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DETERMINATION OF CONSUMER MOTIVES USING THE ALGEBRA OF EXPRESSIONS DURING MARKETING RESEARCH OF INNOVATIVE GOODS

During innovations related to the introduction of a new product, marketers have the problem of choosing methods that can be used to determine the importance of product attributes. The existing methods of direct assessments and joint analysis (conjoin analysis) have both their advantages and significant limitations. To overcome this, you can use the author's method, which is based on the concept of a multi-attribute product using elements of the algebra of statements. Let's assume that the company wants to enter a new market with its products. To do this, it is necessary to know the attributes of the product for each segment that are defining from the point of view of the consumer. This can be done using the following procedure. Preparatory stage. We form a sample of respondents related to the potential market. Stage 1. We highlight the attributes of the product under investigation. Stage 2. For each product attribute, we select its two polar values that it can take. Stage 3. We form an experiment plan by combining attributes with their polar values. For example, let us study the market of tea consumers. At the first stage, to simplify the presentation, we will select 3 attributes, for example, tea strength (caffeine content), tea colour and taste qualities (for example, astringency). At the second stage, we form two polar values for each attribute: strength: strong or weak; colour: light or dark; astringency: astringent or non-astringent. At the third stage, we form an experiment plan. Let attribute 1 (strength) be variable X1, attribute 2 (colour) - X2, and attribute 3 (toughness) - X3. Since each of them can take two values, we determine which 0 if Xi - takes the first

value and 1 - if Xi takes the second value. Stage 4. A map is developed for the respondent with various combinations of attribute values of the product under investigation. Have the respondent mark their preferences as indicated in the table.

Table 1.

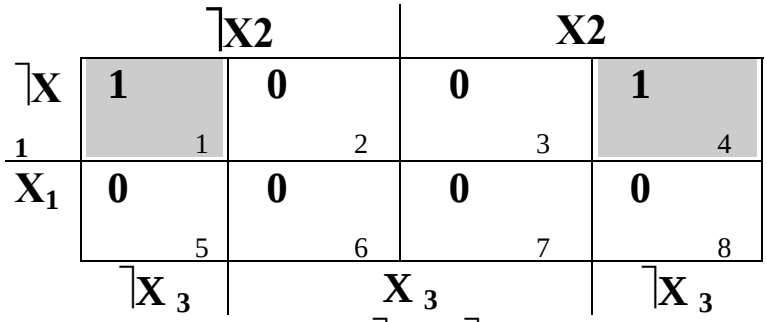
An example of a table used during the study and hypothetical options for its filling

No	A combination of attributes			Respondents' answers			
				1	2	3	4
	Strength	***Colour***	***Astringency***	So	So	So	So
1.	weak	light	astringent	□1	0	□1	0
2.	weak	light	impatient	0	□1	□1	0
3.	weak	dark	astringent	□1	0	0	□1
4.	weak	dark	impatient	0	0	0	□1
5.	strong	Light	astringent	0	0	□1	0
6.	strong	Light	impatient	0	0	□1	0
7.	strong	Dark	Astringent	0	0	0	□1
8.	strong	Dark	Impatient	0	0	0	0

In the case of the first respondent, we have two expressions 1 and 3 that are true from the point of view of counting statements, which are connected to each other by logical connections & (that is, “AND” logical) and V (that is, “OR” logical). If the domain of interpretation is the Boolean set (0,1), we are dealing with Boolean algebra, which is isomorphic to the algebra of statements. The given answers can be written using the number of expressions as follows: $F = \neg X_1 \cdot \neg X_2 \cdot \neg X_3 \vee \neg X_1 \cdot X_2 \cdot \neg X_3$ and F=1, that is, the statement is true, relative to the following value of variables X1, X2, X3: ⟨0,0,0⟩ та ⟨0,1,0⟩. The reduced form of the record corresponds to the conjunctive normal form (KNF), for which there are rules of reduction, i.e. reduction to the perfected KNF (DKNF). From the point of view of the investigated attributes, this will mean that in the process of reduction those attributes that are not significant and defining for the consumer will be rejected. Two approaches can be used to bring the KNF to the SCNF:

– *algebraic*, on the basis of equivalent statements. Yes, in our case $F = \neg X_1 \neg X_2 \neg X_3 \vee \neg X_1 X_2 \neg X_3 = \neg X_1 \neg X_3 (X_2 \vee \neg X_2) = \neg X_1 \neg X_3$. In our case, it means that for this respondent, the determining attributes of tea are its strength and astringency, and not its colour, and the consumer prefers weak strength to astringency.

– using Veitch diagrams (Karnaugh map), which are widely used to optimize logic circuits in electronic engineering, using standard simplification rules. Example,



Where F = $\urcorner X_1 \bullet \urcorner X_{3.}$.

Stage 5. Analysis of the obtained results for the purpose of identifying groups of respondents that can be combined into market segments.

In conclusion, we can add: 1) using effective plans for conducting the experiment, it is possible to reduce the dimension of combinations; 2) the process of entering these into the map, testing and processing is possible to computerize, which significantly increases the utility of the method; 3) the method allows to identify not only the defining attributes of the product, but also to identify the defining negative attributes of the product when changing the wording of the question or optimization based on disjunctive normal forms (DNF) based on the union of zeros.

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