

DETERMINANTS OF THE NEW PRODUCT DEVELOPMENT ACCORDING TO THE SURVEY OF GRAIN PROCESSING ENTERPRISES

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Abstract: In order to achieve success, the company secondary processing of cereals must consistently and systematically improve its market offer by: developing and introducing new products to the market, new solutions introduction in the field of production technology, product composition, and method of packaging and product properties. The aim of the study was to determine the conditions of production of pasta, especially with a reduced calorie, manufacturers' attitudes to production of reduced calorie pasta, desirable characteristics of pasta and their perception by manufacturers. The study was conducted using the method of computer assisted telephone interview (CATI) on a representative sample of companies. According to the surveyed companies the main barrier to implementation of innovative products on the pasta market was technological-economic and assortment profile. The most important determinants of the new products development on the cereal market should be considered economic, technological and related to the management factors and the company's environment, especially knowledge of customer needs and expectations.

Keywords: new product development, grain processing sector

INTRODUCTION

The concept of innovation is derived from the Latin word “innovatio” or “innovare”. Third New International Dictionary Webster [1993] emphasizes the understanding of innovation as any news and explains the concept of “innovation” as: the introduction of a new thing or a new idea, method or device. Innovation according to the definition used in the OECD and the EU is the implement of a new or significantly improved product (good or service), process, marketing or organizational methods to business practice, in the

organization of the workplace or in relationships with the environment [Oslo Manual, 2005].

The purpose of the innovation in the enterprise is, among others [Penc 1995]:

- improve the quality and increase the competitiveness of products and services,
- improve and modernize manufacturing processes, increasing their efficiency and quality,
- better adaptation to the market environment and competitive solutions.

The conviction of the need to create innovative solutions justifies the concept of pioneer advantage (first-mover advantage) [Lieberman and Montgomery 1988], assuming that the introduction of a unique product on the market (or a technological solution) allows to gain monopolistic position. The benefit of being the first on the market is choosing the best possible segment of the market and positioning, determining the conditions of competition for other market participants, the advantages in terms of distribution, achieving economies of scale and experience, high cost changes for customers (innovators and early followers) and the possibility of negotiating of favorable conditions exchange with the suppliers [Koczerga 2011].

Enterprises in the food chain, which aspire to satisfy the customer, must constantly adapt to the needs and conditions of the market through the development of services and product range, prices and product quality, effective market communication, and most of all broadly defined innovativeness of all activities representing key factors determined the competitive position of enterprises in the strategic perspective. These activities represent a large range of essential uses of various innovation types.

A new product definition particularly important for the food chain assumes that it should be *"a completely original, improved or modified product, which is characterized by significant technical and technological changes and competitiveness and which better satisfy needs of existing or new buyers, is produced in the process of research and development and is offered in the distribution channels for no longer than one year since introduction to the market"* [Rutkowski 2007]. Introduction of the innovation in the food chain is mostly associated with technological progress: irrelative, but usually a relative (secondary, simulating, imitative, adaptive, multiplier etc.),

which means the implementation of technical solutions that have already been used in another country or competitive factory. It is equivalent to the acquisition of various types of licenses, patents and manufacturing experience [Sudol 2000].

Evolution of the innovation models to significant penetration and convergence of existing industry and technology divisions (eg. development of biotechnology, rise of nanotechnology), intensive development of knowledge and processes of globalization are observed in practice. This requires a complete change in thinking about innovation and their nature. One of the solutions for organizations is opening of the organizations to the environment and stakeholders (internal and external), by a profound commitment to their innovation processes [Mierzejewska 2008].

The development and marketing of new products that can be described as innovative also requires constant contact with customers / consumers to know their opinions, suggestions and comments. Innovative enterprise should therefore have adequate human, technological and financial resources and be able to explore, analyze and predict the behavior of competitors. One of the most important factors of success in innovation is having accurate sources of information through regular communication with product customers. One of the results of the innovation process is, therefore, a new product, which characteristics are a response to the needs of consumers, and ability to meet the expectations of buyers [Górska-Warsewicz 2013].

The development of the food market, which takes place in the context of attitudes and standards (product, process and distribution) of globalization poses new challenges for food producers, but also carries perhaps even unrecognized threat to the health and interests of consumers. Therefore, food production requires the use of safe technology, scientifically verified and well-documented in relation to humans health.

MATERIALS AND METHODS

The aim of company survey was to determine the conditions of pasta production, especially a reduced-calorie, attitudes of manufacturers to production of low calorie pasta, its desirable features and perception by the manufacturers. In a survey conducted partly by computer assisted telephone interviews (*CATI*) using a standardized questionnaire interview, and partly through direct interviews, attended 56 companies producing pasta

from all over the country. In order to verify the statistical data associated with nominal measurement chi-square test was used; the significance of differences was tested at a confidence level $\alpha = 0.05$. In order to verify the hypothesis associated with the measurement order (rank ordering) rank correlation test Kruskal-Wallis was used. In the case of observation of less than five, it has not been applied statistical inference.

