Chapter 1

The Nature of Innovation Management

Robert Romanowski

Abstract: The Nature of innovation management is referred in literature as short-term process with immediate cost, and as long-term benefits and other outcomes (Dodgson, Gann, Phillips, 2016, p. 6). The concept of innovation has long been dominated by a technical approach to the innovation process, despite the economic arguments exposed by one of the precursors of the theory of innovation and, at the same time, the school of evolutionary economics – Joseph Alois Schumpeter. Frequently, in the context of innovation, it is pointed out that organizational and marketing aspects play a part in the successful introduction of innovation onto the market. The aim of the study is to identify the evolution of innovation processes leading to new innovation paradigm, based on networking and openness. The method of desk research was used in the study to demonstrate the differences between six types of innovation processes, including science push, demand pull, coupling, interactive, integrated, networking and open innovation ones, and ten types of innovation, treated as a result of the process. In the new paradigm of innovation the risk of a result (type of innovation) is reduced by the way it was achieved (the process of innovation). Reduction of innovation's risk is possible when an innovator uses both own and other entities' resources in the process. The nature of modern innovation management has been changed from technical activity pushing novelties to a market into economic factors helping to define possibilities of positioning a new solution even before production.

Keywords: innovation process, types of innovation, innovation management, economic innovations

Introduction

Innovation is a concept that has dominated the discussion on the modern economy, referred to as a knowledge-based economy. The Idea of innovation management is referred to as a short-term process with immediate costs and long-term benefits and other outcomes (Dodgson, Gann, Phillips, 2016, p. 6). The nature of innovation management is based on understanding the innovation process, which implicates necessary resources, a structure of an organization and expected outcomes. Innovation management emerged as a discipline in the 1890's with Edison's innovation factory. Edison changed the image of the sole inventor by converting innovation to a process with recognized steps practiced by a team of inventors working together – laying the basic design of the R&D department (Şimşit, Vayvay, Öztürk, 2014, p. 690).

The process of innovation management, called also the innovation process, was based on the assumption of a gradual opening up towards external sources of information necessary for the effective implementation of an invention on the market. Two hypotheses by Schumpeter¹ resulted in the need to support the innovation process in small and medium enterprises. Among the many actors which can support the innovation process, the most often mentioned are academic bodies and administration at all levels. At the same time, division into types of innovation is related to long-term outcomes of the innovation process.

The concept of innovation has long been dominated by a technical approach to the innovation process, despite the economic arguments exposed by one of the precursors of the theory of innovation and, at the same time, the school of evolutionary economics by Joseph Alois Schumpeter. Frequently, in the context of innovation, it is pointed out that organizational and marketing aspects play a part in the successful introduction of innovation onto the market. The aim of the study is to identify the evolution of innovation processes leading to new innovation paradigm, based on networking and openness, typical for economic innovations with a supportive role from technical ones.

Basic types of innovation

The issue of innovation is not easy to interpret. Joan Robinson, recognizing this issue as a real problem, said "it is easier to show what an innovation is than to define it" (Robinson, 1983, p. 7–8). The perception of innovation is varied and vague, due to the short

¹ Schumpeter foresaw the problems of capitalism associated with creative destruction, affecting large companies which in his time were inefficient "bureaucratic monsters", alongside the development of small, flexible companies focused on innovation and managed according to the spirit of entrepreneurship (1st Schumpeter's hypothesis, also known as 1st Schumpeterian model (Kozłowska, 2010). As it turned out, large companies, even monopolies, acting under capitalist conditions, created mechanisms of self-repair, e.g. in the field of innovation, big companies began to cooperate with governments and in this way, nowadays, most of the breakthroughs are created by them, allowing the economy to grow (2nd Schumpeter's hypothesis, also called 2nd Schumpeterian model (Kozłowska, 2010).

tradition of research on innovation and the diversity of theoretical approaches. As such the concept of innovation is not clearly defined².

Among many authors dealing with issues of innovation a very interesting approach is represented by J.A. Schumpeter and P. Drucker. The concept of "innovation" was introduced for analysis at the beginning of the last century by J.A. Schumpeter (1960), who defined innovation as follows:

- the introduction of a new product (or a new species of product),
- the introduction of a new method of production,
- the opening of a new market, i.e. a market in which a branch of industry in a given country has not been represented yet, regardless of whether the market previously existed or not,
- gaining new sources of raw materials and semi-finished products, regardless of whether this market existed before or not,
- changes in the organization of some industries, e.g. the creation of a monopolistic situation or breaking it.

