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Consumers' Willingness to Buy Novel Functional Food Products †

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Abstract: Functional foods are products that have clinically evidenced health benefits for consumers due to one or more of their ingredients. While research indicates that consumers are highly interested in these products and are often willing to pay premium prices to buy them, stories of market failure are frequent for the specific category. Hence, a critical question is what determines consumers' willingness to purchase functional food products. A hypothesis confirmed by many studies is that health concerns are positively associated with purchasing intentions. Nevertheless, other factors may also positively or negatively affect consumers' willingness to buy functional foods. Our work examines this contention by focusing on a novel functional food product: yogurt enriched with sea buckthorn. The product, which is developing in the framework of an ongoing project, is expected to combine the health benefits of yogurt with the medicinal properties of sea buckthorn.

Keywords: functional foods; consumes; novel products

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1. Introduction

Our daily diet influences our nutrition, just as it does our overall health and wellness. In this respect, there is a wide range of food products designed to offer benefits beyond just simply energy, minerals, or vitamins, the so-called functional foods [1]. Functional foods, by their definition, are foods offering health benefits beyond their intrinsic nutrient value. Because of their nutritional and nutraceutical values, functional foods can prevent various chronic conditions and contribute to health [2]. Functional foods can be defined as dietary

supplements that in addition to their nutritional values, can positively influence body functions towards enhancing physiological responses or reduce the risk of certain diseases [3]. Active components of functional foods can have beneficial effects on metabolic disorders, such as hyperlipidemia, type 2 diabetes, obesity/overweight, hypercholesterolemia, and inflammation [4]. As public awareness of health benefits grows, the functional foods industry is emerging rapidly [5,6].

Sea buckthorn or Hippophae is a deciduous shrub of the family sea buckthorn. Textual research indicates that it has existed on Earth for approximately 200 million years. The ancient Greeks discovered it around 5000 BC and since then it has been employed as a medicinal remedy or a sacred food for both healing and nourishment [7]. At present, more than 20 countries all over the world are promoting and utilizing sea buckthorn. Sea buckthorn ranks first among the top ten raw materials of health products, as announced by the World Health Organization [8].

Sea buckthorn is endemic to Asia and Europe, mainly distributed in the temperate and cold temperate zones of Eurasia. Approximately 150 species, subspecies, and varieties of sea buckthorn have been identified within Eurasia; they differed in the habitat of the shrub, the appearance of berries, and their use value [9]. Among them, *Hippophae rhamnoides* is the most important and widespread in Europe [10]. This plant has attracted the interest of researchers for centuries due to its many properties and numerous economic benefits. It has been utilized in daily life for various purposes, including as a raw material for food products, cosmetics, and nutraceuticals, as well as for environmental protection. Additionally, this plant has a rich history in natural medicine that continues to this day [11].

The two most common products derived from the fruit are juice from the fleshy tissue of berries, and oil produced from the seeds of berries [11]. The plant contains a diverse range of nutrients and bioactive components, including minerals, vitamins, polysaccharides, unsaturated fatty acids, terpenoids, polyphenolic compounds, nonsteroidal compounds, flavonoids, organic acids, and volatile components [12]. Due to this remarkable chemical composition, sea buckthorn exhibits a diverse array of beneficial biological, physiological, and medicinal effects, which were extensively described, such as antioxidative and immunomodulating, cardioprotective and antiatherogenic, antibacterial and antiviral effects, healing effects on acute and chronic wounds, antiradiation, anti-inflammatory, antidiabetic, anticarcinogenic, hepatoprotective, and dermatological effects, etc [9,13–18].

The fruit of Sea buckthorn has been used for treating cardiovascular and respiratory diseases for a long history [5]. Numerous studies have connected the role of dietary lipids to the prevention and treatment of various diseases. These functional lipids, including omega-3 and omega-6 fatty acids, conjugated linoleic acids, medium chain triglycerides, and phytosterols, offer numerous benefits for human health, particularly regarding chronic conditions such as in obesity, bone health, and in treating and managing depression, blood pressure, cardiovascular health, etc. [19]. The berries are nutritious, despite their high acidity. They are rich in proteins and essential amino acids, and they also contain mineral elements such as calcium (Ca), phosphorus (P), iron (Fe), and especially potassium (K), which is the most abundant among them. Additionally, fruits include high levels of vitamins, like C (695 mg/100 g, which is comparatively more than lemons and oranges) [20].

