

How bakery industry is changing to comply with new consumer trends on sustainability and eco-consciousness

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Abstract. The paper provides the main features of the requirements of sustainable development for baking industry to comply with new trend of consumer demand, especially in cohorts of millennials and zoomers, The authors analyzed the best practices of market leaders in the development of a corporate strategy for sustainability. It has been established that the sustainable development strategy is based on the principle of life cycle assessment of bakery products (LSA) and has to be comprehensive, including economic, social, political and environmental aspects: the use of natural capital, assessment of the carbon and environmental footprint, minimization of waste of food raw materials and final products and the use of environmentally friendly packaging, traceability and transparency, the health of consumers and staff support, the use of local raw materials and recipes, concern for the development of local communities and the preservation of the biosphere in the places where products and consumed plant raw materials are produced, intensive communications with consumers to explain sustainable development issues. Bakery products should be positioned as traditional, natural, friendly for the planet and a man. The authors conclude that for successful bakery business has good foundation to be positioned for consumers as really sustainable

1 Introduction

Now the development of bakery industry is characterized by increasing level of uncertainty due to the emergence of new political, economic, epidemiological and climate risks. The consequences of the COVID-19 pandemic have been coincided with a demographic shift associated with rising share of digital generations of millennials and zoomers in the structure of the Russian working-age population. It entails a real change in the paradigm of demand on bakery products, assortment structure and business models based on the widespread applications of digital technologies. Meanwhile in course with concern of the obvious climate changes consumer attention is turned to the implementation sustainable

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development principles and their adaptation in all food industry and bread as a traditional staple. The influence of ecological aspects to health of a man as well as the planet are considered as a key point. The Deloitte Global 2022 Gen Z & Millennial Survey informs that 75% of zoomers and 73% of millennials agree that the world is at a tipping point of responding to climate change and accordingly 44% and 43% are optimistic that efforts to protect and sustain the health of the planet will be effective [1]. Obviously, the ongoing "tectonic" changes require scientific understanding how to comply with the new paradigm of demand. Therefore the business needs of new appropriate positioning of bakery products and baking technology.

Already in 1996, the President of the Russian Federation approved the Concept of the country's transition to sustainable development aimed to ensure a balance in solving socio-economic problems and the tasks of preserving a favorable environment and natural resource potential for people's needs. At present Russia does not have a single strategic document exclusively dedicated to sustainable development, however, the United Nations (UN) sustainable development goals are included in a number of national projects and government programs, and are also reflected in the Food Security Doctrine and the Environmental Security Strategy of the Russian Federation.

UN considers the issue in three aspects - social, economic and environmental. The severity of the problem raising in course of current climate warming, environmental pollution and other negative phenomena transmitted on us as through mass-media as real facts turned to become a matter of concern to the public consciousness. The international Agreements on Climate Change were signed in Kyoto and Paris, their implementation is regularly discussed at special summits, the last of which was held at November 2022 in Sharm el-Sheikh. There at the first time the role of food industry in context of the problem was discussed and have been drawn attention to building of sustainable food production [2]. Under that condition the issue of sustainable bakery business can not more be ignored.

In domestic researches there are until no scientific provisions for bakery business on the features of developing a long-term respond to current challenges in field of sustainability and future shift in consumer demand. At the same time, the main notions of ecological economy and sustainable approach to food business are already designed as in scientific tractates as in the acts of international bodies. Now sustainable development is understood as a type of development that meets the needs of the present without compromising the ability of future generations to meet their own needs [3].

So the purpose of the study is to investigate the need and feasibility of bakery business to be resilient on sustainable and ecological shift in consumer behavior in the long-term prospects.

The authors suppose to solve the following tasks:

- to disclose the key consumer expectations on sustainable bakery business and products;
- to determine peculiarities of the application of sustainable development goals to the bakery business;
- to investigate the practice of successful players of bread market in the development of a sustainable strategies and provide key characteristics of bakery business and baking products to be resilient to new trends.

2 Materials and methods

As a methodological basis for the research there were used the methods of industry analysis, desk research of statistic data, corporate reports, open sources and marketing researches. As the Russian bakery market, especially the largest regional markets of urban agglomerations, is characterized by global organizational and consumer isomorphism [4], the authors have analyzed the experience of leading foreign companies. There was made a study of domestic and foreign researches on the issues of sustainability and sustainable development in the light of documents of the United Nations and other international acts with Russian participation. The method of analysis of the content of Internet queries in the leading Russian search engine Yandex.Wordstat (Selecting words, <https://wordstat.yandex.ru/>) was also applied. At last there were used theoretical positions of ecological economy and institutional approach.

