

Original Research

Environmental and Social Approach to Creating a Product Strategy in Confectionery Industry Enterprises

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Abstract

The food sector, of which the confectionery industry is a part, is characterized by dynamism and constant increase in value. Consumption of food products has a significant impact on human health and life, while production processes affect the state of the natural environment. Both environmental and social aspects are the basis for creating sustainable food products based on the concept of sustainability. The aim of the study is to determine the degree of development of sustainable confectionery products in the studied companies. The research used CATI (Computer Assisted Telephone Interview) method, and CAWI (Computer Assisted Web Interview) method. The research tool used was a survey questionnaire. In order to determine the degree of development of sustainable confectionery products, statistical analysis was carried out using a development index based on distance from the benchmark. The results obtained indicate that the degree of development of a given object is quite far from the ideal. The theoretical and empirical considerations carried out in the article prove that there is a need for further research aimed at creating sustainable product offerings in food industry enterprises.

Keywords: environment, society, product strategies, confectionery industry

Introduction

The world's economic development is proceeding at a rapid pace, in addition to the benefits arising from the development of science, technology, biotechnology, information technology and other important areas of social-economic life, it also brings many threats. One such threat is environmental degradation and deterioration of the quality of human life [1-4].

The impact of industry on the environment can be defined as a serious interference in the ecosystem of our planet and the life of societies. The food industry, including the confectionery industry, has a significant negative contribution to the progressive degradation of the environment and the quality of life of societies [5].

Production and consumption of food is an important link in human existence. The food product, as the main element of the marketing mix of a food enterprise, is a product of human labour, whose primary purpose is to provide benefits to the consumer, among others in the form of satisfying hunger. Food production, including confectionery products, requires the provision

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of various fuels, energy, water and raw materials necessary to produce the product [6, 7]. Obtaining and using the mentioned goods is connected with the negative impact of production enterprises on the natural environment and society. The side effects accompanying the production of products in the form of pollution of air, water, soil, or exploitation of the earth's natural resources, as well as the demand for energy and various types of fuels needed for production, are a serious problem of the modern world [8].

Apart from the environmental hazards associated with food production, the consumption [9, 10] of some food products such as confectionery products is also important. The main raw materials used in the production of confectionery products are white sugar, glucose-fructose syrup, chemical preservatives and trans fats [11, 12]. The vast majority of confectionery products contain sugar, which is one of the major causes of diabetes. Excessive and uncontrolled consumption of sugar found in sweets can lead to other diseases i.e. overweight, obesity and cardiovascular diseases. Confectionery products containing added sugars are poor in vitamins A, E, C, B6, B12, folic acid and minerals including calcium, magnesium, iron, zinc [13]. Other serious risks resulting from high sugar intake include the development of some cancers, e.g. of the pancreas [14]. The consumption of sweets is closely related to dental health. Dental caries and premature tooth loss are more frequently observed in children who consume sweets several times a day than in those who rarely consume these products.

Food production, including the manufacture of confectionery products, is based on agriculture [15]. Agriculture provides the raw materials necessary for production, from which various types of confectionery products are made. Already at the stage of obtaining raw materials for production, measures should be taken to reduce or completely eliminate raw materials that may contain high concentrations of chemicals as a result of farmer's use of chemical fertilizers and pesticides, and such raw materials whose resources are ending or in short supply, such as cocoa beans [16-18]. Responsible and sustainable agriculture is the basis and starting point in the production of sustainable confectionery products.

The production process of confectionery products should therefore focus the attention of production managers already at the stage of product design. At the same time, the designing stage includes not only the product itself, but also takes into consideration the issue of product packaging and its utilization.

The food sector, a part of which is the production of confectionery products, is responsible for generating packaging and packaging waste. This is an important issue that needs a little more attention. The increase in the consumption of food products, including confectionery, contributes to the increase in the production of packaging, which at the end of their life cycle are perceived by consumers as worthless

items, which are then thrown away [19]. Such conduct is a serious threat to the environment and human health.

Considerations in the area of packaging and packaging waste management require the definition of waste. Cruz et al. [20] indicate that waste are defined in the Waste Framework Directive (75/442/EEC), as "any substance or object which the holder disposes of or is required to dispose of". The authors further note that this directive was amended in 2008 (2008/98/EC) but that the definition of waste remained the same. The issue of packaging and packaging waste is defined in the Directive of the European Parliament and of the Council - Directive 94/62/EC, of 20 December 1994. Since the publication of the directive, practically all member states have been undertaking major investments in their recycling systems (e.g. selective collection and sorting equipment and infrastructure). An important provision of the Directive is to indicate that all entrepreneurs placing packaging on the market are responsible for the management and recovery of packaging. In addition to the direct responsibility of companies for the management and recovery of packaging, producers of packaging waste may transfer responsibility to another entity [20].