Schumpeter's classification is important for several reasons. First of all, it stresses the economic and technical nature of innovation (in terms of subject), making it possible to define four types of innovation i.e. product innovation, process innovation, organizational innovation, and market innovation. Furthermore, in terms of time, Schumpeter treats innovation very narrowly, because he recognizes only the first implementation of an invention (in production, organization or on the market) as innovation, which means that only a few changes and innovations can be termed "innovation" in this sense. Schumpeter understands innovation as the creation of fundamental or radical changes involving the transformation of new ideas or a technological invention into a market product or process.

Another important definition of innovation in the field of economics was formulated by P. Drucker, for whom "innovation is the specific tool of entrepreneurship, the means by which they exploit change as an opportunity for different businesses or a different services. It is capable of being presented as a discipline, capable of being learned, capable of being practiced. Entrepreneurs need to search purposefully for the sources of innovation, the changes and their symptoms that indicate opportunities for successful innovation. And they need to know and to apply the principles of successful innovation" (Drucker, 1992, p. 29). For Drucker, innovation is more an economic or social notion than a technical one³.

Drucker's and Schumpeter's approaches can be regarded as two poles in the concept of innovation. While Schumpeter specifically defines situations in which absolute

² In their analysis of innovation Edison, Ali and Torkar provide more than 40 definitions for innovation (Edison, Ali, Torkar, 2013, p. 1390–1407).

³ Moreover, P. Drucker lists systematic and spontaneous innovations, defining the former as the goal of an effective entrepreneur as well as defining it as identifying the sources of innovation opportunities (Drucker, 1992). It separates the sources of innovation depending on whether they are within or without the company's environment.

innovations can occur (i.e. inventions which are introduced for the first time in any market worldwide), Drucker defines innovation as a deliberate search for an opportunity to introduce new products. The main type of Drucker's innovations are secondary (i.e. the reproduction or adaptation to new conditions of already existing solutions). An analysis of these definitions reveals that all of them can be located between the narrowly conceived first change on a global scale (Schumpeterian approach), and the introduction of new products at the local level, at the level of the entity, usually the company, positively affecting the entity or its surroundings (Drucker's approach).

Following an innovation, understood as the development and implementation of a first invention or a new solution for the market, the diffusion of this innovation through market and non-market channels, from the place of origin (the first worldwide implementation) to different countries, regions, sectors (markets) and businesses is necessary. The second element is especially important and often under-emphasized.

Schumpeter's and Drucker's approaches were included in the Oslo Manual (2008), which contains a set of concepts applicable in the innovation policy of the European Union. It is the result of research on measures of innovation, carried out since the 1960s of the 20th century in the OECD (Organisation for Economic Co-operation and Development).

According to the OSLO manual an innovation is "the implementation of a new or significantly improved product (goods or services), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations" (OECD, Eurostat, 2008, p. 48).

The above definition refers to the dimension of the company. It contains information about the nature of novelties introduced in the microscale, and is therefore related to Drucker's meaning of innovation.

The Oslo Manual requires interpreting innovation as a significant change, from those of a routine and insignificant character. "The requirement for an innovation is a situation in which a product, process, marketing method or organizational method is new (or significantly improved) for the company. This includes products, processes and methods that a company has developed first, and those that have been assimilated from other companies or entities" (OECD, Eurostat, 2008, p. 48–49). However, one should realize that innovation can also be based on a series of smaller, incremental changes.

In the case of product innovation, implementation consists of the introducing of new processes, marketing methods or organizational methods, and is when they start to be actually used in businesses. This information confirms the importance of an idea and invention actually being used in the economy. Even the greatest scientific discovery should not be considered as an innovation if it is not possible to introduce it onto the market and thus gain economic benefits. At the same time, a constant trend observed in economic practice is to break the inventor's (or innovator's) monopoly on innovation. Innovations are always accompanied by an immediate reaction from competitors, tracing the progress of innovation in their sector.

It is important to distinguish innovation according to its aspect, a division which refers to the Schumpeterian approach (OECD, Eurostat, 2008, p. 49–55):

- a product innovation is “the introduction of goods or services that are new or significantly improved with respect to their characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics”.
- a process innovation is “the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software.”
- a marketing innovation is “the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing.”
- an organisational innovation is “the implementation of a new organisational method in the firm’s business practices, workplace organisation or external relations.”

