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MODEL OF INNOVATION PROCESSES USED IN POLISH CONFECTIONERY INDUSTRY ENTERPRISES

Summary

Goal – Identification of actions which make up innovative processes in confectionery enterprises.

Research methodology – The entities selected for the study fulfill two criteria: they are Polish enterprises operating in the confectionery industry (entities with dominant equity, with headquarters in Poland) and have market shares of at least 5% (measured by the value of sales revenues in 2017 at the minimum level of PLN 100 million). All the companies which met the above criteria were identified; then ten enterprises were chosen from that group. The research was carried out with the help of a survey questionnaire.

Score – Innovative processes usually begin with research on consumer needs, which indicates the use of a demand innovation model. Furthermore, the more actions an innovative process comprises, the less willingly it is used by enterprises.

Originality/Value – The paper has a cognitive value of the innovation process models used by confectionery enterprises. The author proposes a modification to the current model.

Keywords: innovation process, innovation process models, confectionery industry

JEL classification: 031

1. Introduction

Innovativeness, along with competitiveness, is one of the key issues and challenges faced by modern enterprises. As a result of competition, companies are abandoning the traditional sources of competitive advantage (e.g. cost leadership, scale effects, etc.) in favour of strategies based on continuous innovation. From a company's point of view, innovations are perceived as the key factor supporting competitiveness in domestic and international markets. Dynamic economic changes and the pace of economic development require companies to constantly introduce new or upgraded technological, organisational and marketing solutions.

Because innovations are so important, the author of the present paper decided to find how they are created by companies. The research is based on the assumption that the innovation process is a sequence of consecutive events, from the moment an idea appears until it is implemented in the market.

The main purpose of the paper is to identify the actions which make up innovative processes at confectionery enterprises and to verify the hypothesis that the majority of the surveyed enterprises use demand models of the innovation process.

2. Models of innovation processes – theoretical aspects

Since J.A. Schumpeter, innovation models have undergone a number of significant changes, as a result of the changes taking place in the economy (globalisation, technological progress, etc.). The evolution of the models of innovative processes is summarised in table 1.

TABLE 1

Six generations of innovation process models

	Generation	Model	Elements of model
Linear models	First generation – technology push (from 1950s to mid-1960s)	Technology push model	<ul style="list-style-type: none"> – innovation model pushed by science – simple linear model triggered by the technological impulse
	Second generation – market pull (from mid-1960s to 1970s)	Demand-pull model	<ul style="list-style-type: none"> – innovation model pulled by the market – simple linear model triggered by the market impulse
Non-linear models	Third generation – linking model (from 1970s to mid-1980s)	Interactive model (coupling model)	<ul style="list-style-type: none"> – technology push and market pull model – model which includes market and science interaction
		Chain-link model (coupling model)	<ul style="list-style-type: none"> – technology push and market pull model – feedback was a key factor
	Fourth generation – parallel model (from mid-1980s to 1990s)	Integrated model	<ul style="list-style-type: none"> – integrated model (combination of linear models), in which many components interacted – including suppliers and lead users in the process
	Fifth generation – SIN model (from 90s of the 20th century)	Network model	<ul style="list-style-type: none"> – Network model (simultaneous) involving continuous accumulation of knowledge and integration of internal and external participants of the process – intensive use of information technologies – innovation as a continuous process

	Generation	Model	Elements of model
	Sixth generation (from the beginning of the 21st century)	Open innovation model	– focus on external knowledge – cooperation between individual organisations is important

Source: author's own work based on [Białoń, 2010, p. 29; Bogdanienko, 1998, p. 15; Brzóška, 2014, p. 53; Chesbrough, 2002, p. 18; Chesbrough, 2003, p. 15; Ciborowski, 2012, pp. 49-50; Dzikowski, 2017, p. 21-22; Hobday, 2005, p. 121-125; Janasz, Koziol, 2007, p. 93; Mierzejewska, 2008, p. 4; Roszkowska-Menkes, 2015, p. 59; Rothwell, 1992, pp. 98, 233, 234; Rothwell, 1994, p. 10, 12, 27; Sopińska, Mierzejewska, 2017, pp. 32-33; Weresa, 2014, pp. 36-37.