Regulations on packaging and packaging waste significantly contribute to the protection of the natural environment, and also affect the performance of enterprises [21-22]. The impact of environmental regulations in the sector in question plays a special role in the activities of production companies such as food producers.

A close connection between the food sector and the agricultural production sector can be seen in such areas as energy - water - agricultural raw materials [23]. The indicated industry sectors cooperate with each other in the field of production, processing, distribution, product sales and consumption. On the consumer goods market, the so-called "from field to table" route functions more and more often, which means shortening the distribution channels of food products, and thus eliminating intermediaries in the process of distribution and sale of consumer goods. Reducing middlemen has a positive impact on the state of the natural environment and social aspects [24].

The occurring environmental and social problems accompanying the production of food products, including confectionery, can be eliminated or significantly reduced through the implementation by food industry enterprises of the concept of marketing based on the principles of sustainable development [25, 26]. Maintaining a balance between the production, consumption and sale of products, on the one hand, and environmental and social aspects, on the other hand, will certainly contribute to improving the condition of the environment and societies, and may positively influence the positive perception and development of a food enterprise as a sustainable organization [27, 28].

The article consists of a theoretical and an empirical part, to develop of which different research methods

were used. The theoretical part was created on the basis of literature studies in the field of work. The research method used in this part was the study of the literature on the subject based on, *inter alia*, on the following secondary sources: scientific publications, scientific journals, magazines in the field of the food industry, industry brochures, conference materials, legal regulations, online information services in the field of the food industry.

The empirical part of the article was prepared on the basis of own research carried out in the confectionery industry enterprises. The conducted research considered the issue of an ecological and social approach to creating a product strategy in confectionery industry enterprises. The implementation of the research required undertaking various activities, which were divided into the following stages: preparation of the actual research, gathering factual knowledge, preparation of scientific knowledge, formulation of the generalizations made, and editing of a scientific text. The decision to enter into scientific research was accompanied by a designated research goal.

The purpose of this paper is to identify and determine the approaches of confectionery companies in designing and manufacturing sustainable confectionery products.

A review of the literature on sustainable marketing, of which sustainable product is an important part, allows us to identify significant theoretical and cognitive gaps in this area of knowledge. By reviewing the literature, several publications devoted to sustainable marketing can be identified. This topic is dealt with by [29-36].

The available research on the marketing mix in the sustainable concept is mainly qualitative. They focus on a deeper analysis of a given phenomenon in order to obtain good-quality information and broaden the state of knowledge.

Additional indications of the existence of a scientific gap are the lack of quantitative research and presentation of the results of qualitative analyzes achieved so far, which undoubtedly constitute a valuable source of knowledge about the sustainable marketing mix, but they require further exploration and intensification.

In addition, there is a lack of scientific studies devoted to the issues of creating a sustainable marketing mix in confectionery industry enterprises, including product strategies focused on an environmental and social approach. The conducted qualitative and quantitative research presented in this paper contributes to filling the knowledge gap on this important and at the same time difficult to recognize topic.

The product, as the main component of a sustainable marketing mix, is the basic element of creating any marketing strategy in an enterprise. It is the product in the case of manufacturing companies, or the service in the case of service companies that is the good that is offered to market participants. In the literature on sustainable marketing, a product is defined as a good that satisfies customer needs [37, 38] and significantly

improves social and environmental performance throughout its life cycle compared to conventional products [29, 39]. The essence of a sustainable product is defined by Fuller [31]. The author argues that a sustainable product has environmental attributes that have been created through decisions about how the product is produced, the use of materials from which the product is made, how it operates, how long it operates, how it is distributed, how it is used, and how it can be withdrawn at the end of its life cycle. The author also refers to a sustainable product as a "green product". Martin and Schouten [34] believe that a sustainable product requires responsibility on the part of the company. The authors state that, defining a product as sustainable depends on how the product is managed, *i.e.* understanding, controlling and communicating the environmental, health and safety impacts/effects of the product throughout its life cycle, from manufacture to disposal or reuse.

On the essence of sustainable products, Leitner [33] presents her position. The author believes that a sustainable product is less harmful to the environment. Leitner points out that sustainable products taking into account social aspects and customer needs will better satisfy buyers' expectations than conventional offers. Kadirov [32] argues that from the perspective of original systems thinking, existing marketing concepts seem to be insufficient. The author points out that many marketing concepts develop alternative frameworks in marketing systems. An example of such systems creating sustainable products could be the marketing of hybrid cars. Such activities provide an alternative basis for redefining the basic problems of macromarketing, which should be particularly useful for system designers and decision makers. Their view on the essence of a sustainable product is also expressed by Belz and Peattie [29]. According to the authors, these are goods that satisfy customer needs and significantly improve social and environmental performance throughout the life cycle compared to conventional or competitive offerings. A similar interpretation of a sustainable product is presented by Peattie [39]. In turn, Dangelico and Devashish believe that creating sustainable products is about implementing new technologies or replacing critical components with completely new ones, which significantly reduce the negative impact of the product on the environment [40]. Hellström says that sustainable products focus on increasing eco-efficiency by using more environmentally friendly materials or designing recyclable products [41]. Sustainable products have a higher degree of complexity than regular products because they also cover environmental issues [42]. One of the ways to create sustainable products is to incorporate the idea of sustainable development into the design process, *i.e.* taking measures to reduce resource consumption and environmental impact [43].