The basic difference between the categories of product and process innovations is that the former is far more sensitive to market factors than the latter. A firm’s preference for product innovation is dictated primarily by its importance in controlling and maintaining its market position. In a highly competitive environment, there is a constant need to maintain the company’s position and longevity, which is impossible without an extensive introduction of new products.

Types of innovation processes

On the basis of the definition proposed by Schumpeter, the classic “Schumpeter’s triad” was created (Fig. 1), and can be considered as the first description of the innovation process, as well as being a basis for new innovation processes: invention, innovation and imitation.

Any dissemination of innovation is, in his view, a distinct set of changes that are called imitation. This means that at all times innovation is a unique change (one-time, non-continuous), and the processes of imitative or inventive changes are continuous and repetitive.

Figure 1. Schumpeter’s Triad

Source: Adopted from *Teoria innowacji* by Fiedor R. (1979), PWN, Warszawa.

For Schumpeter, innovation is the first introduction of an invention onto the market, ending the phase of invention. The phase of imitation consists of the spread of news among many customers in numerous geographical and sector markets. For an innovator, the most important goal is to shorten the phase of creativity and prolong the phase of innovation diffusion, while protecting the solutions introduced⁴.

Schumpeter's Triad was followed by seven types of innovation processes. First five were divided into linear models⁵ (science-push/technology-push and demand pull/need-pull), interactive models (coupling model Mowery, Rosenberg, 1979) and integrated one (Rothwell, Zegveld, 1985), and chain-link models (Kline, Rosenberg, 1986, Table 1). The latest innovative models assume building close relationships in the business environment, as in the case of the network model or the model of open innovation (Rothwell, 1994; Chesbrough, 2003).

First innovation process, termed as the science or technology push one, was focused on supply presumption of success (Fig. 2). It was presumed that implementing new technology onto the market gives better possibilities of achieving a competitive advantage. Nowadays, it is recommended to define current state of art in technology and production, highly emphasized in coupling model of innovation (Fig. 3).

Table 1. Innovation models evolution in historical perspective

Generation	Period	Authors of fundamental ideas	Innovation model	Essence of the model
1.	1950's – late 1960's	NASA	Technology (Science) push	Linear process
2.	Late 1960's – first half of 1970's	Myers and Marquis, 1969	Market (Demand, Need) pull	R&D on customer wishes
3.	Second half of 1970's – end of 1980's	Mowery and Rosenberg, 1979	Coupling model	Interaction of different functions
		Rothwell and Zegveld, 1985	Interactive model	Interaction with research institutions and market
4.	End of 1980's – early 1990's	Kline and Rosenberg, 1986	Integrated model	simultaneous process with feedback loops; "Chain-linked" Model"
5.	1990's	Rothwell, 1992	Network-ing-model	System integration and networks (SIN)
6.	2000's	Chesbrough, 2003	Open innovation	Innovation collaboration and multiple exploitation paths
7. (emerging, not fully formed yet)	2010's		Open innovator	Focus on the individual and framework conditions under which to become innovative

Source: Kotsemir and Meissner, 2013, p. 5.

⁴ When introducing a new product the highest costs are related to the phase of creativity in the absence of revenue from sales. In the innovation phase, that is the introduction phase of the product life cycle, the launch costs typically exceed revenues. The biggest gains, that is the excess of revenues over costs, are made in the phase of imitation, also known as the diffusion phase of innovation.

⁵ In the Chapter, expression "innovation model" and "given model of innovation" is used as synonym of "innovation process".

Figure 2. Linear models of innovation: Technology (science) push model Market (need, demand) pull model

Source: NASA, Myers and Marquis (1969).

Figure 3. Coupling model of innovation

Source: Adapted from The influence of market demand upon innovation: a critical review of some recent empirical studies article, by Mowery D., Rosenberg N. (1979). *Research Policy*, Elsevier, vol. 8(2), pp. 102–153, April.

Myers and Marquis (1969) heralded the 1960-s “technology push” view of market-relevant aspects (2nd generation). They reasoned that innovations resulting from R&D activities are targeted towards the satisfaction of customer needs (market pull approach).

The Development of marketing function in enterprises shed new light on the innovation process. When markets become mature, customers are as good source of new ideas as technical staff in R&D departments. A new model, a market pull one, appears (Fig. 2).

