

Sociological Information as a Strategic Resource for New Industrialization of Food Production

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Abstract – Industrial technologies applied in the food industry are high-performance, efficient technologies that use the most advanced technical means and methods of work, allowing to significantly increase the technical equipment of labor and its productivity. In the conditions of the new economy, the scientific and technological activity of food industry enterprises is of particular importance, the specificity of which lies in the fact that the main volume of output is designed for domestic consumption and limited by demand determined by rational norms of food consumption. In this regard, the enterprises of the agri-food sector should plan the release of various types of products to ensure physical accessibility in food products of all social groups. This requires constant work to improve the formulations, technological methods of food production, methods of packaging and delivery to the consumer while preserving in the process of product distribution of all consumer advantages, including freshness. The study of consumer preferences and awareness allows manufacturers to adjust the basic consumer properties of food products—functional, organoleptic characteristics, and preservation ability. In this case, the consumer preserves the property of preservation ability as the shelf life of the products, preferring the freshest ones. In this regard, in order to obtain and analyze the results presented in the paper, the research purpose is: to study consumer awareness of the impact of shelf life of pastilles on their organoleptic properties and potential demand for zephyr and pastila, which include a functional food ingredient—a pectin of local fruit and berry raw materials, which acts as a stabilizer and has a good water-retaining power, which is one of the directions of development of modern industrial confectionery production technologies. It was shown that the composition of zephyr and pastila and their nutritive value are important for consumers; the presence of enriching ingredient in zephyr and pastila, which gives them functional properties, is important for 95% of respondents. However, only 30% of respondents are aware of the functional food ingredient pectin and its beneficial properties. Thus, the scientific-technological and industrial development of the branch is a fundamental factor in improving the quality of confectionery products. At the same time, its development is possible only in the presence of a full-fledged innovation system, which includes education, science, new

technologies, modern business methods, as well as highly qualified personnel.

Keywords – *consumer preferences, confectionery, functional ingredients, pectin.*

I. INTRODUCTION

The concept of industrialization at the enterprises of the agri-food complex is primarily related to the scientific-technological and industrial development of the branch, the application of industrial technologies aimed at improving the quality of food products, ensuring the safety of food raw materials and finished products at all stages of the life cycle.

In the modern conditions of the new economy, the formation of supply and demand in the consumer market is a complex and multilateral issue. The transition to a socially-oriented economy requires the search for modern solutions to the issues of food production regulation. The complexity is due to the speed and variability of demand, difficulties in measuring and forecasting the consumer market, associated with crises and the fall or increase in the production of certain categories of food products [1].

Industrial technologies applied in the food industry are high-performance, efficient technologies that use the most advanced technical means and methods of work, allowing to significantly increase the technical equipment of labor and its productivity.

Production of pastila-like products (zephyr and pastila) is a dynamically developing segment of confectionery. However, it should be noted that consumers have become more attentive not only to the range, but also to the quality and composition of food products. This fact forces manufacturers to respond properly—to introduce new production technologies, improve quality, and expand the range.

Analysis of consumer preferences allows manufacturers to adjust, above all, the nutritive value and organoleptic characteristics of products, to apply high-tech industrial technologies and, thereby, to increase consumer perception of new food products [2]. In this regard, the purpose

of the research is to study consumer awareness of the effect of the shelf life of pastilles on their organoleptic properties and the potential demand for zephyr, which includes a functional food ingredient and stabilizer that has a water-retaining power—a pectin of local fruit and berry raw materials for the development of modern industrial technologies of the confectionery production.

Zephyr is a variety of sugary confectionery products obtained by beating fruit and berry puree with sugar and egg white, followed by the addition of form-building (jelly-forming) fillers: pectin, agar-agar, or gelatinous (marmalade) mass [3, 4]. Food dyes, essences are used as additives in the production of zephyr [5].

In accordance with GOST 6441-2014 (*Confectionery Pastila-Like Products. General Specifications.*), zephyr is a pastila-like product based on a stabilizer, the mass fraction of fruit (vegetable) raw materials in which is not less than 11%, the mass fraction of moisture is not more than 25% , density is not more than 0.6g/cm.

Due to its gentle consistence, specific foamy structure, moderately sweet taste, and relatively low cost, compared to other confectionery, zephyr is in consistently high demand. Contrary to the general opinion that confectionery products contain many calories, zephyr is a low-calorie and very useful product. The most useful prescription component which is part of the zephyr is pectin. The main advantages of pectin and its main useful property is the ability to purify the body. It has the following effects [6]: removes heavy metals such as lead, mercury, zinc, and others from the human body; removes radioactive substances: isotopes of cesium, strontium, yttrium, and others; adsorbs and removes biogenic toxins, anabolic steroids, biologically harmful substances; removes metabolites that tend to accumulate in the body: cholesterol, bile acids, urea.

The main disadvantage of pastila-like confectionery products is their quick drying with the loss of moisture to a content of 85.0–90.0% of dry substances and their drying, which causes their non-durable storage periods [7].