Innovation process models have evolved quite dramatically. The first processes were linear, connected to technology-push or the demand-pull impulse. However, it was noticed that innovation processes were much more complicated and open to a greater number of factors and impulses from different sources. Nowadays, the proposed models are even more complex because they contain feedback and constant interactions between different fields.

The oldest and simplest mechanism from the mid-1950s is the linear model (which is a series of actions, from the idea to the implementation and consumerisation) founded on the assumption that an innovative idea has its source in R&D (research and development). The technology-push model, based on neoclassical theory of growth, comes from J. Schumpeter's concept of innovation.

The 1950s and 1960s were years of rapid development of technology. Huge resources were allocated to stimulate the advancement of science and invested in research centres. Impressive scientific achievements inspired further development and innovative efforts. The success of the market was thought to be primarily due to scientific and research facilities. The market aspect and needs reported by consumers were ignored [Roszkowska-Menkes, 2015, p. 59].

The entire innovative process begins with the results of basic research, which are later subject to applied and development research. Then, companies undertake design and operational work in order to start production. The final stage involves marketing actions and product sales. On a micro-economic scale, this approach means that the initiator of the innovative process is R&D personnel. Enterprises with greater research and development capabilities have a better chance to use their work for economic purposes, gaining an advantage over the competition [Ciborowski, 2012, pp. 49-50].

Another version of the linear model is the demand-pull model, resulting from the assumptions of Keynesian economics. It was created in the 1960s and 1970s. During that period, companies focused on introducing new products, mainly based on existing technologies. Growing competition in the market had strengthened the role of marketing in the policy of every enterprise. Therefore, the marketing staff, whose task was to recognise market needs, played a significant role in this model. The satisfaction of these needs was often associated with the introduction of innovations, which helped those who introduced them to achieve market advantages.

This model retained a linear character, but assumed that it was the market (not scientific research) which was the main source of ideas.

There are many examples of technological innovations related to the demand-pull (an increase in demand for cars resulted in increased use of mechanical drive) and technology-push (nuclear energy) approach [Ciborowski, 2012, p. 52]. The common feature of both models was a clear distinction of all the stages of the innovation process, which took place successively, without the possibility of feedback.

Both models are linear, so in the modern economy – especially in highly developed countries – they are no longer valid because they only consist of one-way information flow, excluding feedback, which is typical of market economies. Therefore, both concepts have essential shortcomings: they are overly simplified and unrealistic as they take into consideration only one source of innovation [Ciborowski, 2012, pp. 49-50].

At the end of the 1970s, many empirical studies confirmed the excessive simplicity of the above models (demand-pull and technology-push). This is because innovation processes are very rarely linear and depend on many factors surrounding the organisation (suppliers, recipients, research centres, public institutions) which were ignored in the older models. Instead, innovative processes should be based on interactions between technological changes and signals coming from the market. Therefore, linear models began to be replaced by more complex non-linear ones. Feedback between demand-pull and technology-push factors became the main characteristic of the third generation models of innovation processes [Hobday, 2005, pp. 121-125].

The years 1970-1985 saw a number of oil crises, increased raw material prices, rising unemployment, reduction of demand dynamics, which had an effect on business strategies. They were consolidated and rationalised, whereas the scale of operations was broadened. Therefore, innovative processes began to be implemented based on systematically conducted research using the interaction between technology and the market. The feedback in the interactive model was between the demand-pull and technology-push. The factors which had the greatest impact on shaping the demand included: the size of the market, the rate of the change in demand, the flexibility of consumer habits, and the speed with which information about new products flowed to consumers. Meanwhile, the supply side mainly referred to the technological capacity of the economy, measured mainly by the amount of research and development expenditures, resources of qualified workforce, and inventiveness [Weresa, 2014, pp. 36-37].

