Z E S Z Y T Y N A U K O W E P O L I T E C H N I K I Ł Ó D Z K I E J
Nr 1218 ORGANIZACJA I ZARZĄDZANIE, z. 69 2017

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SUPPLY CHAIN ENTITIES' AWARENESS OF CORRECT FOOD LABELING AS AN ELEMENT CONTRIBUTING TO THE SAFETY OF THE PACKAGED PRODUCT

1. Introduction

The vast majority of foods offered to consumers is marketed in packaged form. The development of food production technology as well as retail sales demands drive continuous improvement in packaging. The main areas of improvement are: ensuring product safety, providing relevant information, streamlining the distribution process and facilitating end-use. The obligation to meet consumer requirements and expectations in those areas falls on food producers; however, all other entities forming the food supply chain should take part, and some responsibility, in the process of adapting the packaging to consumer needs.

In view of numerous irregularities regarding a low level of consumer satisfaction with food product packaging presented in literature, the aim of the study was to assess the awareness of supply chain entities in terms of validity of correct food labeling on a selected group of foodstuffs.

2. The role of supply chain in meeting consumer expectations concerning food

The supply chain is a network of manufacturers and service providers who work together to process and transfer goods – from raw material to the end-user. All these entities should be linked together by the flow of goods, information and cash [2].

Responsible businesses are aware that placing any food product on the market requires timely and reliable information, which is only obtained under close integration with other participants along the supply chain [4]. The aim of thus acquired data should not be merely to forecast and determine the level of demand. The scope of information necessary to do business on the food market should also include the observed preferences and expectations of customers towards the product. Relationships resulting from cooperation within the framework of existing supply chains need to be oriented towards the identification and fulfillment of consumer needs and expectations.

According to P.R. Murphy i D.F. Wood [13], the awareness – understood as knowledge and discernment of consumer needs – is one of the main benefits of the effective use of information in the supply chain. On the other hand, M. Christopher [3] points out that inside the supply chain not only the integration of business processes with suppliers is necessary, but with product distributors and consumers as well. A smooth operation of the food supply chain should also include processes that adapt the product packaging to customer needs.

However, research results indicate a low level of consumer satisfaction regarding information conveyed through the packaging of a food product [20], [16], [9], [10]. The most common irregularities are associated with low visibility of information on the packaging. Moreover, consumers seem to have difficulty reading and understanding targeted content. Another confirmation of relatively low involvement of food producers in correct labeling of products are annual reports of IJHARS (Inspekcja Jakości Handlowej Artykułów Rolno-Spożywczych – eng. Food and Agricultural Products Quality Control Inspectorate). According to the data for 2015, among all products checked, irregularities in the labeling were reported in as many as 26% of them. In comparison with the data for the year 2014, the number of improperly labeled products increased by 1.9 percent. The most common irregularities related to information such as product name, its composition or misstatements regarding its certain properties [19].

Properly selected and designed packaging contributes to its functionality as well as ensures the safety and comfort of product use. According to the currently prevailing views, the packaging should fulfill three main functions: protection, comfort (utility), and communication [12].

Labeling, as an element affecting all of the above functions of packaging, is an essential factor reflecting consumer expectations for food products. It shapes the overall quality of the product and the safety of its use [15]. Food labeling plays an important role in informing consumers about the characteristics of the product. Full and reliable information is necessary to make an informed and appropriate purchasing decision, but it also determines the safety of product use [8] [9].

The packaging, through its spatial form (shape), size, color and graphics, performs the function associated with conveying information. The informative aspect of packaging means: the presence and legibility of the mandatory and optional information important in terms of consumer rights, needs and expectations; the ability of the packaging, through its visual layer, to suggest the product's use; readability and accessibility of information through an appropriate use of visual elements [11].

Following a recent increase in the range and supply of food products, the consumers are becoming ever more informed, aware and demanding. That is why, the processes of packaging design must reflect the growing demands and expectations of consumers in terms of labeling [9]. In this study, it was assumed that the awareness of entities in the supply chain is essential to meet consumer needs and ensure product safety, including its packaging.