Based on the cited definition, several characteristic features of a sustainable product can be identified [29]:

- ensuring customer satisfaction,

- dual focus (environmental and social aspects),
- full product life cycle orientation,
- significant improvements (sustainable products must make a significant contribution to solving environmental and social problems at macro level),
- continuous product improvement (a product considered to meet customer needs today may be considered standard tomorrow),
- competitive offerings (a product that satisfies customer needs may lag behind compared to competing products. Comparison of the product to competing products must be a criterion in making changes).

These characteristics of a sustainable product perfectly capture the essence of such a product and clearly distinguish it from a conventional product, the main purpose of which is to sell and generate economic benefits for the company.

Another definition of sustainable product indicates that they have ecological characteristics which are nothing but extended waste management factors that have been created by decisions on how the product is produced, what it is made of, how it works, how long it works, how it is distributed, how it is used and how it can be disposed of at the end of the product life cycle [31]. By further reviewing the literature in the area of sustainable product one can also find such a statement that a sustainable product does not contribute to the concentration of hazardous substances in the earth's crust and ecosphere, i.e. it does not pollute and poison the environment with toxic substances, fossil fuels and synthetic materials [34]. The statement made is mainly about the manufacturing process itself and the disposal of the product at the end of the product life cycle. The way products are designed and manufactured largely determines how much energy, water, fuel, raw materials and other natural resources will be required for use. Therefore, the product design and planning process is crucial in achieving sustainability [30].

The strategy for creating sustainable confectionery products should be integrated with the strategic plan of the company. Significant elements in creating a strategy are factors such as top management support as well as periodic reviews of the company's product offer. The most important element in creating a sustainable product strategy is undoubtedly the support of the top management - it is a prerequisite. The implementation of the strategy for creating sustainable confectionery products should start with the top management, as it is extremely important to include environmental aspects in decisions taken at lower levels of management. The implementation of the sustainable product strategy also takes into account the control and evaluation activities of the undertaken projects at short intervals. This procedure is to verify whether the new sustainable products meet environmental requirements and whether the production, financial and sales performance indicators are at a satisfactory level.

Creating a strategy requires multidimensional cooperation of experts in such areas as research and development (R&D), marketing and sales, and production engineering. It is recommended that the above-mentioned teams of specialists integrate with experts responsible for ecological activities in the enterprise, who know the practices, methods and tools of eco-design. Multidimensional cooperation of experts from individual areas of the company will contribute to creativity in action and exchange of knowledge, which is certainly a good step at the beginning of the path to creating sustainable confectionery products.

The essence of creating sustainable products by food companies, including confectionery manufacturers, is to achieve three goals: addressing climate change, alleviating poverty, and addressing natural resource depletion [44].

The strategy for creating sustainable confectionery products is based on a dual focus [29]. This means that production companies, in addition to reducing the negative impact of production activities on the environment, equally care about people and whole communities. Sustainable confectionery product is created through human labour. Thus, it is the duty of the company to provide decent and safe working conditions, ensure fair wages, surround workers with social protection, not employ children and apply a policy of sustainable purchase of raw materials for production, which means that the raw materials used in production come from legal sources and are created through fair and ethical activities [27, 45-47].

Considering the strategy of creating sustainable confectionery products, it is also worth pointing out that the main reason why products are manufactured is their sale on the consumer goods market. So the aim of companies is to achieve profit from sales of manufactured products. Obviously, one cannot refer negatively to such conduct of enterprises whose mission is to increase profits and market share. Sustainable marketing, which includes a sustainable product, carries a rational solution in the form of reconciling environmental, social and economic goals.

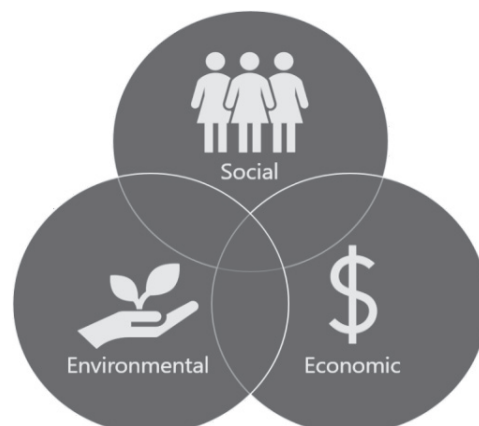


Fig. 1. Triple bottom line.