3 Results and discussion

As our calculations based on Rosstat database [5] (<https://rosstat.gov.ru/folder/12781>) demonstrate already at 2022 year in Russia the number of millennials and zoomers was 46.3 million persons, including about 40 million persons of working age, which is almost 50% of the working population. The generations were named digital natives as entered in conscious age surrounded by gadgets and the Internet [6]. Obviously up to 2030 year digital natives will make up the vast majority of consumers. They are differed from previous generations in the way of thinking and, accordingly, the way they choose their diet. These generations tend to pay more attention to the issues of climate change and the well-being of the planet.

The shift in the demographic structure affects the change in demand on bakery products. First of all, the demand for traditional mass varieties is falling. As there was shown by our calculations based on statistical data [7], in the period from 2010 to 2021 years the consumption by Russian households of wheat bread was decreased by 18% and for rye and rye-wheat bread by 17.6%, with a total decrease of bakery products in demand by 15% (Fig.1).

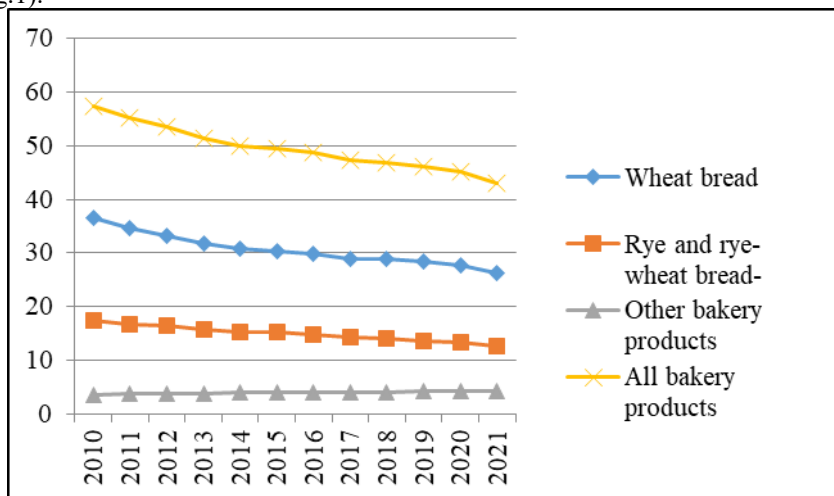


Fig.1. Consumption of bread and bakery products by Russian households in kg for person per year at 2010-2021 years

Meantime since the end of the previous century in developed countries there has been a revision of the general idea of nutrition. If earlier the main value was considered as the prevention of hunger, and in this context bread served as the important element of everyday diet, now the UN and other international organizations have adopted a number of documents that recognize human rights not only to be satisfied in sufficient amount of safe food, but also physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life and also protection of ecological sustainability and the carrying capacity of ecosystems to ensure the possibility for increased, sustainable food production for present and future generations [8].

The formation of a new ecological consciousness by consumers requires a new positioning of bread-baking. At recent years the consumer interest in the field has become more and more evident.

It may be discussed two aspects of the impact of the ongoing changes on the bakery industry:

Firstly, the paradigm of demand for bakery products is changing, when not only their nutritional value and price are taken into account, but also the compliance of the product with the requirements of sustainable development, the impact on health like a man and the planet.

Secondly, there are being imposed special requirements on technological processes, primarily in terms of reducing greenhouse gas emissions into the atmosphere, switching to recycling and renewable resources, minimizing food waste and impact on the biosphere (environmental footprint).

The results of analysis of consumer trends on sustainable development showed the follows consumer priorities:

1. Progress of the manufacturer in reducing the carbon footprint.
2. Increased focus on reducing food waste.
3. The use of environmentally friendly circular packaging, especially based on natural raw materials.
4. Attention on special ecological labeling or promotion of information about sustainability programs.
5. Traceability and transparency of the entire food chain to ensure information about sustainable sources of raw materials, as well as social factors - the well-being of farmers, staff, animals.
6. Promotion of organic bakery products.
7. Increased attention to traditional regional bakery products using local raw materials and technologies.

Many Russian consumers feel that the state of the planet has reached an extreme point, and climate change has already begun to affect everyday life. At future this trend will play an increasingly significant role in consumer behavior. As there was noted above, consumers want to see the progress of food producers to build a new reality that is friendly to the planet and people. In accordance with Russian surveys, from 25 to 55% of consumers buying food take into account its environmental friendliness but amidst millennials the share is 58% [9].

Moreover analyzes of Internet queries demonstrates a growing interest in such words as a natural product, traceability, organic product. Our calculations based on Yandex WordStat database demonstrates that greatest interest is shown by consumers in Moscow, Moscow region and St. Petersburg (table 1). These markets of bakery products are leading in Russia in terms of sales and growth rates.