Most of the surveyed companies were small family businesses, operating in the form of individual activities (39.3%), less frequent larger enterprises, operating as a company (53.6%). The largest group consisted of micro-enterprises (41.4%); small and medium-sized enterprises were of similar frequencies in the sample (respectively 28.6% and 26.8%). Analyzed companies operated primarily on the local market (in the city, county) - 48.2%; similar number of surveyed enterprises operated regional market (44.6%). More than one third of the surveyed companies (32.1%) declared conducting its business in the domestic market, and 28.6% - in the international market.

Most entrepreneurs participating in the study (55.4%) declared an increase in expenditures on innovation activities in 2013; 1/3 of the respondents from companies producing pasta (33.9%) declared that these expenditures have not changed. Other companies declared a reduction of expenses on innovation activities during the period.

RESULTS AND DISCUSSION

In the opinion of the surveyed entrepreneurs, the most important reasons for the introduction of new product innovation are the market trends (64.3%), the introduction of new products by competitors (53.6%) and consumer expectations. The least frequently indicated reason for product innovation was the purchase of a patent (14.3%), which may be due to high costs. Minor importance for product innovation in the surveyed companies were also imitation of foreign companies (25%) or the marketing department review (the company's management, sales managers) (26.8%), which indicates a search of product innovation ideas mainly in the immediate environment of the company (competition, consumers).

In the case of almost all product innovation reasons declared by pasta producing companies, they were more often indicated of small and medium-sized enterprises; exception constitute the answer 'others', which focused mainly on the lack of innovation (Table 1). Significant differences between companies depending on their size occurred in the case of all-cause innovation,

except for the purchase of patents (on which responded only small and medium-sized enterprises). This shows a greater interest in the introduction of innovations by small and medium enterprises than microenterprises.

Table. 1. Reasons for the introduction of product innovation in the surveyed pasta companies according to company size

Specification	Percentage of answers	Micro-enterprises	Medium and small enterprises	The significance of asymptotic (two-sided) ^{a)}
Introduction of new products by competitors	53.6%	25.0%	75.0%	0.007
Purchase of a patent	14.3%	0.0%	100.0%	no data*
Marketing department review / the company's management / sales managers	26.8%	7.1%	92.9%	0.002
Market trends	64.3%	32.4%	67.6%	0.047
Modernizing / increase / change in assortment	39.3%	19.0%	81.0%	0.005
Imitation of foreign companies	25.0%	0.0%	100%	<0.001
Requirements of retail chains	35.7%	16.7%	83.3%	0.006
Consumer expectations	50.0%	19.2%	80.8%	0.001
Others (lack of innovation, the clients requirements, modified packaging)	28.6%	73.3%	26.7%	0.005

N = 54, Source: pasta company survey, IX-X 2014

a) Pearson chi-square test, grouping variable – company size

* 50 % cells having the expected size of less than 5

Source: Author's own work

Most common ideas for new products for the surveyed companies are inspired from the outside; sources of information include consumers (83.9%); less - trade shows and exhibitions (53.6%), competitors (50%), suppliers of raw materials (intermediates) – 46.4%, trade press, market reports (44.6%). About 1/3 of entrepreneurs derive information of product innovations from the observation of market trends (37.5%), from consulting firms – 28.6%, and the observation of imported products (25.0%). Much less enterprises

as a source of ideas for new products uses internal sources: the marketing department (35.7%), manufacturing (32.1%), sales (30.4%), research and development (28.6%) and quality control (21.4%). According to the research of other authors [Rudder 2003; Fuller, 2005; Fortuin and Omta 2009; Sojkin *et al.* 2009], companies frequently use external rather than internal sources of information about the concepts of new products.

Firms differ in terms of new products ideas source; most sources of information were more often used by small and medium-sized enterprises; only if the answer was “other” (primarily of the lack of cases declaration to draw new ideas or the use of all sources) predominate microenterprises (66.7%) (Table. 2). The smallest differences between the companies were observed in the trade press and market reports, which willingly use micro, small and medium-sized enterprises (respectively 43.5% and 56.5%). Significant differences between the micro, small and medium-sized companies were found in such sources as the marketing department, R & D and imported products; considerable difference in the distribution of responses related to the quality control department. This is because such departments operate mainly in small and medium-sized enterprises.