The use of pectin from fruit and berry, including local, raw materials is a promising direction not only to increase the physiological value of confectionery products, but also to increase their shelf life, since pectin has good water-retaining power, retains free water in products, therefore when adding in confectionery, in particular—zephyr, increases their shelf life [8, 9]. In addition, according to the Agency of Industrial Information, currently there is practically no own production of pectin in Russia, and the demand for it is met through imports. However, today, under the ongoing embargo, imported pectins are practically unavailable, with the exception of Chinese-made pectins (Yantai Andre Pectin Co., Ltd.) [9].

II. MATERIALS AND METHODS OF THE RESEARCH.

The material for the analysis was the statistical data on consumer preferences and awareness, obtained in the course of marketing research using the method of non-directive interview with the use of online social media survey technologies. The method of non-directive interview allows you to flexibly change, if necessary, the order of questions and answer options. In addition, the respondent can offer his/her own answer. 450 residents of Yekaterinburg aged between 16 and 60 were interviewed. The sample is representative of the age and gender

structure of Yekaterinburg with an error of 7%. The main characteristics of the population living in the city are: the total number of residents is 1,469 thousand inhabitants, including men 47%, women 53%, and population density is 3,139 people/km².

III. RESEARCH RESULTS AND ITS DISCUSSION.

Since the main task of the research was to study consumer awareness of the shelf life of pastila-like products, the answers to the 1st question “Do you pay attention when buying zephyr and pastila on the production date and shelf life?” are as follows (Fig. 1).

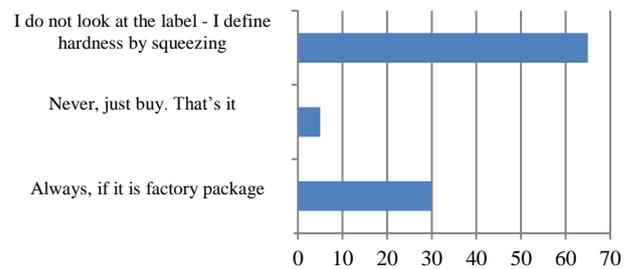


Fig. 1 – Consumer behavior when buying pastila-like products, %

As can be seen from the diagram in Fig. 1, 65% of respondents do not trust the marking data, apparently having experience of information falsification, and trust only their tactile sensations, squeezing the product; 30% always look at the date of production and shelf life, thus showing their trust in relation to the manufacturer and the seller; and only 5% of respondents never look at the expiration date, explaining that they did not have to buy stale pastila-like products.

When answering the question of the questionnaire “Have you ever thought that the shelf life of pastila-like products indicated on the label is overestimated?”, the overwhelming number of respondents (60%) answered positively, and very categorically—it is definitely overestimated; 25% did not think about it, because they have no experience buying zephyr and pastila, and 15% choose these products according to their own tactile sensations (Fig. 2).

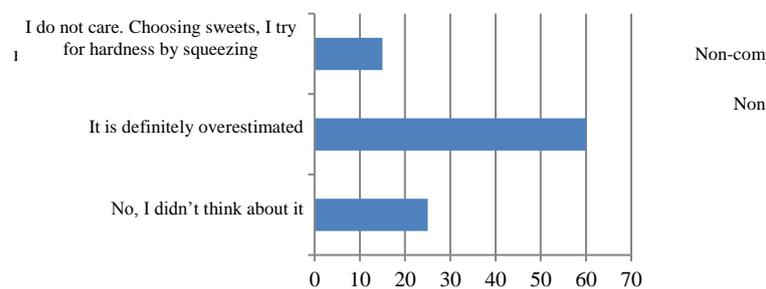


Fig. 2 – Attitudes of consumers to information about the shelf life of pastila-like products, %

This is a very correct approach when choosing many food products, as even experts in the mass media advise consumers to independently determine whether the products they buy are suitable for food, whether they are of high quality,

fresh, and tasty, which is possible, to a certain extent, using their own sense organs.

The survey found that 52% of respondents have experience buying zephyr, the quality of which did not suit them for such sensations as defects in taste, consistence, and surface (Fig. 3).

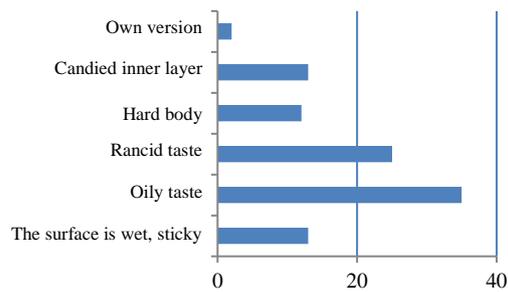


Fig. 3 – Consumer feelings when buying low-quality pastila-like products, %

As can be seen from the diagram in Fig. 3, all discrepancies or defects can be attributed to three groups: defects of taste, namely, rancid taste (25%), oily taste (35%); appearance defects—the surface is wet, sticky (13%), and defects of consistence and structure—hard body (12%), candied inner layer (13%). At the same time, the current GOST 6441-2014 regulates the requirements for the consistence and structure of zephyr.

As for 2% of respondents who offered their own answer, these were signs of infestation with granary pests. The reason for this discrepancy is a violation of the sanitary storage regime.