Consideration of triple bottom line values [48-52] leads to balancing environmental and social aspects with economic objectives of the company. It allows building the financial capital of the enterprise while respecting the environment and the quality of life of societies [53]. Fig. 1 shows the triad of objectives - triple bottom line.

Improving products by taking into account the concept of sustainable development when creating the product offer may contribute to achieving competitive advantage. Apart from ensuring good product quality, affordable price or convenience of purchase, an important attribute of a sustainable product will also be information on how it was produced. Emphasizing the importance and significance of conducting sustainable production activities by a confectionery company will certainly contribute to achieving planned economic goals.

Clearly, the managers responsible for production have a role to play in the development of sustainable confectionery product strategies. The attitude of high and middle level managers determines the production profile aimed at creating pro-environmental and pro-social products [54, 55]. On the one hand, the company seeks to maximize profits, and on the other hand, it incorporates environmental and social aspects into its operations. Production managers are therefore faced with the difficult task of achieving the set goals. Hence, it is so important to balance production, organizational, marketing and sales activities to ensure a balance between these areas. Moreover, managers are aware of the fact that the consumer goods market is subject to constant evolution and pressure from customers. This situation forces companies to look for newer and newer solutions in the area of production and creation of attractive offers which will provide customers with benefits and satisfaction. The customer, buying a product should be convinced that it has been produced with a sense of responsibility for the environment and is not the cause of social problems [28, 44].

Creating and marketing new confectionery products that are more environmentally and socially sustainable can expand the markets served as well as open up new areas of sales [56]. Developing new products requires managers to pay attention to future trends and market phenomena and to change their thinking to a more systems-environmental mindset. In addition, managers should expand their knowledge of new manufacturing techniques and availability of new raw materials or materials needed for production [57].

The literature review indicates that more and more attention is being paid to the issue of sustainable development. The issues concerning the strategy of creating pro-environmental and pro-social food products, including confectionery, are particularly important because of the influence of the consumption of these products on human health and life. Despite the observed increase in interest in the discussed issues among researchers, there is a need for further research on the subject both in the qualitative and quantitative

layer. This article is a starting point for further analysis in the area of creating product strategies based on the concept of sustainable development.

Experimental

The research presented in the article was conducted in confectionery enterprises operating on the Polish market.

The purpose of the study is to determine the degree of development of sustainable confectionery products in the surveyed companies.

In addition to the included research objective and outlining the means of achieving it through secondary and primary data collection, research hypotheses were included:

H1: Companies in the confectionery industry are taking steps to design and create confectionery products that respect the environment, but these projects are not fully implemented and need to be improved.

H2: Confectionery companies produce products with respect for social aspects, taking into account the health of consumers and the working conditions of the workforce.

The analysis identified the following research problem:

Do and what actions taken in the production sphere contribute to the creation of sustainable confectionery products?

Such defined research problem indicates a two-stage course of research. The first stage of research concerned environmental aspects. An attempt was made to assess the degree of implementation of practices aimed at protecting the natural environment. The second stage of research involved the identification of entrepreneurial activities focused on social aspects. Both the first and the second stage of the research were aimed at determining the level of development of sustainable products in the analysed enterprises. Taking into account the assumptions concerning the two-stage research course, Fig. 2 presents a conceptual scheme of the research.

The course of the research process assumed the acquisition of secondary and primary data as a result of a research study conducted among enterprises of the confectionery industry. The main interest of the researcher was to obtain information on the conducted business activities of enterprises, taking into account environmental and social aspects. For this reason, the author deliberately delimited these areas, which in turn made it possible to analyze, process, interpret and present the results of the research.

The research process was accompanied by certain limitations. A significant problem in the conducted research was encouraging the respondents to participate in the research. The respondents are rather skeptical about participating in the study, pointing to the lack of time or the lack of knowledge in the field of

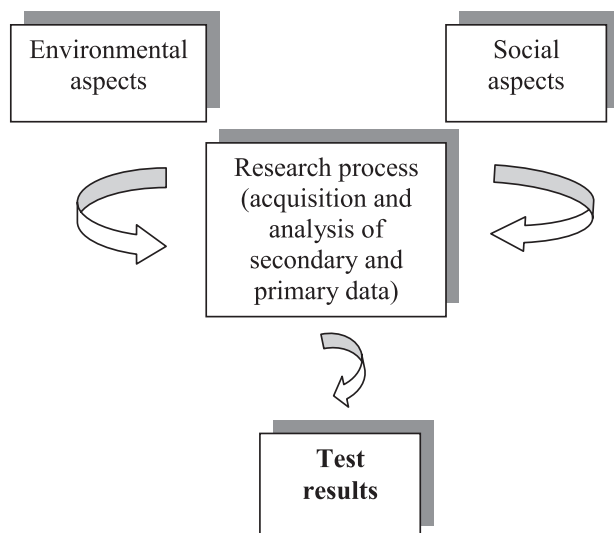


Fig. 2. The research process.

