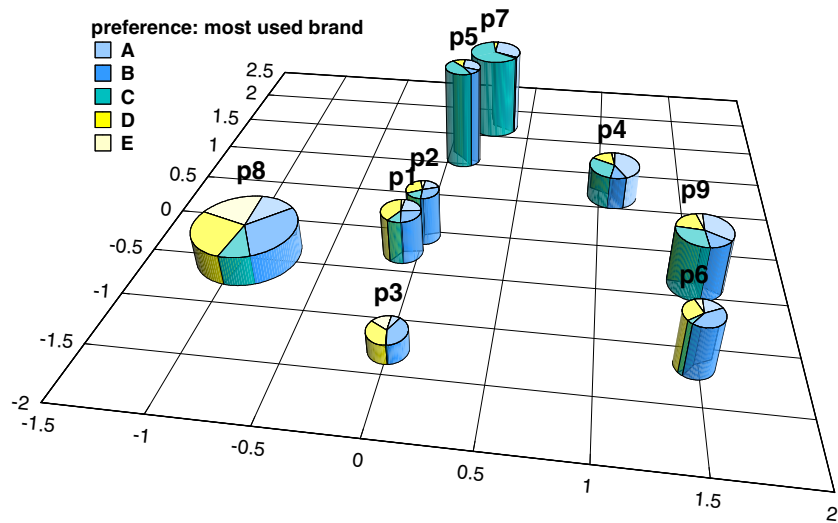
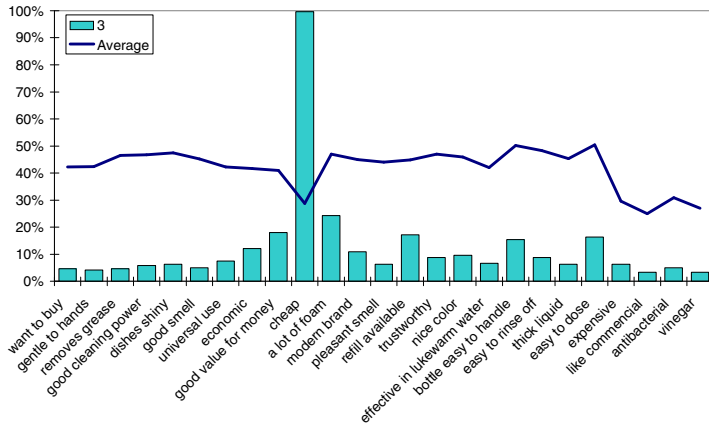


Figure 2: Nine cluster TRN solution perceptual class profiles



Position p1 is characterized as easy to use and handle, p2 as a solid product that is gentle to the hands, p3 is cheap, at position p4 almost all respondents perceive all attributes to apply, except for price. The position is not seen as an expensive one. P5 rates high on most characteristics, but is seen as expensive and not providing good value for money. P6 is a cheap product position indicating a well functioning product without

extras like being gentle to the hands or antibacterial. P7 is perfect but expensive. P8 attracts all zero vectors (meaning either that no attributes are associated with brands or respondents refuse to answer). P9 is perceived as solid, expensiveness is perceived heterogeneously.

Competition

The concept of competition in dynPBMS is based on disaggregate perceptions, this means that one individual places more brands at the same position (perceptual substitutability). Analysing the competitive relations based on the nine cluster TRN grouping of perceptions leads to coefficients given in Table 2. These indicate the percentage of the respondents that locate pairs of brands at the same position, significant values are printed in bold face.

Table 2: Competition coefficients to the nine cluster solution)

brand 2	brand 2	competition coefficient	brand 2	brand 2	comp. coefficient
A	B	0,229	B	D	0,433
A	C	0,289	B	E	0,542
A	D	0,258	C	D	0,154
A	E	0,268	C	E	0,274
B	C	0,173	D	E	0,542

Brands „B“, „D“ and „E“ compete (half of the respondents assign pairs of these brands to the same position). All remaining pairs of brands have coefficients lower than one third, with „C“ and „D“ and „C“ and „B“ representing the most differentiated pairs.

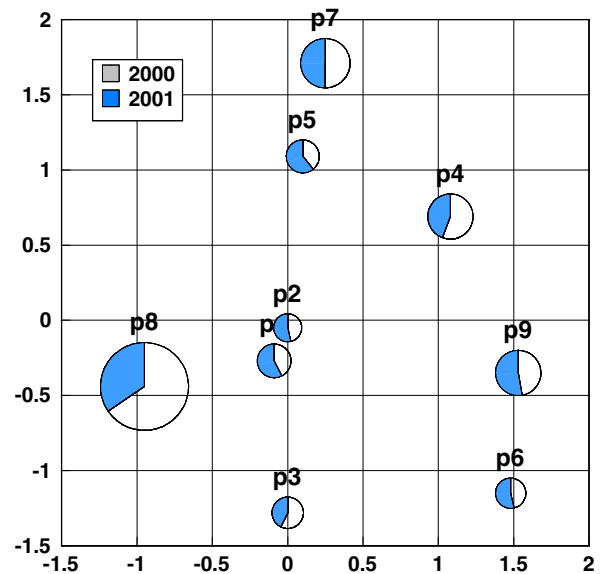
Changes over a two-year time period

The changes in the distribution of perceptions are significant, as illustrated in Figure 3. This dynamic view of the perceptual chart can be investigated for each brand separately and thus provides a more holistic view of image change that the attribute-wise testing.

Figure 3: Shift of perceptions from 2000 to 2001

Managerial implications resulting from dynPBMS

There are clear differences in the perceptions of brands. From the point of view of „A“, 4 positions should attract the management’s attention (positions 4,5,6 and 9) for two main reasons: first, the starting position is favourable, as a number of respondents already locates „A“ there. Second, these positions are attractive in terms of product use: many women perceive „A“ in a way that mirrors market demand. Positions 5 and 7 are very similar and basically stand for top quality at a high price, whereas position 4 stands for association with all items (thus indicating partial answer tendencies) and position 9 reflects uncertainty about the pricing and some attributes not being associated (as e.g. antibacterial). Target markets can be chosen by choosing individuals perceiving brand “A” in the favourable positions outlined above. Only minimal competition can be detected between „C“ and „A“ due to the fact that different people locate the brands at the attractive positions. Should „A“ aim at positions 5 or 7, competition is likely to occur. Changes over time are captured in a holistic way that can be further explored by identifying change patterns of particular perception segments.



Conclusions

Obviously the two approaches lead to completely different consequences for brand “A” management on the basis of the same empirical data. DynPBMS reveals generic product images and allows insights about the strength of “position claim” at these positions for specific brands. Furthermore, consumer heterogeneity is revealed and “weighted” by preference. Missing data is clustered at one position, not distorting other image profiles. And segmentation, positioning and competition decisions are made in a harmonized manner. The limits of the dishwashing market include (1) that not all competitors were included in the survey, (2) the items are redundant and (3) only two consecutive years could be studied.

Despite these drawbacks dynPBMS proves to be a fruitful alternative of analysing typical three-way format brand data providing a very differentiated picture of the market structure.

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