As a consequence, Mowery and Rosenberg (1978) first described the importance of interactions of the innovation process of corporate functions involved. Rothwell and Zegveld (1985) extended this by connecting the traditional linear approach to businesses with external research institutions and the market (3rd Generation; Fig. 3 and 4).

The “chain-linked” model of Kline and Rosenberg (1986) (4th generation, Fig. 5) considered the innovation process a fundamentally parallel process in which the parties (corporate) function through numerous backward loops (feedback loops) are connected.

In addition they cause interactions of internal innovation activities with external research/science system at all stages of the process. They differ, however, between direct external research services and the general (publicly) available knowledge bases.

Figure 4. Interactive Model of Innovation

Source: adapted from Reindustrialization and technology, by Rothwell R., Zegveld W. (1985), Longman Group Limited, London.

Chain-linked model showing flow paths flow of information and cooperation.

Symbols on arrows: C – central-chain-of-innovation; f – feedback loops; F – particularly important feedback.

K-R: Links through knowledge to research and return paths. If problems solved at node K, link 3 to R not activated.

Return from research (link 4) is problematic – therefore dashed line.

D: Direct link to and from research from problems in invention and design.

I: Support of scientific research by instruments, machines, tools and procedures of technology.

S: Support of research in sciences underlying product area to gain information directly and by monitoring outside work.

The information obtained may apply anywhere along the chain.

Figure 5. Integrated Model of Innovation/Chain linked Model of Innovation

Source: Adapted from An Overview of Innovation by Kline, S., Rosenberg, N. (1986). The positive sum strategy: harnessing technology for economic growth, Washington, DC, National Academy Press, 275–305.

The two authors arrive to the conclusion that science and technology were interdependent and suggestible. Thus, science is based on new technologies, and allows the development of new technological breakthroughs in science fields.

The innovation process of the “fifth generation” is based on the “chain-linked” model of Kline and Rosenberg (1986) and adds a strategic component of the integration of cooperating companies, the growing importance of information and communication technologies and the use of expert systems and networks (Rothwell, 1992). The above mentioned types of process are based on presumption for shortening the phase of inventiveness results from the need to reduce the so-called “Valley of death” in the innovation process (Fig. 6) (see also Romanowski, 2016).

The “Valley of death” is the most important moment in the invention phase because leaving it determines the technical, marketing, and financial success of the innovation process. Technical success occurs when, after the development phase and testing, the product launch takes place. Marketing success occurs when a new product gains a growing group of customers and current revenues exceed current costs (success of a new product). Financial success occurs when the cumulative costs of the innovation processes are covered (the break-even point is reached) and the innovator has a global surplus of revenues over global costs.

Figure 6. Valley of death

Source: Osawa, Miyazaki, 2006.

The invention phase can also be shortened if the parameters for new product success are defined: demand, supply, technological, and financial. Setting the demand parameter may help to adjust the features of a new product to meet the needs of customers in accordance with current consumer trends (Romanowski, 2013). The demand parameter can also be based on the distinct features of a new product currently available on the market that are different from other offers. The technology parameter assumes the use of technologies that have not been used in the market, even if they are available in other markets. The financial parameter is related to the possibilities of obtaining external financing from sources such as private entities, (e.g. business angels) as well as public (e.g. guarantee funds or operators of European funds) and social ones, (e.g. in the form of crowdsourcing). The risks associated with the invention phase are then greatly reduced through the introduction of open innovation assumptions, involving the use of external resources to create new solutions in an enterprise. The model based on open innovation requires not only the cooperation of enterprises with research units and local administrations, but also a skilful acquisition of knowledge from all entities surrounding the company in question, especially from customers. Open innovation frequently allows the formulation of a business model better suited to market needs than the model of a market pioneer. This approach is consistent with the concept of "imovation", which gives better results than imitative diffusion, or creative diffusion (Shenkar, 2011) and seen in such countries as Japan and South Korea.

Networking and open innovations as a new paradigm of innovation process

The 6th generation of innovation models introduces the paradigm shift from science push (black box model) to open innovation processes. The generation of innovation at company level thus far was mainly considered a company internal process and function. Chesbrough (2003) established the currently predominating thinking of open innovation which highlights the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively⁶. It assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology (Chesbrough, 2006). Hence one of the most promising forms lies in the collaboration within the model of open innovation.