the conducted research study. Another limitation was obtaining the consent of decision-makers to conduct research in a given enterprise. The claim of decision-makers that providing information on the subject of research constituted an interference with the company's trade secret was also a certain difficulty. The limitations, however, were not the costs of the conducted research or the method of reaching the respondents. The internal research grant obtained by the author of this article made it possible to conduct a research study.

In the conducted research two interviewing methods were used, namely CATI (Computer Assisted Telephone Interview) and CAWI (Computer Assisted Web Interview), in which the respondent is asked to fill in a questionnaire in electronic form placed in an Internet application. The author of this article also planned to use the method of personal interview conducted in the offices of enterprises, but due to sanitary restrictions caused by the COVID-19 pandemic this method of research was not used.

The research was conducted on a random sample of 350 enterprises classified in the Polish Classification of Activities (PCA 2007) under the following codes PCA 10.72.Z (Manufacture of rusks and biscuits; manufacture of preserved pastry goods and cakes) and PCA 10.82.Z (Manufacture of cocoa, chocolate and sugar confectionery). The database was purchased from a professional market research company. The percentage of obtained answers amounted to 89 enterprises.

The tool with which the study was conducted was a research questionnaire consisting of two parts and containing a structured list of questions. The first part included questions on environmental issues while the second part of the questionnaire dealt with social aspects. A seven-point version of the Likert scale [58] was used in this study to increase the accuracy of measurement. The seven-point scale gives slightly higher measurement accuracy when a single statement

is evaluated. The study was conducted between August and November 2021. Table 1 provides the characteristics of the study conducted.

Results and Discussion

The implementation of the research requires the presentation of the general characteristics of the entities participating in the study. The structure of enterprises included in the research has been presented in Tables 2-6.

From the information in Table 2, it can be concluded that the largest group of enterprises participating in the study were medium-sized enterprises with 50-249 employees. It was 46 enterprises, which constitutes 51.69% of the surveyed companies. The second group of enterprises are large organizations with over 250 employees. 28 large enterprises took part in the survey, which constitutes 31.46%. On the other hand, the smallest group of enterprises participating in the study were small enterprises employing up to 49 employees. It was 15 organizations representing 16.85% of the respondents.

The enterprises covered by the research were also characterized in terms of their legal form. Table 3 presents the legal forms of enterprises.

The dominant legal form of participating companies was the Limited liability company - 36 organizations representing 40.4% of all surveyed companies. Enterprises operating as General Partnerships are the second group of enterprises, accounting for 25 organizations, i.e. 28.2%, respectively. Enterprises representing A natural person running a sole proprietorship accounted for 13 companies, which constitutes 14.6%, and the Joint stock company - 9 companies, i.e. 10.1%. The smallest representation in the study was provided by Limited partnerships 5 companies - 5.6% and Partnership 1 companies - 1.1%.

The presentation of the enterprises participating in the survey concerned the Provinces in which the enterprises operate. Table 4 shows the areas in which enterprises operate.

The largest number of enterprises participating in the study came from The Voivodeship of Mazovia - 13 organizations, which constitutes 14.6%. The next areas in terms of the number of enterprises participating in the study were the Silesia and Greater Poland Voivodeships, from which 11 companies each came - 12.4%. The smallest number of enterprises came from the following voivodeships of Pomerania, Lubusz, Sub-Carpathia - 3 companies - 3.4% and from the voivodships of Warmia and Masuria and Western Pomerania 1 enterprise each - 1.1%.

An important issue concerning the research study was obtaining information on the professional experience of the respondents participating in the study. The obtained data in this regard are presented in Table 5.

Table 1. Characteristics of the conducted research.

Specification	Characteristics
Object of the survey	Enterprises in the sugar industry
Research method	CATI (Computer Assisted Telephone Interview) CAWI (Computer Assisted Web Interview)
Research tool	Questionnaire survey
Sampling	Random
Population covered	350 companies
Number of enterprises participating in the survey	89 companies
Territorial area of the survey	Poland
Research time	August - November 2021

Source: own elaboration

Table 2. Number of employees.

0-49		50-249		250 and more	
No. of firms	Percent	No. of firms	Percent	No. of firms	Percent
15	16.85%	46	51.69%	28	31.46%

Source: own elaboration

Table 3. Legal forms of examined companies.