Among the factors influencing the new product development in companies producing pasta, the highest rated (on a scale of 1 to 5) were such factors as the financial situation of the company (average 4.44), experience of the management (4.39), the type of market in which company operates (4.29), technology of production and consumer loyalty (after 4.29), as well as brand awareness by consumers (4.22) and its image (4.19). Slightly less importance had such factors as the involvement extent on the national market (4.18), promotional price and actions of competing companies / brands (after 4.16), as well as market share (4.15). The factors of medium importance for the development of new products by pasta manufacturers (average approx. 4.0) may include sales system by sales representatives and regional representatives, the range of the products, the type of distribution channels, retail structure, the length of brand exposure in the market, the continuous introduction of new products on the market and active marketing department, the structure of the wholesale trade, conducted or commissioned market research and the number of distribution channels.

Table. 2. New products ideas source in the surveyed pasta companies according to company size

Specification	Percentage of answers	Micro-enterprises	Medium and small enterprises	The significance of asymptotic (two-sided) ^{a)}
Consumers	83.9%	40.0%	60.0%	b.d.
Fairs and exhibitions	53.6%	35.7%	64.3%	0.289
Competitors	50.0%	34.6%	65.4%	0.253
Raw material / intermediate suppliers	46.4%	29.2%	70.8%	0.074
Trade press, market reports	44.6%	43.5%	56.5%	0.910
Traders / retailers	42.9%	31.8%	68.2%	0.184
Observation of market trends	37.5%	31.6%	68.4%	0.228
Marketing department	35.7%	22.2%	77.8%	0.032
Production department (technologist)	32.1%	25.0%	75.0%	0.090
Sales department	30.4%	26.7%	73.3%	0.142
Consulting company (Consulting)	28.6%	21.4%	78.6%	0.063
Research and development	28.6%	14.3%	85.7%	0.013
Imported products	25.0%	16.7%	83.3%	0.039
Quality control department	21.4%	20.0%	80.0%	b.d.*
Others	16.1%	66.7%	33.3%	b.d.*

N = 54, Source: pasta company survey, IX-X 2014

a) Pearson chi-square test, grouping variable – company size

* 25 % cells having the expected size of less than 5

Source: Author's own work

The factors of minor importance for the new product development in pasta producing companies (average less than 4.0) are the number of competitors brands, variation range, cooperation with retail chains, sales of products under retailers brand, the use of television advertising or promotional activities in stores (eg. tastings), offering all the products under one brand, using advertisements in newspapers, radio, many brands (each product

under a different brand name), as well as other factors that are particularly important for the producers (eg. tradition, trust) (Table 3). It therefore be concluded that the most important factors in the new product development in pasta producing companies are economic, technological, management, and business environment. Important for this process is understanding customer needs and expectations, which whereby to create product strategies, communication strategies, distribution and pricing strategies of innovative products. As shown by numerous studies, the factors that contribute most to the innovation of enterprises, are the size of the company, its-resources and financial situation [Lagnevik *et al.* 2003; Khan *et al.* 2014].

The importance of all the analyzed factors influencing the new product development in pasta producing companies, was higher rated in small and medium-sized firms; the top rated companies in this category included such factors as the financial situation of the company (average 4.63), experience of the management (4.59), brand awareness by consumers (4.43) and its image (4.45) and the intensity of the activities of companies / brands competing (4.43) and the actively working marketing department (4.43) (Table 3). Significant differences between the companies according to their size are related to the assessment of such factors as the image of the company/ brand, price promotion and the intensity of the companies actions/competitive brands, sales system by the commercial agent, the type of distribution channels, the length of brand exposure in the market, the continuous introduction of new products on the market, the actively working marketing department, conducted or commissioned market research, the number of channels, the number of brands owned by competitors, differentiation range, working with retail chains, sales of products under the trade mark (i.e. retailers), the use of television advertising and offering all the products under one brand. Most of these factors are of major or moderate importance for companies, which shows more importance for small and medium-sized enterprises to both marketing factors (especially in terms of promotion, and distribution), and competitive activities, compared to micro-enterprises.

Table 3. Importance of the factors influencing the new product development in companies producing pasta according to company size

Specification	Percentage of answers	Micro-enterprises	Medium and small enterprises	The significance of asymptotic (two-sided) ^a
Financial situation of the company	4.44	4.13	4.63	0.188
Experience of the management	4.39	4.09	4.59	0.086
Type of market in which the company operates	4.29	4.09	4.40	0.582
Technology of production	4.24	4.00	4.37	0.166
Consumer loyalty	4.24	4.00	4.38	0.404
Brand awareness by consumers	4.22	3.87	4.43	0.092
Company image / brand	4.19	3.78	4.45	0.020
Extent of involvement on the national market	4.18	3.96	4.30	0.275
Pricing promotional activities such as discounts	4.16	3.78	4.40	0.031
Intensity of the companies activities / brands competing	4.16	3.74	4.43	0.015
Market share of the company	4.15	3.87	4.30	0.145
Sales by sales representatives and regional representatives	4.07	3.55	4.40	0.001
Range of the products	4.06	3.64	4.30	0.007
Type of distribution channels	4.05	3.65	4.30	0.008
Retail structure	4.04	3.65	4.23	0.069
Length of brand exposure in the market	4.04	3.64	4.27	0.016
Continuous introduction of new products on the market	4.04	3.65	4.27	0.042
Active marketing department	4.04	3.43	4.43	<0.001
Structure of the wholesale trade	4.02	3.65	4.23	0.066
Conducted or commissioned market research	4.00	3.61	4.23	0.021
Number of distribution channels	4.00	3.64	4.20	0.036
Number of competitors brands	3.98	3.57	4.23	0.013