The idea of networking innovation model relates to Schumpeter's second mark (hypothesis), which focuses on supporting the innovation processes in small and medium enterprises, because the large ones are developed enough to carry out their own R&D efforts⁷. Innovations are no longer "just" seen as a process, involving various functions and can be explained by the participation of a number of different institutions. Here cooperating companies (including suppliers) and customers with varying degrees of

⁶ The idea of open innovations is described in chapter *The concept of open innovation – the essence, types and examples in the petrol station sector*.

⁷ Big companies tend to create oligopolies based on public tenders.

intensity are involved continuously in various phases of the overall activity, while public R&D facilities and (business) external R&D facilities are included only at certain stages in the innovation process (Fig. 7).

Figure 7. Relationships in network economy

Source: Adapted Innovation networks: concepts and challenges in the European perspective (p. 247), by Koschatzky K., Kulicke M., Zenker A. (2001), Physica – Verlag – Springer, Heidelberg.

Over time, the development of new technologies and knowledge companies become increasingly dependent on external knowledge and external technology. This knowledge and technologies can be either publicly accessible or be privately owned by other companies, individuals or research institutions. Furthermore, external knowledge and external technologies are available either in a codified or personal and published or undisclosed form.

Business environment institutions, especially research and development service providers together with public and private research institutions and, increasingly, training institutions contribute much to build, develop and diffuse existing, publicly available “knowledge and technology pools”. Moreover, the role of universities as employer and educator of highly skilled workers and researchers especially for R&D needs further consideration. These institutions also provide services for external innovation-related activities, especially

technology transfer, R&D activities and its evaluation. The small and medium enterprises, to implement successful innovation, should use both company's internal R&D activities in innovation process, including the company knowledge and existing technologies prerequisite for the implementation of in-house innovation activities, and external sources for innovation. This attitude is described in literature within Triple Helix Model (Etzkowitz and Leydesdorff, 1995, p. 14–19) and all the derivate ones⁸.

New paradigm of innovation process, based on networking and openness, helps to define new set of innovations, treated as a result of a process (Table 2).

Ten types of innovation is directly related to Schumpeter's and the Oslo Manual classification. A new set of innovations emphasise the economic side of innovation process. The technical novelties are to support new configurations, offerings or customers' experience. This new approach is based on presumptions coming from design thinking, leading to user – driven innovation and cooperation with institutions and entities supporting innovation process.

The multidimensionality of innovation processes can be described by means of nine characteristics (Guinet, 1995, as cited in Nowakowska, 2009):

- innovation is interactive in nature, because it is created based on relationships arising in a company as well as contacts in its environment;
- innovation is located, because most often it comes up in a particular area with specific resources that play a key and unique role in the process of its creation, meaning "transfer" of the innovation process is difficult, even if possible;
- innovation is a process of integration, because it is based on an integrated structure and a specific organizational form which promotes the processes of creating, absorbing and diffusing knowledge as well as new solutions;
- innovation is a learning and interactive process, resulting from an organizational and institutional context;
- innovation is largely non-technical, only in exceptional cases does it depend entirely on technical knowledge;
- innovation has a social dimension, it is the result of various interactions and relations between individual entities, and thus is rooted in systems and social institutions;
- innovation is based on creative destruction, since its introduction often changes the existing structure of the market, economy, and organizational systems; it entails changes of management, individual and group behaviour, etc.;
- innovation is a source of culture, it stems from accepted community norms, value systems and patterns of behaviour, and is often created taking into account the historical context;

⁸ The idea of Quintuple Helix model, a derivate of Triple Helix model, is described in chapter *Green Entrepreneurship in Quintuple Helix Model*.