Legal form of the business	Number of companies	Percentage of companies
Joint stock company	9	10.1%
Limited liability company	36	40.4%
Limited partnership	5	5.6%
Partnership	1	1.1%
General partnership	25	28.2%
A natural person running a sole proprietorship	13	14.6%

Source: own elaboration

The largest share of respondents participating in the study had at most five years of professional experience, they were 33 people, or 37.1%. 27 people had professional experience in the range of 11-20 years, which constitutes 30.3% of the respondents. 24 employees - 27% had professional experience in the range of 6-10 years. The smallest number of people participating in the study had professional experience in the range of 21-30 years. It was 5 people, or 5.6% of the respondents.

Referring to the characteristics of the respondents participating in the survey, it is also worth presenting data on the position held in the enterprise. Table 6 presents the obtained data in this regard.

63 people in the management position participated - 70.8% of the respondents, while the respondents holding

a non-managerial position accounted for 26 people, i.e. 29.2%, respectively.

The population of 350 enterprises requires the determination of the research sample. Determination of the minimum size in the case of using in further studies the indicator of the structure is using the formula (1).

$$N_{min} = \frac{Np(\alpha^2 \cdot f(1-f))}{Np \cdot e^2 + \alpha^2 \cdot f(1-f)} \quad (1)$$

For the assumed significance level $\alpha = 0,05$, the estimated fraction size $f = 0.8\%$ and the precision level $e \leq 0.08$ assuming a maximum error of $\pm 8\%$, which can be considered a fairly decent level of reliability, and considering the size of the target population $Np = 350$, we obtain $N \geq 75$. In the conducted study, the random

Table 4. Provinces where the businesses operate.

The Voivodeship	Number of companies	Percentage of companies
The Voivodeship of LowerSilesia	7	7.9%
The Voivodship of Podlussia	7	7.9%
The Voivodeship of Pomerania	3	3.4%
The Voivodeship of Silesia	11	12.4%
The Voivodeship of Warmia and Masuria	1	1.1%
The Voivodeship of Greater Poland	11	12.4%
The Voivodeship of West Pomerania	1	1.1%
The Voivodeship of Cuiavia &Pomerania	6	6.7%
The Voivodeship of Lublin	5	5.6%
The Voivodeship of Lubusz	3	3.4%
The Voivodeship of Lodz	7	7.9%
The Voivodeship of Lesser Poland	7	7.9%
The Voivodeship of Mazovia	13	14.6%
The Voivodeship of Opole	4	4.5%
The Voivodeship of Sub-carpattia	3	3.4%

Source: own elaboration

Table 5. Respondent’s professional experience.

5 or less		6-10		11-20		21-30	
No.	Percent	No.	Percent	No.	Percent	No.	Percent
33	37.1%	24	27%	27	30.3%	5	5.6%

Source: own elaboration

Table 6. Position of the respondent.

Managerial position		Non-managerial position	
No. of respondents	Percent	No. of respondents	Percent
63	70.8%	26	29.2%

Source: own elaboration

sample N was 89 ($N=89$) companies operating in the confectionery industry in Poland.

To evaluate the degree of development of sustainable products in the studied confectionery enterprises, a development index based on the distance from the

benchmark was proposed. Let the object X_i described by the vector $(x_{i1}, x_{i2}, x_{i3}, \dots, x_{in})$ be evaluated, the benchmark be $X_i^* (x_{i1}^*, x_{i2}^*, x_{i3}^*, \dots, x_{in}^*)$ and the anti benchmark $X_i^- (x_{i1}^-, x_{i2}^-, x_{i3}^-, \dots, x_{in}^-)$. The development index of the object is determined from the formula:

$$m_i = 1 - d_i^* / d_i^- \tag{2}$$

where:

d_i^* is the Euclidean distance of the test object X_i from the standard X_i^* ,
 d_i^- is the Euclidean distance of the pattern X_i^* from the anti-pattern X_i^- .

Table 7. Minimum sample size N for error rate e .

Number of population Np	Error rate e	Minimum sample size N
350	0.08	75

Source: own elaboration

Table 8. Sustainable development indicators for confectionery product N = 89 (environmental area).

X1	X2	X3	X4	X5	X6
Designs products taking into account their impact on the environment	Saves energy, water and fuel needed for production	Eliminates or reduces the emission of harmful gases, dust, odorous substances, sewage, production waste	Uses renewable sources	Eliminates or reduces the types of materials used to make packaging, e.g. film, paper, plastic, aluminium	Uses packaging made from wholly or partly recycled materials
0.55	0.68	0.64	0.32	0.67	0.66

Source: own elaboration

Table 9. Sustainable confectionery product development indicators N = 89 (social area).