In this model, it was emphasised that an idea for innovation could derive from the market and the emergence of a new technology. Neither of these factors had significance in itself. What was important was the combination of the two [Bogdanienko, 1998, p. 15].

Undoubtedly, the advantages of the coupling model are feedback and information flow speed, because all actions include interaction with the market (market needs). However, this model does not take into account many other important factors that naturally influence the discussed interactions, e.g. buyers' expectations,

business motivations, market changes, cost constraints, etc. Moreover, very often the results obtained at individual stages (which are uncertain) force a return to the previous stages in order to modify the designed solution.

Despite the continuous development of innovative process models, they still lacked other external factors (besides market and technology) which were important (e.g. globalisation, foreign competition). Therefore, in the 1980s and 1990s, another integrated model of the fourth generation innovation processes appeared. Its key feature was that it linked the internal and external phases of the innovation process which were held as part of one project team in a company. The team's task was to integrate all the departments and people associated with the process. An important aspect in this model was design with a focus on real production capabilities.

Undoubtedly, the integrated model contained many more factors affecting the innovation process than the previous models. However, at the turn of the 20th and 21st centuries, growing global competition was observed as a result of increasing globalisation, higher consumer requirements and changes in product strategies, which were focused on quality and other non-price factors. All this prompted the development of a new model of the fifth generation innovation processes, i.e. a network model. It consisted of all the elements of earlier models, in addition emphasising the role of network links with closer and further environments, system integration, and a compromise between the time and cost of developing innovation. The most important link in this model was the learning process. It involved the flow of knowledge inside the company, through learning from suppliers, contractors, partners, and users. An important element of the network model were also alliances concluded by enterprises with partners or competitors, in order to acquire and use foreign capital. The development of this model was first of all possible due to the use of new IT solutions, new management methods, and thriving business [Brzóška, 2014, p. 53].

The most important features of the network model include: integration with suppliers, use of specialised systems in R&D, hybrid connections, emphasis on the implementation of innovation, flexible organisational structures and focus on product quality [Sopińska, Mierzejewska, 2017, pp. 32-33].

At the beginning of the 21st century, the acquisition and use of external knowledge grew in importance, which paved the way for yet another model of innovative processes – the open innovation model. It was a combination of the company's own (internal) knowledge and external knowledge. Such couplings have influenced the increased role of cooperation between various organisations [Ciborowski, 2012, p. 58]. The main difference between the current models of innovative processes as compared to the fifth generation models is that the former revolve around the mechanisms of creating, consumerisation and using various types of knowledge, and not only data exchange using ICT tools [Brzóška, 2014, p. 53].

In the sixth generation models, the role of non-material factors and knowledge hidden in the innovation process is emphasised. New solutions are created as a result of the exchange of knowledge coming from inside and outside the organisation.

Moreover, cooperation with a community in possession of knowledge, which is increasingly frequently used in the innovation process, is very important.

Individual approaches to innovative processes have evolved, which resulted primarily from the diversity of factors and actions leading to innovation. Elements that reflect the diversity of innovation mechanisms include [Białoń, 2010, p. 35]:

- the impact of technological changes which have been going in different directions and at different levels;
- the essence of change varying with each level over time;
- the entities which benefit from innovation may also change.

However, the goal of each of these models is unchangingly the development and implementation of new or significantly improved products and processes. And the most important thing from the point of view of the issue in question is to capture the technological changes embodied in products and processes.

The above evolution of the models of innovative processes proceeded from a traditional closed model towards an open innovation model. At the end of the twentieth century, the first kind (i.e. traditional models) dominated. According to the traditional model, the innovative process is based on its own resources, which are strictly protected from the competition, and thus require large expenditures on research and development. Therefore, innovative activity was mainly available to large and financially stable organisations.