Table 1. The shares of word quires in Russian Internet from Moscow region and Sankt-Petersburg in total quantity of quires at May of 2023, %

Word	Moscow and Moscow region	Saint Petersburg
Carbon footprint	29.4	6.2
Sustainable development	25.6	9.1
Traceability	29.9	6.9
Organic bread	32	4.4

The changing paradigm of demand and the growth of global risks require from business to adapt and the raw material base and the technology of baking provide ample opportunities for this.

One of the main theoretical provisions of ecological economics is the concept of natural capital, which is defined as stock that yields a flow of natural services and tangible natural resources [10]. This includes energy of natural resources, land, minerals and fossil fuels, water, living organisms, and the services provided by the interactions of all of these elements in ecological systems. It is a source that generates the flow of natural services and material natural resources used by the bakery business along with traditional fixed and circulated capital.

The bakery business uses or can potentially use the following elements of natural capital: traditional and non-traditional energy sources (solar, wind, hydro-energy); fossil fuel; water for technological and general purposes; land for making business activities; renewable natural bio-resources - plant raw materials and yeast and other microorganisms; ecosystem services in the form of the activity of yeasts and microorganisms during the fermentation of dough as well as in the processing of waste. At the same time, the bakery business has a fairly high level of environmental efficiency, which is understood as the ratio of the result obtained in the process of using all capital resources to the results extracted from natural capital without taking into account the use of renewable natural resources - grain and other plant raw materials, microorganisms and recycled water. The greater the result extracted from these renewable resources in the ratio, the higher the efficiency of the business from point of view of ecological economy.

Also the assessment of the level of greenhouse gas emitted at the production process has the great importance for a sensitive to sustainability consumer. Now according to international organizations the share of greenhouse gas in relation to the entire agri-food sector is currently estimated, as about 30% of the total emissions. [11]. In Russia, according to the Ministry of Natural Resources and Roshydromet, this share is significantly lower due to the structure of the economy oriented towards the extractive industry [12]. Bakery production emits carbon dioxide, methane, nitric oxide and during cooling and freezing of part-baked and frozen goods hydrofluorocarbons. Under the decomposition of phytocarbons in baking process there are released ethyl alcohol, acetic acid, acetic anhydride and other complex hydrocarbons, which subsequently are decomposed with the release of carbon dioxide [13]. Bakery production emits and absorbs greenhouse gases from both biogenic carbon (food raw materials and waste) and fossil fuels (fuel and energy, transportation, packaging).

The analysis of methods for calculating the carbon footprint showed that now in fact there are no reliable databases to determine it in bakery industry and researchers are guided by various sources (technical consumption rates of raw materials and fuel, statistical and other data). Some researches content examples of the calculations both for traditional products and frozen and part-baked goods. The results of different studies significantly differ in quantitative parameters. At the same time for mass breads the baking technological process itself directly generates only approximately 15% of the total carbon footprint in carbon dioxide equivalent, including most of its stages; about 10% is generated by

transportation and sales, and less than 5% by packaging [14]. The main bulk of the emission relates on the stages of production of raw materials and consumption. In particular, food waste in trade and households are estimated at 30 percent or more of total carbon footprint.

The analysis of the best practices of leading bakery companies (Grupo Bimbo, Barilla Group, Mondelez International, Lantmannen Unibake), showed that to comply with new consumer trend on sustainability they develop special programs and strategies, reports on their implementation, pay great attention to participate in various forums, communicate with specialized organizations.

At recent some researchers began to argue that driving of consumer attention to sustainability has being to become not only a factor of ethics and creating an attractive image of the company, but also to entail an increase in market value of its business. This approach has been called environmental and social corporate governance (ESG) [15]. Therefore, sometimes the tasks of sustainable development are considered within the framework of the appropriate strategy, as, for example, in Mondelez International, the world's largest producer of snacks, also present on the Russian bakery market.

The study showed that usually sustainable development strategies are linked to the UN Sustainable Development Goals and include the following areas:

1. A sustainable, healthy line of bakery products proposing an accent on reducing the content of critically important substances (salt, sugar, trans-fats), immune effect, increasing the content of useful components, enrichment with minerals and vitamins, improving fat composition, the use of wholegrain and other raw materials containing dietary fiber, resistant starches, proteins; a personalized approach to products to satisfy the needs of specific consumers and provide them indulgence; reliable information on the packaging regarding the issues of sustainable development and the impact on health.

