The problem of choosing a consumer segment in the agro-industrial complex

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Abstract. The problem of forming a products portfolio is directly related to what group of consumers these products are aimed at. In this regard, there is a problem of choosing a clear consumers segment. The article proposes a method of selecting choosing a consumer segment in the agro-industrial complex.

1. Introduction

The main decisive factor in the choice of products by food industry enterprises is the information about the belonging of consumers to certain classes, i.e. their segmentation. Existing segmentation methods do not provide an accurate answer to this question. A new approach to segmentation based on fuzzy logic methods is proposed.

2. Factors for choosing a new segmentation technology based on fuzzy set theory

To implement a specialized intelligent information system for supporting decision-making to assess the correlation of products manufactured by the enterprise to certain segments of this product consumer, it is possible to use an expert learning recognition system based on the fuzzy set theory, involving additional hypotheses for the construction of decisive recognition rules [1]. The application of the fuzzy set theory and hypotheses is regulated by the multidimensional, heterogeneous structure of features describing consumer segments, as well as the peculiarities of the subject area under consideration, which do not allow strictly limiting the possible decisive boundaries of recognition.

Training of the system is carried out with the additional information involvement of subject area experts on the preliminary classification of products by the degree of belonging to the classes of consumers.

The expert system allows making conclusions about the greatest influence of certain production parameters on belonging to a class of consumers, and also to model further development of the range for the producer company at variation of the parameters defining belonging to a consumer production segment [2].

In addition, for processing arrays of information, methods are used to solve the problems of options choice in the conditions of the criteria fuzzy nature for choosing alternatives, their parameters, etc [3].

The algorithm of consumers' segmentation assumes:

- Statement of the problem, determination of production parameters
- Dividing consumers into distinct classes

- Specify clear boundaries between segments
- Determination of the belonging consumers' degree to segments

1. Statement of the problem, determination of production parameters. It is possible to use the following interpretation in the recognition problem of objects or phenomena, which fully meets the requirements of the classification problem in the decision support system [4].

To analyse the fuzzy belonging of objects to classes, it is necessary to determine the type of scale in which the values of the feature are measured. According to the method of preliminary results processing, the dimensionless index Vi is a product parameter, which is one of the decisive factors in its consumption by one or another segment of consumers. This interpretation in the results of the experiment corresponds to the measurement of feature Vi; in the scale of relations [5].

2. Dividing consumers into distinct classes. In the conditions of statistical methods in applicability in objects classification, we will use the substantiated in and recommended in [6] λ-compactness to divide objects into classes. In the one-dimensional case under consideration, the application of the hypothesis for a numerical trait is not difficult.

According to this method [5] objects are identified with points on the axis of some objects measure, and the criterion discriminating classes of objects is the maximum λ-distance between points (objects). This λ-distance is the ratio of the distance between the points corresponding to the position of objects on the numerical axis of the measure to the minimum of two adjacent distances [1].

The division of objects into classes is justified by the criterion of maximum λ-distances.

3. Specify clear boundaries between segments. It is necessary to clarify the boundaries between the segments on the basis of the same distances between objects (ΔVi), on which λ-distances were calculated and to set between classes at points dividing the distance between boundary objects in proportion to the values of neighbouring distances.

4. Determination of the belonging consumers' degree to segments. It is obvious that a clear division of objects into classes according to the measured values of some feature is a realistic assessment of the objects belonging to classes.

3 Implementation of consumer segmentations methods of agricultural products based on fuzzy set theory

As an example, we consider the market for milk and dairy products. During the implementation of the method, the following features of segmentation are identified, which allow to distinguish groups of consumers:

- product selection criteria: freshness, taste, packaging, composition, manufacturer;
- age;
- floor;
- income;
- perception of product properties;
- the culture of the product consumption.

The result of the implementation is: a) the allocation of consumer segments; b) the representations definition of each consumer's segment about the ideal product.

Objective parameters of the product: milk and dairy products is a fresh product that is produced from liquid mixtures prepared according to special recipes, containing in certain ratios the components of milk, fruits, berries, vegetables, sucrose, in some formulations - egg products, flavoring and aromatic substances.

The main types of dairy products include milk of different fat content, fermented milk products, yogurts, sour cream of different fat content, cottage cheese, oil.

As an example, we consider yogurts: ice cream, milk-based yogurts, fruit-berry or vegetable-based yogurts; from fruits, berries or vegetables with the addition of a milk base; using chicken eggs; multi-layered yogurts; special purpose yogurts; containing confectionery fat.

Yogurt in consumption is characterized by the manifestation of the following properties: nutritional value and caloric content, therapeutic and prophylactic, dietary, useful in children's nutrition, useful not only for its nutritional value and caloric content, the naturalness of its ingredients, but also for its therapeutic and prophylactic properties, including a tendency to gastric diseases. According to scientists, the ingredients included in yogurt affect the content of serotonin, which is in the brain and is responsible for obtaining pleasures, the consumption of yogurt leads to a decrease in the impact of stress on a person. In addition, milk and cream, from which yogurt is made, contain L-tryptophan, calming the nervous system and helping to cope with sleeplessness.

According to the results of consumption, a one-dimensional scale of yogurt characteristics preferences is given (figure 1).