The traditional approach to innovation forces companies to conduct precise and long-lasting research, in which each member of a research team, has a strictly defined scope of tasks and responsibilities. In addition, the dynamic environment in which enterprises operate, increasing competition and convergence of industries, as well as the steady and dynamic development of technology (communication and computerisation) make it possible to build increasingly interactive relations between market participants, which necessitates the involvement of more and more participants in the innovation process. Therefore, the effects of the traditional approach cease to meet the needs and expectations of the recipients, also being increasingly cost-intensive. This is why there is a growing interest in the new approach to the innovative process, the so-called open innovations [Mierzejewska, 2008, p. 4].

In recent years, as a result of the undertaken research, it has also been recommended that enterprises focus on the analysis of the relationship between innovative processes and the development of knowledge. This is reflected in the spiral process model, in which the relationship between the creation of a learning organisation, the organisation of knowledge and the innovation organisation is analysed. This model consists of three processes: knowledge creation, innovation and learning to learn [Niedzielski, 2016, pp. 35-36].

Models of innovative processes in an enterprise may be based on different concepts, but they all share common features: openness and cooperation, being driven by risk, uncertainty, and the cost of innovation. Undoubtedly, the processes taking place in the modern economy will continue to cause changes in innovation processes, and thus the evolution of the existing models. This will contribute to the

formation of new, more multi-faceted concepts of creating innovations in the future.

3. Research methodology and results

The confectionery industry is a very important part of the food sector, because it is a branch with high growth potential and a higher level of innovation in relation to other sectors. In the last decade, it has been one of the most dynamically developing industries in Poland. Its value in 2018 is almost PLN 14 billion.

According to Eurostat data, at the end of 2017, there were about 650 entities in the confectionery industry, the vast majority of which were classified as small and medium-sized enterprises. Over 80% of the market belonged to foreign enterprises, such as Nestle Polska, Mars Polska, Storck Polska, Mondelez International Polska (previously Kraft Foods), Danone, Lotte Wedel, or Ferrero Polska. Polish confectionery producers owned less than 20% of the market share. Among them are: Wawel, Mieszko, Colian (offers products under the following brands: Goplana, Solidarność, Jutrzenka, Grzeński, Familijne, Jeżyki, Akuku, Appetita, Siesta, and Helena), Zakłady Przemysłu Cukierniczego Otmuchów, Terravita, Millano Group (offers products under the following brands: Baron, Pomorzanka, Hibbi, Millato and Elitchoco), Zakłady Przemysłu Cukierniczego „Bałtyk”, Zakłady Przemysłu Cukierniczego „SKAWA S.A.”, Przedsiębiorstwo Wytrobów Cukierniczych „Odra”, Zakłady Przemysłu Cukierniczego „UNITOP-OPTIMA”, Wolność” LLC, Union Chocolate, Kopernik, Eurohansa, Ewa, Jago, and others.

The author used the purposive sampling method. This means that the enterprises investigated in this paper were selected in a subjective way, based on the author's knowledge about the entire population. The confectionery industry comprises about 650 business entities, of which nearly 80% are foreign enterprises, while less than 20% are Polish.

Attention was focused only on Polish enterprises¹ (ones with dominant equity and headquarters in Poland), whose possibilities of creating their own technological solutions are very limited, mainly due to capital reasons (in its various forms).

In addition, the study sample was narrowed down to companies which had a sizeable market share (taking into account the group of Polish enterprises themselves), i.e. at least 5% (measured by the value of sales revenues in 2017). The confectionery industry is very concentrated, therefore a five-percent market share seems to be sufficient.

¹ In addition, the presented empirical studies are a fragment of a doctoral dissertation titled “*Factors for the growth of innovation of industrial enterprises in Poland: The case of the confectionery industry*”, in which the study sample were the Polish companies in this industry. This selection of the sample results from the fact that in Polish enterprises the possibilities of creating own technological solutions are very limited, mainly due to capital reasons (in its various forms). This causes significant differences in access to knowledge and technology, and a development gap between Polish entrepreneurs and their foreign competitors. Therefore, conducting research on a group of Polish enterprises seems justified.