X7	X8	X9	X10	X11	X12
Designs products taking into account their impact on consumer health	Eliminates or reduces sugar, salt, chemical preservatives, artificial colors, trans fats	Uses raw materials of the highest quality for production	Effectively manages human capital with respect for employee rights	Ensures safe and hygienic working conditions for employees	Ensures fair remuneration
0.72	0.65	0.48	0.68	0.77	0.75

Source: own elaboration

The development index (2) belongs to the interval [0 ; 1] and the higher it is, the higher the degree of development of a given object X.

On the basis of the research carried out, indicators of sustainable product development were determined from formula (2) for enterprises in the manufacturing industry. The indicators are presented in Tables 8 and 9.

For a better illustration of the phenomenon, the values obtained are presented in Fig. 3.

The data presented in Fig. 3 indicate the level of development of the activities of the confectionery industry enterprises aimed at environmental and social aspects of creating product strategies in the surveyed enterprises.

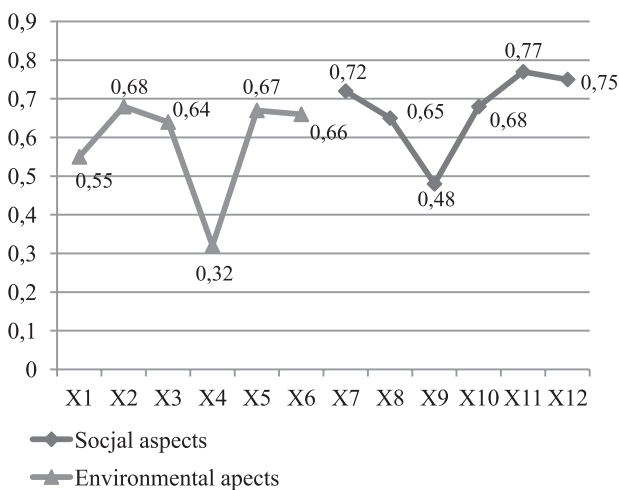


Fig. 3. Level of development of a sustainable confectionery product.

Evaluating the environmental indicators it should be stated that the X2 indicator, which defines the activities of enterprises regarding the saving of energy, water and fuels needed for production, is closest to the development pattern equal to 1. The value of this indicator is 0.68. The X5 indicator, is at a similar level of development, amounting to 0.67, it which defines the activities of enterprises in the area of elimination or limitation types of packaging materials used, e.g. foil, paper, plastic, aluminum. Also similar is the index X6 = 0.66 referring to the use by enterprises of packaging made from wholly or partly recycled raw materials. The X3 index, which defines the elimination or reduction of harmful gases, dust, fragrances, sewage, and the generation of production waste, achieved a slightly lower value. This indicator is 0.64. On the other hand, the index X1 = 0.55, concerning the design of products, taking into account their impact on the natural environment, and the index X4 = 0.32, determining the level of use of renewable sources by enterprises, are unfavorable. In the case of the X4 indicator, it can be concluded that this indicator is highly distant from the pattern.

When analyzing social aspects, it is worth noting that the issues related to providing employees with safe and hygienic working conditions are closest to the development pattern of 1. The X11 development index is 0.77, which is the highest rate among all analyzed social and environmental issues. The X12 indicator is at a similar level, namely fair remuneration of employees for the work performed. This indicator is 0.75. A fairly high figure of 0.72 is represented by the X7 indicator for product design taking into account their impact on the health of consumers. The above-mentioned three indicators related to social aspects were set at the level

above 0.70, so it can be concluded that the activities of enterprises related to social issues in this respect are at a satisfactory level. Slightly below the level of 0.70 were assessed activities related to the effective management of human capital with respect to employee rights: $X_{10} = 0.68$ and activities of enterprises in the field of eliminating or limiting the content of sugar, salt, chemical preservatives, artificial dyes, trans fats in products: $X_8 = 0,65$. On the other hand, the X_9 indicator concerning the use of the highest quality raw materials for production is unfavorable. This indicator is 0.48.

Conclusions

The paper deals with the question concerning the strategy of production enterprises with regard to creating sustainable confectionery products. The author was interested in confectionery enterprises operating on the Polish market. The product, as the main component of the marketing mix, occupies a special place in the business strategy of enterprises because it is the product that is the organization's resource whose task is to ensure the enterprise's income by selling it on the consumer goods market.

The market of food products is a very dynamic market, often referred to as FMCG (fast-moving consumer goods), which is subject to constant trends, fashions and also turbulences. One of these phenomena is the need, and even the necessity, observed today to create products that have the least negative impact on the environment and society. Such products are called sustainable products. Maintaining balance concerns three areas, i.e. achieving financial goals by the company, or economic benefits from its economic activity, secondly, maintaining the well-being of the natural environment, which means such human behaviour that takes care of the state of nature and the third area relating to people themselves, and more broadly speaking, whole societies that should be guaranteed the right to live in health, in a clean environment and possibly high standard of living.

The indicated areas have already been discussed in the earlier part of the study.