2. Raw materials and resources meeting the requirements of sustainable development, primarily for grain raw materials, land, animals, human workers, revision of suppliers to select adhering to the principles of sustainable development. Much attention is paid to minimize the loss of food raw materials, the secondary application of food waste, the use of waste from other food industries, in particular beer. In terms of packaging, there have been set target indicators for reducing plastic, introducing recycled packaging, packaging decomposable in nature, natural based on edible and plant raw materials, reducing the size and density of packages, optimizing the use of recycled packaging and other transport packaging.

3. Target indicators on reduction of greenhouse gas emissions set for each stage of the production process including the use of digital technologies, primarily the Internet of Things and Artificial Intelligence to optimize the technological process and reduce fuel consumption per every production unit, to reduce emissions of biogenic carbon, to increase the use of wind, solar, hydro power, and the share of electric vehicles in the transport fleet.

4. Logistics aimed on optimization of storage systems (size and location of warehouses, reduction of energy consumption in refrigerators and defrosters, use of natural coolers, optimization of routes and tonnage of transport, for example, higher capacity in order to reduce fuel consumption per ton-kilometer of a run).

5. Development of local communities in the regions where production units are located, priority in the production of bakery products to use local grain raw materials and local recipes, including national ones; support for the local biosphere, including pollinating insects; support for regional farmers and small businesses, including small forms of trade; educational environmental programs for the local population; charity to local development and health programs; shifting to local suppliers throughout the food chain.

6. Staff development, including educational programs on sustainable development, health care and professional development; promotion of a healthy lifestyle for employees (proper nutrition, physical activity, medical care).

7. Communications aimed at outsourcing resources from the business environment, in particular in the form of awards from specialized non-profit organizations, assignment of eco-identifiers and promotion the image of the company as embedding its business into the goals of sustainable development.

To manage sustainable development the companies also create a special organizational structure and sometimes introduce the position of vice-president or executive director who coordinates the implementation of programs in different departments.

At the same time sustainable bakery products are often sold under a special brand and are positioned as having a zero or small carbon footprint, delivered by ecological transport, in natural circulating packaging, organic, completely consumed without non-degradable waste.

To promote a food product as resilient to eco-conscious consumers the companies use various types of special labeling currently being introduced in different countries - indicators of the carbon and environmental footprint.

4 Conclusion

Increased attention to health and demographic changes entail a transition to a new paradigm of consumption of bakery products associated with a change in the institutional values of digital native generations, characterized by an increase in interest in sustainable development and healthy nutrition. The processes will accelerate at nearest future. Therefore bakery business has to adapt the new reality and to take into account a need of its positioning as committed to sustainable development and bakery products as friendly to a man and the planet.

The bread itself as ancient natural staple food economy having been based on natural plant food raw materials and on application of services of microorganisms is according with principles of ecological and enables real opportunity to be promoted as sustainable both for the business and the product.

References

1. Deloitte Touche Tomatsu Limited, The Deloitte Global 2022 Gen Z & Millennial Survey, 21 (2022)
2. United Nations, Report of the Conference of the Parties on its twenty-seventh session, held in Sharm el-Sheikh from 6 to 20 November 2022, 8 (2023)
3. Thomsen, C. Encyclopedia of Corporate Social Responsibility, 2358 (2013)
4. Kostyuchenko, M. N., Kosovan, A. P., Shaposhnikov, I. I. & Martirosyan, V.V., *The bakery products market in the globalization economy conditions: institutional changes and trends in the development of consumer behavior and competitive strategies*, Proceedings of 2nd International Scientific Conference on New Industrialization: Global, National, Regional Dimension (SICNI 2018). Advances in Social Science, Education and Humanities Research. **240**, 500 (2019)
5. Rosstat, Demographics, 1278 (2023)
6. Plensky, M., On the Horizon, **9-5**, 1(2003)
7. Rosstat, Consumption of Food Products in Households at 2021 year, 19 (2022)

8. FAO, Voluntary Guidelines to adequate support the progressive realization of the right of the adequate food in context of national food security,19 (2005)
9. VCIOM (Russian Public Opinion Research Center), Ecological Consumption, analytical review (2021)
10. Daily, H.E., Farley, J., Ecological Economics, 17 (2011)
11. Crippa, M., Solazzo, E., Guizzardi, D., Monforti-Ferrario, F., Tubiello, F. N. & Leip, A., Nature Food, 1 (2021)
12. UN, Report on the technical review of the fourth biennial report of the Russian Federation, 5 (2020)
13. GosNIIHP, Methodical Guidelines on rationing, accounting and control of re-emission of pollutant in bakery enterprises, 3 (1996)
14. Espinosa-Arias, N., Stichnothe, H., Azapagic, A, Int J Life Cycle Assess, **16**, 356 (2011)
15. Barnett, M. L.; Salomon, R. M. Strategic Management Journal.27, 1120 (2006)