The value of the confectionery industry (taking into account only Polish enterprises) is approximately PLN 2.2 billion. Therefore, referring to the minimum market share of 5%, the research sample encompassed enterprises whose sales revenues in 2017 amounted to at least PLN 100 million.

In summary, the selected enterprises fulfill two criteria:

- 1) a Polish enterprise in the confectionery industry (entities with dominant equity and headquarters in Poland)
- 2) an enterprise with a minimum market share of 5% (measured by the value of sales revenues in 2017, at the minimum level of 100 million PLN).

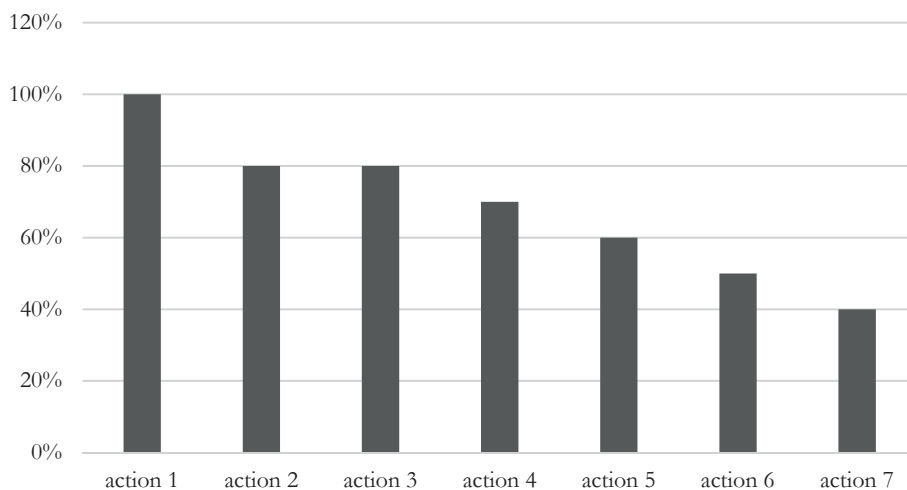
The study included all the companies which met the above criteria. The following 10 companies were chosen from the group of all the entities: Colian Holding Inc., Wawel Inc., Mieszko Inc., Zakłady Przemysłu Cukierniczego Otmuchów Inc., Terravita Spółka LLC, Millano Group, Zakłady Przemysłu Cukierniczego „Bałtyk”, Zakłady Przemysłu Cukierniczego „SKAWA Inc.”, Zakłady Przemysłu Cukierniczego „UNITOP-OPTIMA”, and Union Chocolate LLC. The studied research sample is a finite group. Of this group of enterprises, all the entities agreed to participate in the research, so the results of the research were obtained from 10 companies. All the surveyed entities are large enterprises employing over 250 people. The research was carried out with the help of a questionnaire survey and lasted from March to the end of June 2017. The study was conducted mainly by means of an e-mail questionnaire and a telephone questionnaire (both methods were used for all the enterprises), with the support of the direct interview method (applied in the case of half of the enterprises).

The analysed enterprises were asked to indicate the order of occurrence of individual actions in the innovation process. It was assumed, based on the literature, that the model of the innovation process consists of the following seven actions:

- 1) market need (consumer survey);
- 2) basic research (acquiring new knowledge, creating new theories);
- 3) applied research (practical application of basic research results);
- 4) development works (application of previously acquired knowledge to produce specific products, materials, systems, technologies, or services);
- 5) implementation work related to a new product or process (first implementation, application, and use of innovations);
- 6) large-scale production;
- 7) marketing.

On the basis of the conducted research, it can be definitely said that the enterprises use diverse approaches to the innovation processes in their companies (chart 1).

