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THE EFFECTIVENESS OF INNOVATIVE PROCESSES IMPLEMENTED BY THE SME COMPANIES. RESULTS OF THE EMPIRICAL RESEARCH.

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Abstract

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The essence and the importance of innovation in the process of building the competitiveness of enterprises is widely described in the economic literature. But the analysis of innovative activity of companies very often indicates that the innovations introduced to the market do not bring the expected benefits. This leads to the conclusion that very often innovation activities of enterprises are inefficient. And detailed analysis of such cases can identify the key barriers to implementing effective innovation.
The modern model for the innovative activity indicates that one of the key factors for success of innovative activity of enterprises is properly implemented the introduction of new solutions to market. The problem of diffusion of innovation involves a number of issues related to the process of spreading and promoting innovation in the market. It is widely recognized that the powers of innovation diffusion is an important determinant of the capacity of firms.
Author posed the following research hypothese:
Innovative activities carried out by the surveyed companies is inefficient.
The purpose of this paper is to present the problems associated with effective diffusion of innovation in the SME sector business activity in Poland, with particular emphasis on the barriers in this area. Commonly available statistical data, the author's empirical research results from the period 2009–2012 and results of other studies conducted by the University of Szczecin were used to prepare this publication.

innovations, the effectiveness of innovative processes

In case of the developed economies the main force fuelling the increase of the productivity is innovations basing on three pillars: research and development (R+D), knowledge and education. The innovation becomes a key criterion of the competitiveness. The innovative actions make a significant value added for industry and services and contribute to strengthening the competitive abilities of the national economy on the international market. The innovation is a key element increasing the efficiency and the economic growth, especially in the era of rapid technological changes. The development trends of the more developed countries reveal that only the increase of competitive advantage based on the knowledge and innovations may guarantee stable development and creation of new, better work positions.

Poland is presently in specific moment of its development. Previous competitive advantages based on law work costs are more and more vividly losing their significance. It becomes necessary to create new advantages based on knowledge and innovation forming a main factor of the long-term economic growth. From this point of view, it is crucial to develop innovative activities of companies, including research and development, as the most important factors of the competitiveness in global scale.

Unfortunately, the innovation of Polish economy is relatively low. In Innovation Union Scoreboard report, published in 2011 by InnoMetrics research institute, commissioned by the European Commission, the Polish economy in view of innovation expressed with SII (Summary Innovation Index[1]) has been located at the 23rd position with 27 EU member countries researched (the value of the aggregate SII ration for Poland = 0. 296, the value of the averaged ration for EU27 = 0.539)[2].

InnoMetrics have given the lowest marks to own innovative activities of companies of the small and medium businesses sector (value for Poland = 13, 76, EU27 average = 30, 31), the cooperation of the companies of the small and medium business sector in scope of the innovations with other companies of the market (Poland = 6, 4, EU27 average = 11, 16) as well as the sale of innovative (new from the market or company point of view) products and services (Poland = 9, 84, EU27 average = 13, 26).

Factors with positive influence on the innovation of the Polish economy include the high potential in scope of the absorption of the innovative solutions – Polish companies' gaining and implementation of foreign licenses and patents (Poland = 0, 18, EU27 average = 0, 51), human resources (Poland = 35, 3, EU27 average = 33, 6), ability to finance innovative actions and the functioning of the innovative activity support. It should be added that the innovation of the Polish economy measured with SII in 2011 is decreased in relation to 2010 (SII = 0.304).

The critical evaluation of our economy is confirmed with the World Bank's ranking prepared in 2012, basing on KEI (Knowledge Economy Index) with Poland at the 38th location[3]. The low level of the Polish economy's innovation is also revealed in the data of the European Statistical Office (Eurostat), gathered within the Community Innovation survey (CIS) evaluating the situation of companies in scope of their innovation activity[4].

The low innovation of the Polish economy is especially noticeable for the small and medium businesses sector, which may have negative consequences related, among others, to the decrease of the competitiveness of the economy and its marginalisation on the international arena. This aspect is frequently addressed in numerous scientific publications and reports considering the condition of the Polish economy's innovation – among others, the publications by: E. Horodyńska-Okoń, K. Piecha, W. Świtalski, M. Zastępowski, M. Plichta.