3. Empirical studies

The study was conducted among representatives of various entities in the supply chain of dietary supplements. This particular group of foodstuffs has been selected due to the surge in popularity of dietary supplements in all age groups and optimistic forecasts for further sales growth. Based on the analysis of supply chains for dietary supplements, the following entities have been selected for further investigation: producers and distributors (pharmacists, wholesalers, retailers) of these products.

The research was carried out with the use of questionnaires [14], [17]. The survey had quantitative character and covered the whole country. The method of entity selection for study was characterized by non-random, accidental (sampling) approach [1]. The questionnaires were delivered to the supply chain entities of food supplements by mail and in a few cases face-to-face. The study was carried out on a sample of 255 representatives of distributors and 82 employees of companies producing dietary supplements. A detailed characteristic of the population studied is presented in Table 1 and 2.

The assessment of the level of awareness of supply chain entities was based on collecting their opinions about: the need for further research to improve informative function of packaging, the necessity of introducing design procedures concerning proper labeling, and the analysis of the packaging design process for dietary supplements.

The results obtained were evaluated with the use of descriptive statistics and statistical inference methods. The data was analyzed using chi-square test ($\chi 2$) [18]. The statistical dependence was determined based on the residual value [5].

Table 1. The structure of the surveyed population – distributors of dietary supplements

Independent variables	Categories	Population surveyed n = 255	
		n	%
Range of business activities	Pharmacies and wholesalers	236	92,5
	Grocery store	4	1,6
	Medical and herb shop	15	5,9
Location of business	Rural area	30	11,8
	City up to 99 000 residents	64	25,1
	City 100-500 000 residents	42	16,4
	City above 500 000 residents	119	46,7
Number of employees	Up to 9	149	58,4
	10 to 49	34	13,3
	50 to 249	19	7,5
	Above 250	18	7,1
	No answer	35	13,7
Education	Secondary	100	39,2
	University level	132	51,8
	No answer	23	9,0
Position	Manager	44	17,3
	Sales assistant	194	76,1
	No answer	17	6,6
Years of service	Up to 5 years	83	32,5
	6 to 15 years	100	39,3
	16 to 40 years	40	15,7
	No answer	32	12,5

Source: own elaboration.

The research on companies involved in the distribution of dietary supplements was conducted among employees of these entities. More than 90% of respondents were employed in pharmacies and by wholesalers. This was mainly due to the fact that through these distribution channels most of the dietary supplements are sold to consumers. The study was conducted in outlets located in rural areas (30%) and in large cities (46%). They were mostly micro-enterprises contracting fewer than 9 employees (58%).

Table 2. The structure of the surveyed population – manufacturers of dietary supplements

Independent variables	**Categories**	**Population surveyed n = 82**	
		n	**%**
Production scope – the share of dietary supplements in the whole range of manufactured products [%]	10-40	18	22,0
	50-90	33	40,2
	100	29	35,4
	No answer	2	2,4
Sources of financing	Foreign or joint venture	15	18,3
	Polish only	66	80,5
	No answer	1	1,2
Range of business activity	National	50	61,0
	International	32	39,0
Number of employees	Up to 9	26	31,7
	10 to 49	25	30,5
	50 to 249	24	29,3
	250 and more	7	8,5
Level of education	Secondary, Bachelor's, Engineer	17	20,7
	Master's degree	65	79,3
Position	Owners and Directors	7	8,5
	Senior Managers	22	26,8
	Junior Managers	34	41,5
	Clerks and Administrative Workers	7	8,4
	No answer	12	14,6
Years of service (seniority)	Up to 5 years	49	59,8
	6 to 15 years	25	30,5
	Above 15 years	7	8,5
	No answer	1	1,2
Type of education	Technical	10	12,2
	Economics	32	39,0
	Pharmaceutical	13	15,9
	Other	12	14,6
	No answer	15	18,3

Source: own elaboration.