CHART 1

**Number of actions undertaken in innovation processes
in surveyed enterprises**

Source: author's own work based on surveys.

The occurrence of at least one of the listed actions was declared by all the enterprises. However, with each subsequent action, the participation of the surveyed entities decreases. Two and three actions in the innovation process were indicated by 80% of the enterprises, four actions – 70%, five actions – 60%, six actions – half of the enterprises, and seven actions – 4 enterprises. On the basis of the above results, it can be concluded that the more actions an innovative process contains, the less frequently it is used.

Most enterprises (80%) indicated that the first action in the innovation process was a market need, i.e. a survey of consumers and their needs. This means that the model of the innovative process used in the surveyed enterprises usually focused on the demand and not the supply side. In addition, it was the only type of action in the innovation process used by all the surveyed enterprises. The second most frequently indicated action was basic research (40%): this type of action was used by 70% of the surveyed entities, while applied research was used in 80% of them. Development, implementation and marketing efforts, which occupied lower positions in the list, were used by 60% of the surveyed enterprises, while only half of the entities undertook actions related to large-scale production (table 2).

TABLE 2

Sequence of actions in innovation processes in surveyed enterprises

Type of action	Sequence of actions							not taking action
	first	second	third	fourth	fifth	sixth	seventh	
consumer survey	80%	10%	10%	0%	0%	0%	0%	0%
basic research	10%	40%	10%	10%	0%	0%	0%	30%
applied research	10%	10%	30%	10%	10%	10%	0%	20%
development work	0%	10%	10%	30%	10%	0%	0%	40%
implementation work	0%	0%	10%	10%	20%	10%	10%	40%
large-scale production	0%	0%	0%	10%	10%	10%	20%	50%
marketing	0%	10%	10%	0%	20%	20%	10%	40%

Source: author's own work based on surveys.

When enterprises indicated market research as the first action in the innovation process, its further course focused mainly on basic research (10%) and applied research (10%). In the second place, when basic research was indicated equally frequently (10%), the following factors played a role in the innovation process: consumer survey, applied research, development and marketing. In the next place, respectively, applied research (30%), consumer surveys, basic research, development works, implementation work and marketing – 10% each. The fourth most frequently occurring actions were: development works (30%), basic and applied research (10% each), implementation works (10%), and large-scale production. In the fifth place, both implementation work and marketing achieved 20%, followed by: applied research (10%), development (10%) and large-scale production (10%). The sixth place was occupied by marketing (20%), and applied research, implementation work, and large-scale production (10% each), while the last place by large-scale production, implementation works (10%), and marketing (10%).

Based on the above data, it can be concluded that the general course of the innovation process in the surveyed enterprises is as follows: consumer survey, basic research, applied research, development work, implementation work, marketing, and large-scale production.

However, it should be remembered that the more stages the innovative process consists of, the less frequently it is used. Therefore, in order to unify the model of the innovative processes used by enterprises, a shortened version may be proposed in the form of: consumer research, R&D research (not necessarily divided into three stages: basic, applied and development), implementation of a new product or process, and sales. Narrowing the innovation process to four stages can help the surveyed companies to implement new solutions.

5. Conclusions

Most confectionery enterprises use the market pull model of the innovation process, because the first action in the entire process is to survey consumers (their needs), and only then to conduct basic research, applied research, or development work. As many as 80% of the surveyed entities indicated such a sequence of actions. The generalized process of innovation is as follows: survey of consumers and their needs, basic research, applied research, development work, implementation work, marketing and large-scale production.

In addition, it was observed that the more actions an innovative process comprises, the fewer enterprises use it. The full course of the innovation process presented in the article (7 actions) is used by only 40% of the studied enterprises. Therefore, a shortened version of the innovation process was proposed in the form of the following four stages: consumer survey, R&D research (not necessarily divided into three stages: basic, applied and development), implementation of a new product or process, and sales. Narrowing the innovation process to the indicated stages may help the surveyed enterprises to implement new solutions.

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