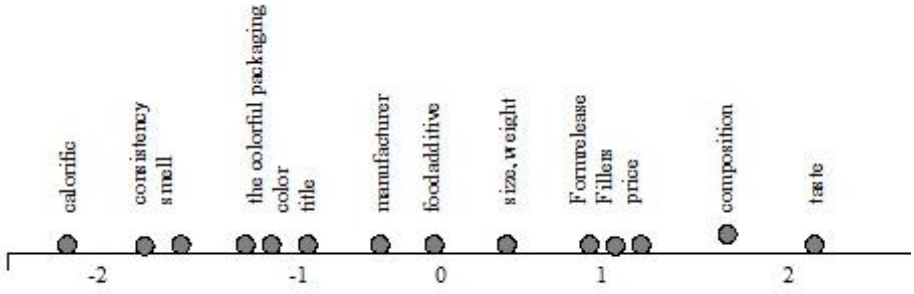

Figure 1. The relative importance of the yogurt characteristics when choosing a brand.

Consumers take into account the properties of yogurt in the following order: taste, composition, price, fillers, and form of production; other characteristics are almost not taken into account. The picture is remarkable in that such a characteristic as taste has a significant advantage over others.

When buying yogurt, consumers often pay attention to its composition, taste and appearance, rather than the price.

Thus, it is possible to summarize:

- yogurt has therapeutic and prophylactic, dietary, anti-stress properties;
- yogurt is perceived by consumers as a dessert;
- there is a wide variety of yogurt types;
- respondents' opinions on the significant properties of yogurt allowed to describe the characteristics of the consumer segment and the significant properties of the product for it.

The basis for consumers' segmentation of the yogurt market is the criterion of goods choice.

1st segment-the main criterion for the goods choice for such consumers is the desire to find their own, unique, original, different taste. As a rule, these are people with a bright personality, and looking for their style in everything, including the taste of yogurt. These are people who answer the question, what kind of yogurt they "taste", "like", what attracts them is an original, bright combination of different tastes.

2d segment-buyers, the main criterion of choice for which is the habit of this variety/type of yogurt. They choose the kind of yogurt that they have tried repeatedly, in which they are completely confident. It is important for them not to be deceived - stability, similarity of taste to what they ate yesterday, the day before yesterday, a month ago or last year, they appreciate more than new sensations. The risk associated with buying a new type of yogurt is a more significant barrier for them

than the pleasure of a possible "find". Buyers of this group are "accustomed" to local yogurts and are somewhat wary of any other, even if they are cheaper.

3^{d} segment - the main criterion of choice for such consumers is the attractiveness of this yogurt type for their child. Also of great importance there is the convenience of using this yogurt (convenient durable packaging, etc.).

4th segment -for this group of yogurt consumers, the main motive of choice is the desire to taste again the "same" yogurt that they tried in childhood, youth. Such people are driven by nostalgic associations. They remember the past as something perfect that can't happen again. They belong to such statements: "Now there is no such thing...", etc.

5thsegment-these consumers tend to constantly try new varieties of yogurt, not stopping at any of them. They will never become adherents of any certain grades of yogurts-new attracts these buyers stronger, than the familiar, checked taste.

It should be noted that servicing this segment of consumers is associated with great difficulties - even if the company manages to create a product that is attractive to such customers, it will very soon lose its novelty for them. They will switch to the next novelties.

The result of the segmentation methods is a comparison of the ideal product for the corresponding consumers class with the products produced for this segment and realistic belonging of objects (product parameters) to the segments. Under the conditions of the initial data heterogeneity in accordance with the classification method of combining the use of fuzzy set theory and the λ-compactness hypothesis, the results are obtained in the implementation of the developed model.

Such parameters of yogurt as the content of fat, sugar, solids, and calories, characteristics of fillers, flavours, weight, and cost were selected and expertly correlated to the previously allocated 5 classes of consumers according to criteria such as price, type, range, taste, and manufacturer.

According to the calculated belonging coefficients of all yogurt types to consumer segments, out of 63 product titles, 4 types of yogurt have a very low degree of belonging, 21 types of yogurt have an average degree of belonging.

According to the available assortment consisting of 64 titles, the first segment of consumers corresponds to 8 titles of yogurts, the second segment – 7, the third segment – 23 titles, the fourth segment – one, the fifth segment-25 titles.

Formed product selection criteria showed the lack of correspondence between existing products and the projected ideal product for each segment of consumers. Comparison of the ideal product with the types of goods produced at the enterprise is necessary, since one of the decisive factors when choosing new products is the demand for the results of innovations by the consumer [7]. The results can be in the form of new or modified products that meet new or existing needs, and the effect of innovation can be an increase in sales of products that initiate development. On the basis of the received belonging degrees of yogurts parameters we proposed to eliminate 7 types of enterprise production which are inconsistent to ideal representations of a certain segment of consumers and initiation of innovations [8].

It is important not only to exclude those types of yogurt which does not correspond to the segments of consumers, but also to initiate product innovations and to the extent that the company is able to implement on the market.

4. Conclusion

The presented method of fuzzy objects classification is based on several heuristic assumptions, which, using the fuzzy set theory, allowed to reveal additional relations between real objects. A classification method combining the use of fuzzy set theory and the λ-compactness hypothesis is used, which allows to obtain high results in the conditions of heterogeneity of the initial data. The possibilities of fuzzy set theory are used for realistic estimation of objects belonging to classes, to identify the formulation of fuzzy productive rules for the construction of expert systems.

The mathematical model of consumers clustering and correlation of the corresponding production range to classes of consumers allows comparing an ideal product of the corresponding consumers'

class with the made types of production at the enterprise. This helps to design the ideal product for each class of consumers, to form a criterion for choosing innovations and to decide on the choice of such innovations that will increase sales for each class of consumers. The developed method of forecasting the choice of innovations taking into account the clustering of consumers can be the basis for planning innovations in the food industry. The proposed method of innovation planning allows food industry enterprises to choose innovations in the conditions of uncertainty and heterogeneity of initial information about the class of consumers and their preferences.

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