Table 2. Ten types of innovations

Profit model	Network	Structure	Process	Product performance	Product system	Service	Channel	Brand	Customer Engagement	10 types
Configuration These types of innovations are focused on innermost workings of an enterprise and its business system				Offering These types of innovations are focused on an enterprises' core product (good or service), or a collection of its products	Experience These types of innovation are focused on more customers-facing elements of an enterprise and its business system					(Keeley)
The company make money in the ways that are different form competitors or industry norms	The company work with other firms or surprising collaborators to develop new offerings that drive a shift from business as usual	The company have a unique or unusual organizational structure and approach to attracting the best assets	The company are uniquely skilled at doing or delivering across goods, services and platforms	The company produce a notably superior offering that dominates market share or earn a substantial premium	The company make multiply products that connect with one another in unique ways	The customers rave about their interactions with the company, particularly those instances where things went wrong and the company somehow made everything right	The company deliver its offerings to customers and users in ways that challenge or cofound what is usual within the industry	The company have an unusually distinct or vivid identity, particularly compared to the rivals	The offerings confer a unique identity, status, or sense of recognition to users and they become a part of their lives	Definition
Ad-supported Bundled Pricing Flexible Pricing Freemium Membership Premium	Alliances Collaboration Franchising Open Innovations Secondary Markets Merger/Aquisitions	Competency Center Corporate University Decentralized Management Incentive systems Knowledge Management Organizational Design	User Generated Process Flexible Manufacturing Intellectual Property Lean Production On-Demand Production Process Automation	Customization Ease of Use Engaging Functionality Environmental Sensitivity Safety Styling	Extensions Plug-ins Integrated Offerings Modular Systems Product Bundling Goods/Service Platforms	Guarantee Loyalty Programs Personalized Service Self-Service Supplementary Service "Try Before You Buy"	Cross-Selling Experience Center Flagship Store Go Direct On-Demand Pop-up Presence	Brand Extension Certification Co-Branding Component Branding Private Label Transparency	Community and Belonging Curation Experience Simplification Mastery Personalization Status and Recognition	Tactics/instruments

Source: Reprinted from Ten Types of Innovation: The Discipline of Building Breakthroughs. by Keeley L., Walters H., Pikkell R., Quinn B. (2013). Hoboken N.J.: John Wiley, Sons.

- innovation is risky and costly, especially for small and medium-sized enterprises, which is of great importance in the process of its development and commercialization.

Conclusion

Innovation almost never fails due to lack of creativity but almost always due to a lack of discipline. The most certain way to fail is to focus only on products. Successful innovators analyse the patterns of innovation in their industry and make conscious, considered choices to innovate in different ways. Innovations can be broken down and analysed, to define the reason of failure. Innovation is the creation of a viable new offering (Keeley, Walters, Pikkell, Quinn, 2013, p. 8) and can be built up systematically to increase the odds of success exponentially.

The idea of innovation management is based on two general presumptions: shortening the process of invention with cost reductions and making the outcome of innovation successful by market acceptance. When searching for assumptions concerning the introduction of a new product on the market one should be guided by market logic to a much greater extent than by technical one⁹. The innovative processes taking place in a knowledge based economy are complex and largely dependent on both technical and economic conditions.

It is worth remembering that innovations by their nature are variable and, together with changes in customers' needs and developments in science and technology, as well as the tendency to share knowledge, will move in the direction of an open innovation model.

In the new paradigm of innovation, the risk of a result (type of innovation) is reduced by the way it was achieved (the process of innovation). Reduction of innovation risk is possible when an innovator uses both his own and other entities' resources in the process. It is the premise of modern innovation management.

References

1. Chesbrough H.W. (2006). *Open Innovation: Researching a New Paradigm*. Oxford University Press, New York.
2. Chesbrough H. (2003). *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Harvard Business School Press.
3. Dodgson M., Gann M.D., Phillips N. (2016). *Perspectives on Innovation Management*. [In:] M. Dodgson, M.D. Gann, N. Phillips (Eds.), *The Oxford Handbook of Innovation Management*, Oxford University Press.

⁹ As was the case of Apple in the mobile market, where changes made to iPhone functionality (the phone stopped being just a communication device and became a personal mobile entertainment center), brought about in a couple of years the collapse of the then market leader – Nokia.