The research on manufacturers of dietary supplements included companies of different sizes and numbers of employees. The percentage of companies analyzed, from the smallest - up to 9 people, through the ones with the number of employees ranging from 10 to 49, and finally from 50 to 249, was almost equal and amounted to approx. 30% of total share in each group. As many as 80% of the entities that

participated in the study were financed by Polish capital only. Most companies declared the percentage share of the production of dietary supplements at the level of 50-90% of the total of its production range.

4. Results and discussion

The assessment of the level of awareness of supply chain entities regarding the need for further research to improve informative function of packaging was carried out first. The analysis conducted in both groups of supply chain entities has shown that the vast majority of respondents confirm the necessity of carrying out further research to improve the informative function of packaging. Image 1 presents the obtained results.

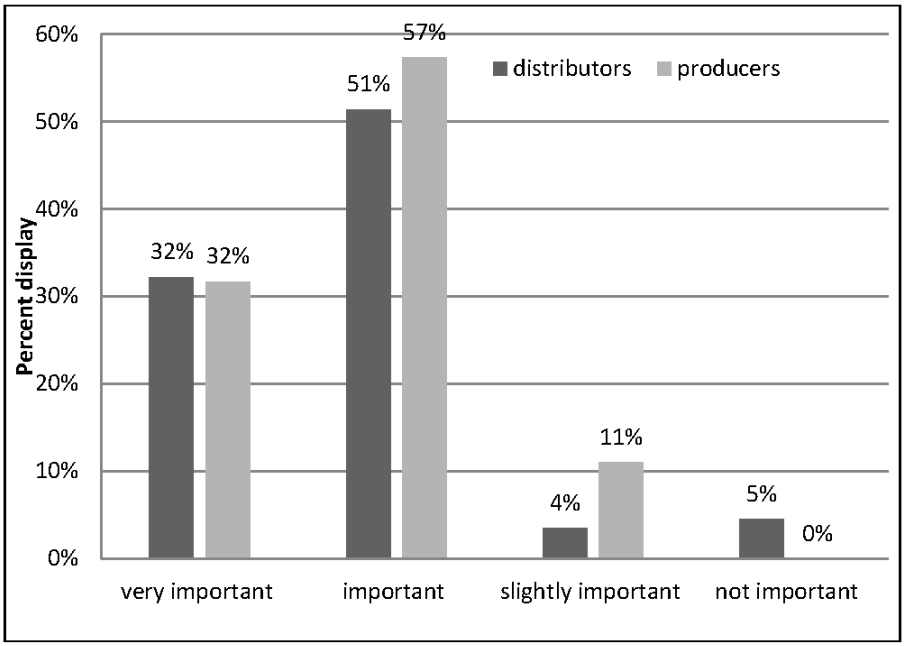

Image 1. The need for further research to improve informative function of packaging (for dietary supplements)
Source: own elaboration.

As many as 32% of respondents said that it is very important to conduct further studies to improve the informative function of packaging. Among producers, 57% claimed such research to be essential as opposed to 51% of distributors. Upon analyzing the distribution of the responses received (presented in Image 1), it was

found that manufacturers of dietary supplements consider the informative function of packaging to be more important in general compared with the responses of the other group. About 5% of retailers deemed the need to study the informative function of the packaging completely unnecessary. Such extreme opinions did not occur among the manufacturers.

The second stage of the assessment focused on the necessity of introducing design procedures concerning proper labeling of dietary supplements. Also in this issue, both groups expressed similar views. Distributors as well as manufacturers of dietary supplements fully acknowledged the need to prepare advanced design procedures concerning product packaging and they found them equally useful. Only about 12% of distributors and 19% of manufacturers were against the development of such procedures. In their opinion, they would be completely useless in the process of preparing the labeling of dietary supplements. The study revealed that distributors are more inclined towards developing and implementing design procedures than the manufacturers. This may be due to the observed difficulties the consumers face when making their purchasing decisions. On the other hand, the manufacturers tend to be more skeptical when it comes to the usefulness of design procedures.