Food industry develops many products from the berries, leaves, and bark extracts of sea buckthorn [21,22]. The different parts of the plant can be processed into oil, juice, dried food, alcoholic beverages, candies, ice cream, tea, jam, biscuits, vitamin C tablets, food colors, medicines, cosmetics, and shampoos [23]. This plant holds a significant economic value, as not only the berries, but also the roots, leaves, and seed can be utilized to produce a variety of products. Over the past decades, there has been an enormous increase in the

production of products based on *Hippophae* sp., and its cultivation is expected to grow even more in the near future in certain countries (e.g., Greece) [24].

In this research, a novel functional food product, yogurt enriched with sea buckthorn is produced. This product, which is developing in the framework of an ongoing project, is expected to combine the health benefits of yogurt with the medicinal properties of sea buckthorn. Hence, a critical question is what determines consumers' willingness to purchase functional food products. The aim of the work is to assess consumer behavior, attitudes, and opinions towards the development of these new products involving the use of sea buckthorn.

2. Methods

This study is being conducted, from May to August 2024, within the framework of the SYMP.E.G.A. research project, which aims to develop novel agricultural products, specifically functional yoghurt enhanced with sea buckthorn fruits. Precision Agriculture will be used to improve the cultivation process of this innovative, nutritious, and value-added product. Its steps include: (a) researching and developing a novel Precision Agriculture business model for targeted cultivations, (b) applying Precision Agriculture technologies to sea buckthorn crops, (c) evaluating the effectiveness of five crop varieties, (d) harvesting sea buckthorn berries, producing high-nutrient yoghurt enhanced with sea buckthorn (both on a pilot and laboratory scale), and (e) taking steps to mediate and support innovation.

The same questionnaire (same dates, same sample) was used in the joint survey for the two sister projects (SAKAMI and SYMP.E.G.A.) [25]. Additionally, there were particular questions for the two projects' products (high nutritional value yoghurt enriched with sea buckthorn and cereal bars enriched with sea buckthorn, respectively). Specifically for the SYMP.E.G.A project the second part of the questionnaire was designed to investigate the influence of five categories of factors on consumers' willingness to buy the novel product: (a) Perceived health benefits of functional foods; (b) Expected sensory attributes of the product; (c) Sustainability performance of the product, involving an environmental and a social dimension; (d) Social acceptability of similar products; (e) Ease of finding the product.

3. Results

The results of the investigation showed that the examined parameters had an impact on consumers' willingness to buy yoghurt that has been enriched with sea buckthorn. Knowledge of the (bio)functional action (72.4%), health reasons (68.9%), support of small-scale farmers (69.6%), taste (14.9%), and price (23.7%) are the most important characteristics that can be proposed as predictors of consumer behavior.

Comparing the products of the 2 projects, we observe that younger consumers prefer to consume cereal bars enriched with sea buckthorn while older consumers prefer to consume high nutritional value yoghurt enriched with sea buckthorn. However, there is a special category of young consumers, mainly women, who are careful about their diet and are aware of healthy eating issues and who would be willing to pay even 50% more than conventional yogurt. This consumer group constitutes 12.5% of the sample and is the main target group of the SYMP.E.G.A. project.

4. Conclusions

This research has provided valuable insights into consumer behaviour toward a yoghurt product enriched with sea buckthorn, highlighting key factors that influence purchasing decisions, awareness levels, and consumption patterns. The findings indicate that while sea buckthorn is recognized for its health benefits—such as its high antioxidant

content, immune support, and nutritional value—consumer awareness and familiarity with the product remain relatively limited in many markets.

Knowledge of the (bio)functional action, health reasons, support of small-scale farmers, taste, and price emerged as significant drivers in consumer decision-making. Moreover, demographic variables such as sex and age, education, and health-consciousness significantly affect interest and purchasing behaviour. Marketing strategies emphasizing education, transparency about health benefits, and appealing product forms (e.g., juices, supplements, skincare) can enhance consumer engagement and trust.

In conclusion, increasing consumer education and targeted marketing efforts are essential for expanding the market for sea buckthorn products. Future research could further explore regional differences, long-term consumption trends, and the impact of sustainable sourcing on consumer perception.

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