4. Drucker P.F. (1992). *Innowacja i przedsiębiorczość – praktyka i zasady*. PWE, Warszawa.
5. Etzkowitz H., Leydesdorff L. (1995). *The Triple Helix – University – Industry – Government Relations: A Laboratory for Knowledge Based Economic Development*. EASST Review, vol. 14.
6. Fiedor R. (1979). *Teoria innowacji*. PWN, Warszawa.
7. Keeley L., Walters H., Pikkell R., Quinn B. (2013). *Ten Types of Innovation: The Discipline of Building Breakthroughs*. Hoboken: John Wiley & Sons, NJ.
8. Kline S., Rosenberg N. (1986). *An Overview of Innovation*. [In:] R. Landau, N. Rosenberg (Eds.), *The positive sum strategy: harnessing technology for economic growth*. National Academy Press, Washington, DC, pp. 275–305.
9. Koschatzky K., Kulicke M., Zenker A. (2001). *Innovation networks: concepts and challenges in the European perspective*. Physica – Verlag – Springer, Heidelberg.
10. Kotsemir M., Meissner D. (2013). *Conceptualizing The Innovation Process – Trends And Outlook*. p. 5; <https://wp.hse.ru/data/2013/04/12/1297246623/10STI2013.pdf>. (access: 2019-08-08)
11. Kozłowska A. (2010). *Ewolucja struktur gospodarczych w świetle Schumpeterowskiej koncepcji kreatywnej destrukcji*. Wydawnictwo Uniwersytetu Ekonomicznego w Poznaniu, Poznań.
12. Mowery D., Rosenberg N. (1979). *The influence of market demand upon innovation: a critical review of some recent empirical studies*. Research Policy, Elsevier, vol. 8(2), pp. 102–153, April.
13. Myers S., Marquis D.G. (1969). *Successful Industrial Innovations: A Study of Factors Underlying Innovation in Selected Firms*. National Science Foundation.
14. OECD, Eurostat (2008). *Podręcznik Oslo. Zasady gromadzenia, i interpretacji danych dotyczących innowacji*. 3rd edition, Wspólna publikacja OECD i Eurostatu, Oslo.
15. Osawa Y., Miyazaki K. (2006). *An empirical analysis of the valley of death: Large-scale R&D project performance in a Japanese diversified company*. Asian Journal of Technology Innovation, 14: 2, 93–116, DOI: 10.1080/19761597.2006.9668620.
16. Robinson J. (1962). *Economic Philosophy*, Penguin Books. London, available at: <http://digamo.free.fr/ecophilo.pdf> [accessed 3.05.2015].
17. Romanowski R. (2013). *Ewolucja trendów konsumpcyjnych w XXI wieku w kontekście tworzenia gospodarki opartej na wiedzy*. Handel Wewnętrzny 2013, styczeń–luty, *Konsumpcja w innowacyjnej gospodarce*, pp. 14–26.
18. Romanowski R. (2016). *Innovative Product Management*, [In:] R. Romanowski, B. Pierański (Eds.), *Innovation Management: Educational Aspects*, Bogucki Wydawnictwo Naukowe, Poznań, pp. 45–54.
19. Rothwell R. (1992). *Successful industrial innovation: critical factors for the 1990s*. Science Policy Research Unit, University of Sussex.
20. Rothwell R. (1994). *Towards the Fifth-generation Innovation Process*. International Marketing Review, 11, pp. 7–31.
21. Rothwell R., Zegveld W. (1985). *Reindustrialization and technology*. Longman Group Limited, London.
22. Samuelson P., Nordhaus W. (2004). *Ekonomia. Tom 2*. Wydawnictwo Naukowe PWN, Warszawa.
23. Şimşit Kalender Z., Vayvay Ö., Öztürk Ö. (2014). *An Outline of Innovation Management Process: Building a Framework for Managers to Implement Innovation*. Procedia – Social and Behavioral Sciences, vol. 150 2014/09/15, pp. 690–699; DOI 10.1016/j.sbspro.2014.09.021
24. Schumpeter J.A. (1960). *Teoria rozwoju gospodarczego*. PWN, Warszawa.

25. Schumpeter J.A. (1964). *Business Cycles: A Theoretical, Historical and Statistical Analysis of Capitalist Process*. McGraw-Hill, New York.
26. Shenkar O. (2011). *The challenge of imovation*. Ivey Business Journal, April, available at: <http://iveybusinessjournal.com/publication/the-challenge-of-imovation/> (access 2014-11-11).
27. Smoleń T. (2012). *Produkt*. [In:] A. Czubała (Ed.) *Podstawy marketingu*. PWE, Warszawa.
28. Spruijt J. (2016). *8 Types of Innovation Processes (Infograhics)*. Openinnovation.eu; <https://www.openinnovation.eu/14-09-2016/8-types-of-innovation-processes/> (access 2019-08-25)
29. Stawasz K.E., Niedbalska G. (2008). *Rodzaje innowacji*. [In:] Matusiak K.B. (Ed.), *Innowacje i transfer technologii – Słownik pojęć*. PARP, Warszawa.