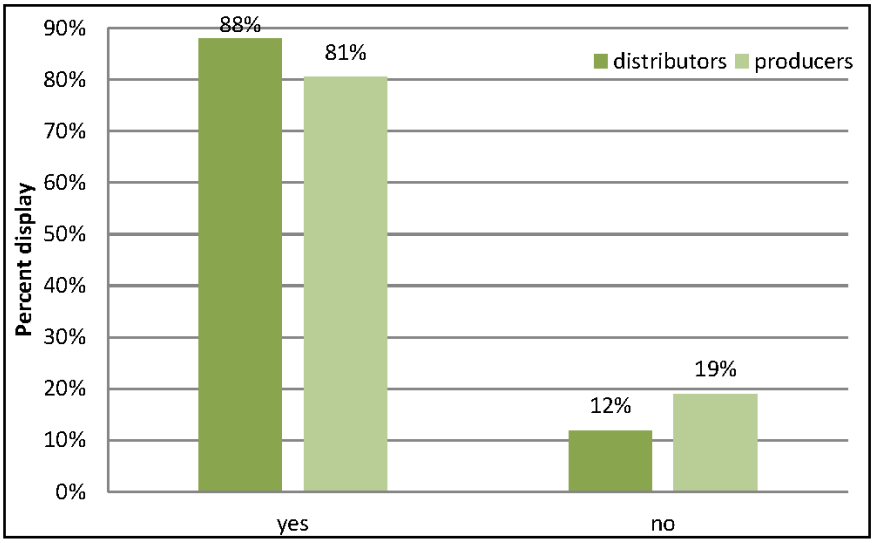

Image 2. The need to introduce design procedures concerning proper labeling of dietary supplements
Source: own elaboration.

In this study, the process of designing food supplement packaging, for which the manufacturers are generally responsible, has been thoroughly assessed. Upon analyzing the data obtained, it was found that in approx. 40% of the surveyed enterprises the packaging design processes were implemented by manufacturers alone (Image 3). Here, in up to 85% of cases, that task was performed by relevant departments, and in the remaining 15% – it was the responsibility of a special team made up of employees from different business units (e.g. marketing, production etc.). The results showed that 60% of companies supported themselves, to a greater or lesser extent, with external services. Most often, in 43% of cases studied, manufacturers of dietary supplements carried out the process of packaging design by partly collaborating with other companies. In 17% of cases the task was entirely outsourced to an external company.

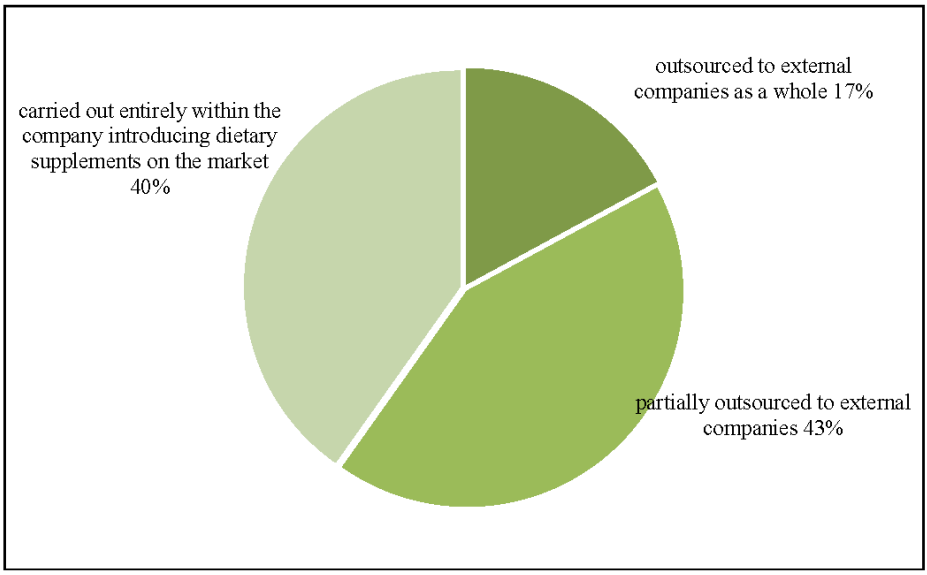

Image 3. The process of designing food supplement packaging
Source: own elaboration.