Focusing on the essence of this article, i.e. the strategy of creating sustainable confectionery products which, due to their specificity consisting in using in production processes such ingredients as: sugar, salt, trans fats or chemical substances, which are commonly recognized as damaging to human health and life, these companies have a special duty to create products which have the least negative influence on people's health condition. Apart from the influence of the consumption of confectionery products on the health of purchasers, the area of research also included environmental aspects.

Referring to the aim of the research, which is to determine the degree of development of sustainable confectionery products in the studied enterprises, empirical research was conducted, the results of which are included in this article. Tables 8 and 9 present the determined values of the overall assessment of development indicators in terms of creating pro-environmental and pro-social products in confectionery enterprises. For the surveyed companies, indicators $X_1, X_2, X_3, X_4, X_5, X_6$ determining the environmental area have the average value of $X_{env} = 0.58$. On the other hand, the indices $X_7, X_8, X_9, X_{10}, X_{11}, X_{12}$ referring to social aspects have the average value of $X_{soc} = 0.67$. With the values of indices $X_1, X_2... X_3... X_{12}$ it is possible to determine the global Y index for the evaluation of the examined phenomenon, which equals $Y_{glo} = 0.62$. This means that the degree of development of sustainable confectionery products (Y) in the surveyed enterprises is quite far from the ideal value of 1.

As a result of the empirical study, it can be concluded that the contained research hypotheses H1 and H2 were confirmed. Considering hypothesis H1 relating to environmental aspects, for which the index of the degree of development is $X_{env} = 0.58$ it is concluded that this hypothesis has been confirmed. When analyzing specific development indicators, by means of which the level of development of sustainable production activities aimed at environmental aspects of creating product strategies

Table 10. Procedure for creating pro-environmental and pro-social products.

Environmental aspects		Social aspects	
Stage 1	Stage 2	Stage 1	Stage 2
Complete elimination or reduction of atmospheric emissions of gases, dusts and fragrances	Use of energy and fuels from renewable sources (replacement of fossil fuels with renewable energy)	Eliminating from the production of substances and ingredients harmful to human health, e.g. chemical preservatives, artificial colours, flavour enhancers, etc.	Providing employees with health and safety at work as well as favourable working condition.
Stage 3	Stage 4	Stage 3	Stage 4
Effective and economical use of water in production processes.	Limitation of sewage and post-production waste production.	Guaranteeing fair remuneration for employees.	Selection of ecologically and social sensitive people for work.

in the surveyed enterprises was determined, it should be stated that the activities undertaken in this area are not implemented at a satisfactory level. Companies show positive tendencies only in limiting various types of materials such as plastic, foil, paper or aluminum needed for the production of product packaging. They also try to use packaging made from fully or partially recycled materials. In addition, enterprises save energy, water and fuel needed for production. However, the activities carried out are not sufficient to unequivocally state that the confectionery industry companies fully follow the principles of sustainable development, they are rather selective activities. Whereas H2, for which the index of the degree of development is $X_{soc} = 0.67$ is also confirmed. The companies participating in the study carry out activities aimed at taking into account social aspects, mainly in terms of ensuring safe and hygienic working conditions, respecting employee rights, fair remuneration, or the production of products whose consumption does not adversely affect the health of buyers. To this end, companies limit some of the raw materials needed for production, such as sugar, salt, chemical preservatives, artificial colors and trans fats. Despite some positive activities carried out by the analyzed enterprises in the social aspect, it should be noted that the degree of development index amounting to $X_{soc} = 0.67$ is not entirely satisfactory.

High and middle level managers play a special role in creating product strategies focused on the environmental and social approach. It is the attitudes and behaviours of management personnel that determine the implementation of activities aimed at creating pro-environmental and pro-social confectionery products. For this purpose, the author of this article has made an attempt to develop a procedure for managing production activities in confectionery industry enterprises aimed at creating product strategies based on environmental and social aspects.

The presented procedure covers environmental and social aspects. In each of these two areas there are four stages of conduct leading to the implementation of sustainable production of food products. The author recommends taking all actions contained in this procedure leading to ensuring sustainable production of food products. Selective use of individual activities will result in incomplete management of production activities in food industry enterprises and take on an apparent character.

The conducted research study, both in its theoretical and empirical layers, does not fully exhaust the undertaken subject matter. The author has attempted to determine the degree of development of a given object, which does not fully exhaust the problem of creating sustainable product strategies in manufacturing companies. Therefore, there is a need for further theoretical and empirical research in the analysed area. Future research should be characterized by intensity and depth in both qualitative and quantitative layers.

This article may prove useful and supportive for manufacturing companies, not only in the food sector, wishing to take action in creating sustainable products, but also for organizations operating in other sectors of the economy.

Conflict of Interest

The author declares no conflict of interest.

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