Variation range of products	3.94	3.48	4.24	0.002
Cooperation with retail chains	3.91	3.48	4.17	0.037
Sales of products under retailers brand	3.91	3.39	4.24	0.013
Use of television advertising	3.87	3.43	4.13	0.043
Use of promotional activities in stores (eg. tastings)	3.83	3.50	4.00	0.225
Offering all the products under one brand	3.72	3.35	3.93	0.037
Using advertisements in newspapers. radio	3.71	3.39	3.90	0.174
Many brands (each product under a different brand name)	3.38	3.22	3.40	0.553
Other factors that are particularly important for the producers (eg. tradition. trust)	2.53	2.35	2.79	0.419

1/ responses on a scale of 1 to 5 where 1 is absolutely unimportant factor, and 5 - very important factor

N = 54, Source: pasta company survey, IX-X 2014

a) Kruskala-Wallis test, grouping variable – company size

Source: Author's own work

CONCLUSIONS

At the core of innovation market participants of grain processing products is seeking sources of innovative solutions: new products, new technologies and new areas of application of these solutions. Innovative activities are the basis of modern business development strategy and the pace of change in technics, technology and organization makes the companies introducing innovations able to keep up in an increasingly competitive market. Company to succeed must consistently and systematically improve its products by introducing new technology solutions for production, product composition, and method of packaging or product properties. The purpose of introducing new products is the satisfaction of the customers' needs on the food market who are becoming more demanding.

The survey on a representative sample of pasta producing enterprises in Poland indicated the basic conditions of the production process and planned product innovations, mainly due to the characteristics of these companies

and their perceptions, attitudes and in consequence manufacturers for new products. It shows that the main barrier to implementation of innovative products for the pasta market are techno-economic profile and range of companies. The dominant part of these are micro and small family businesses with a long-time functioning and operation of the local markets, in the traditional distribution channels, producing traditional, narrow trading range on the basis of the basic raw material which is in a dominant amount of common wheat, which determines the profile of production and manufacturing capabilities and innovative selections of pasta to a large extent the attitude of manufacturers to innovate.

In the opinion of the surveyed companies the most important role in the development of new products plays an economic, technological, management, and business environment. Important for this process is also knowledge of customers' needs and expectations. Careful approach of pasta producers to innovative additions to pasta is observed, while opportunities for product innovation diffusion.

Evaluation of the research results of pasta producers' views shows the diversity of opinion and market behavior in relation to the introduction of new products, processes and the proposed research, a new product in the form of pasta with increased fiber content. Differentiating factor is primarily the size of the company (in the study defined by the volume of employment) and, consequently, corporate internal resources: financial, management competence, the presence of functional departments (marketing, R & D, logistics) in the enterprises structure, market activity and promotion, having brands, the nature of markets (local, national, international) and economic relations with the environment.

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STRESZCZENIE

Przedsiębiorstwo wtórnego przetwórstwa zbóż, aby osiągnąć sukces, musi konsekwentnie i systematycznie udoskonalać swoją ofertę rynkową poprzez kształtowanie i wprowadzanie nowych produktów na rynek, wprowadzanie nowych rozwiązań w zakresie technologii produkcji, składu, sposobu pakowania czy właściwości produktu. Celem badań było określenie uwarunkowań produkcji makaronów, zwłaszcza o obniżonej kaloryczności, nastawienia producentów do produkcji makaronów o obniżonej kaloryczności, pożądanych cech tych makaronów oraz ich postrzegania przez producentów. Badanie przeprowadzono wykorzystując metodę wywiadów telefonicznych ze wspomaganie komputerowym (CATI) na reprezentatywnej próbie przedsiębiorstw. W ocenie badanych firm podstawową barierę wdrażania innowacyjnych produktów na rynku makaronów stanowił profil technologiczno-ekonomiczny i asortymentowy przedsiębiorstw. Najważniejszymi determinantami rozwoju nowych produktów na tym rynku należy uznać czynniki ekonomiczne, technologiczne, związane z zarządzaniem, a także otoczeniem firmy, szczególnie poznanie oczekiwań i potrzeb klientów.

Słowa kluczowe: rozwój nowych produktów, sektor przetwórstwa zbóż