The chi-square test was used to analyze the collected data [18], thus enabling the determination of relationships related to the process of packaging design in the surveyed organizations. Based on the obtained results, it was found that the range of business activities of the company and number of employees are variables that differentiate the process of preparing food supplement packaging (Table 3).

Table 3. Statistical dependence of the process of packaging design on the variables characterizing the surveyed companies

Independent variables	χ^2	**P**
Range of business activities	5,99*	0,050
Number of employees	13,66*	0,030

Explanation: The * symbol indicates that the hypothesis of independence of variables should be rejected (at the level of $\alpha = 0.05$)

Source: own elaboration.

The use of residual value to analyze the process of packaging design [5] provided more insights into its character and particular stages. As a result, it was found that national companies, more than other ones, carry out designing projects almost entirely inside the company. International companies, on the other hand, tend to collaborate with external businesses to achieve this end.

Based on the residual value analysis, statistical dependence of the packaging design process on the range of business activities and number of employees has revealed what follows. The smallest companies with up to 9 employees are more likely to outsource the packaging design project. Medium and large companies with more than 50 employees are more likely than other companies to partially implement projects in cooperation with external companies. On the other hand, the businesses with the number of employees 10-49 more often carry out packaging design projects entirely inside their company.

When cooperation with external companies in terms of dietary supplement packaging design was declared by respondents, their satisfaction with the results of such collaboration was also investigated. They were asked to evaluate the incidence of possible behaviors that concerned the projects submitted to them. These were: the overall project approval, introduction of minor changes, and the introduction of major changes in the project. The respondents evaluated the occurrence of each situation by choosing one of the following: frequently, rarely, never. The results show that according to respondents, the projects were frequently approved without introducing any changes (57%), the projects were frequently approved with minor changes (55%), and the projects were but rarely approved after major changes (42%).

The results of the final stage of the research show that manufacturers generally accept the packaging design proposals for dietary supplements developed by external companies and introduce but minor changes in the designs.

5. Conclusion

The results of this study indicate that the key entities in the supply chain of dietary supplements recognize the need to conduct further research on the informative function of packaging as far as the products they place on the market are concerned. They consider it to be important for the general safety of products and consumers.

Particularly relevant and useful may be the research results concerning introduction of design procedures for proper labeling of dietary supplements. Distributors as well as manufacturers of dietary supplements fully acknowledged the need to prepare advanced design procedures, which might serve as a starting point for the scientific community and professional organizations to initiate the preparation of appropriate guidelines since there are none as yet.

Besides the preparation of design procedures, consumer satisfaction regarding the labeling of dietary supplements may be improved by the newly developed methods and research tools enabling verification of product labeling [6]. Not without significance will be their dissemination and popularization among food producers and companies specializing in packaging design.

Another step to be taken in order to improve consumer satisfaction regarding product labeling is to strengthen cooperation between entities within existing supply chains. A better integration of information systems and extending their functionality by introducing new solutions, such as the transfer of data associated with the observed needs and expectations of end-customers might also help improve consumer satisfaction. Within the established channels of information flow, the possibility of transferring such data up the chain – to the food manufacturers and its suppliers – should be taken into account, thereby intending to improve the competitiveness of the supply chain as a whole.

Acknowledgments

The publication was founded by appropriations of Commodity Science Cracow Uniwersity of Economics, a grant for the maintenance of the research potential.

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