It was interesting to learn the opinion of consumers about deviations from the normal organoleptic characteristics of pastila-like products (Fig. 4).

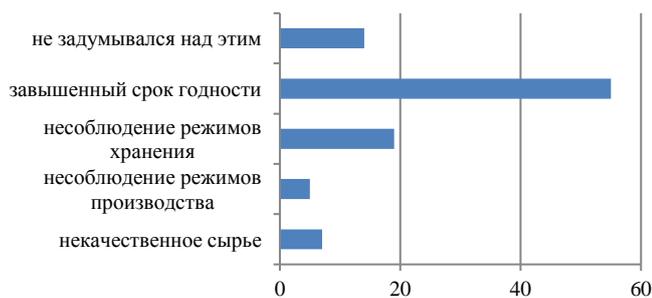


Fig. 4 – The reasons for the deviation of organoleptic indicators from the norm of pastila-like products, %

As can be seen from the diagram in fig. 4, more than half of the respondents consider the main reason for the defects of pastila to be overestimation of shelf life. Quite a small part of the respondents (12%) believe that the cause of the defects is poor-quality raw materials and non-compliance with the production conditions, that is, the majority trust the manufacturers; 19% of respondents believe that defects have arisen due to non-compliance with storage conditions, which is quite true, as during transportation and storage, and these are

unavoidable stages of distribution, the indicators of the climatic regime are not always observed—temperature should not exceed 18°C and RH—no more than 75%; it is possible temperature drops, leading to wetting of the surface, and a decrease in RH below 70%, at which the product dries, the consistence becomes coarse and inelastic, and the structure is hard and not sufficiently lush.

According to the survey results, it can be concluded that consumers of pastila-like products believe that their shelf life is clearly overestimated, having experience using low-quality pastila and zephyr with an overestimated shelf life.

At the next stage of the research, consumers' awareness of enriching ingredients and the importance of their presence in pastila-like products were ascertained. Answering the question “What is your attitude to enriched functional food ingredients (nutrients—vitamins, micronutrients, dietary fiber) confectionery?”, 75% of respondents gave a positive response, which indicates awareness of the positive impact of functional foods. The remaining 25% expressed a neutral attitude.

According to the survey data, the composition of zephyr and pastila and their nutritive value is important for consumers; for 95% of respondents, it is important to have an enriching ingredient in zephyr and pastila, which gives it the functional properties. However, only 30% of respondents are aware of the functional food ingredient pectin and its beneficial properties.

As for the last question of the questionnaire “If you were offered a zephyr containing pectin from local fruit and berry raw materials, would you buy it?”, the respondents answered as follows (Fig. 5):

It was found that only 26% of respondents categorically answered “no”, preferring zephyr, prepared according to traditional recipes and, apparently, poorly aware of the benefits of food ingredients obtained by biotechnological methods from local raw materials; only 14% of respondents found it difficult to answer this question.

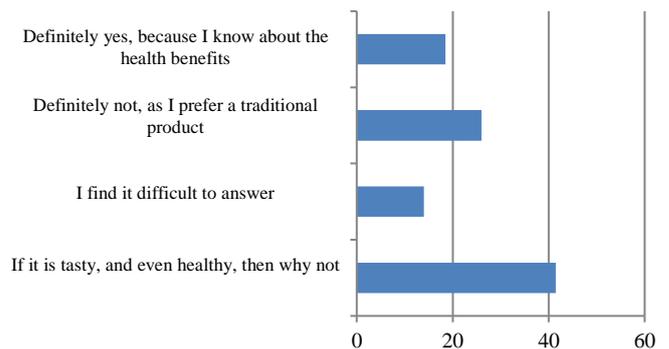


Fig. 5 – The study of the potential demand for zephyr, which contains pectin from local fruit and berry raw materials, %

But interest in zephyr, containing pectin from local raw materials, was shown by the majority of respondents—60%, with 18.5%—in the form of direct demand.

Summarizing the results of the marketing research, it can be concluded that the potential buyers of zephyr, which include functional food and technological ingredient pectin

from local fruit and berry raw materials, are 60% of respondents.

Consumers of older age groups (over 60 years old) prefer products of domestic producers, while the product itself is much more important than its image. In addition, there is a prejudice that imported products cannot be natural and high-quality. Middle-aged consumers and the younger generation are becoming more and more demanding and give their preference to quality and expensive products—various new products are popular among them [10]. This factor determines a number of tendencies characteristic of the confectionery market: interest in healthy nutrition, natural products, and demand for functional foods [11].

A new product, due to its obscurity for the consumer, most often automatically attracts its attention. At any given time, the buyer has certain needs and appropriate opportunities to meet them. Representing a new product in the market, including a functional focus, the manufacturer offers the buyer a new way to meet the needs [12, 13, 14].

Thus, the scientific-technological and industrial development of the industry is a fundamental factor in improving the quality of confectionery products. At the same time, its development is possible only in the presence of a full-fledged innovation system, including education, science, new technologies, modern business methods, as well as highly qualified personnel that can fulfill the tasks facing the agri-food sector and food industry. In this aspect, the feedback from consumers can act as one of the components of the enterprise innovation system [15, 16].

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