Simultaneously, many national researches (and some statistics published e.g. by GUS [Central Statistical Office]) reveal that Polish companies frequently declare a relatively high level of own innovation – especially in the aspect of introducing to the market innovative goods and services or the absorption of innovative solutions – A. Żołnierski, Innowacyjność polskich przedsiębiorstw 2011 [Innovation of Polish Companies 2011] PARP Report.

The revealed cognitive dichotomy indicates the existence of possible differences in methodological defining and understanding the innovation or omitting during the evaluation of the innovative activities, the aspects related to results that should be caused by such activities – despite the fact that the researched companies more and more frequently declare implementation of the innovative undertakings, the efficiency of such actions is not reflected in the companies' results (measured with basic financial indicators, e.g.: increase of goods and services sale, increase of profit, decrease of costs of operation).

In view of the above information, the condition of the Polish economy's innovation calls for detailed researches and analysis aiming at the attempts to explain the described situation.

1. The essence of effectiveness of innovative activity implemented by companies

The efficiency of activity notion is frequently used especially in relation to economic sciences, where it gains a special meaning in the context of improvement of actions and decisive processes. The literature usually defines efficiency as the result of undertaken actions, described with the relation of the achieved results to borne expenditures (Stoner 1994, p. 29–30).

The analysis of the literature on the subject indicates that the issue of the efficiency of innovative actions is relatively seldom addressed (among others: Arundell, Bloch, Rosebusch, Sawang), and the Polish literature practically does not present a full elaboration considering the influence of company's resources on the efficiency of innovative actions (among others: Karaganov, Karasek, Wach, Zastępowski).

The efficiency is measured (both ex post and ex ante) with the use of index methods, based on the partial, synthetical productivity indicators of the resource usage (e.g. work, capital). The calculation of ex ante efficiency estimates the anticipated effects with the use of specific means or time. The ex post efficiency is implied to determine the results of the specific tasks' implementation.

The authors undertaking the subject of evaluating the innovative activity's efficiency try above all

1 The method of creating SII has been described in detail in the report Innovation Union Scoreboard 2011, ISBN 978-92-79-23174-2.
2 http://www.proinno-europe.eu/page/summary-innovation-index-0#_ftn2
3 Knowledge Economy Index Rankings http://siteresources.worldbank.org/INTUNIKAM/Resources/2012.pdf.
4 http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/

to define the efficiency of the innovative activity (usually in relation to defining the efficiency of other types of company activities) and apply classic efficiency measures, usually based on the measurable features of innovative activity.

As indicated in the literature (e.g. Brzeziński, 2001, p. 146) the innovative activity is basically evaluated with the same methods as used for the evaluation of investment projects. Thus, the wide scope of innovation forms is brought to technological, production or process shape, as those the effects of which may be evaluated with financial measures. However a problem occurs e.g. in case of the value innovation or even the organizational innovation, when it is hard to specify an expected rate of return and the prospected market success – due to the complexity and multidimensionality of possible effects and costs. Thus there are suggestions to distinguish the evaluation of the efficiency of purely capital investments and the evaluation of the innovation usage, since these undertakings have different goals and methods of their implementation, results, methodology of specifying expenditures and results, conditions of evaluating the results and the influence on changes of other activity indicators (Karganov, 2008, p. 135–136).

Similar distinction may also be found in the comparison of types of company's efficiency performed by A. Jaki, who makes a clear distinction between investment efficiency and innovation efficiency (Jaki, 2008, p. 3–7).

The above observations prove the necessity to undertake detailed researches in relation to the nature of innovative processes' efficiency and determine an attempt to elaborate methods of measuring the efficiency of innovative activities that in the fullest way would take into consideration the nature and complexity of the innovative processes.

The starting point for creating the methodology for the evaluation of innovative activity's efficiency may be a detailed analysis of innovative processes that take place in companies.

2. The measurement of innovative activity on the basis of the analysis of innovation diffusion

The implementation of innovative projects – regardless of the size of company which implements the innovation and regardless of the type of the implemented innovation – takes place according to the diagram which is defined in the subject literature as the model of the innovative process (Drucker 1994, p. 35). The first models describing the manner of implementation of innovative processes were drawn up as early as the 1950s and 1960s. Examples may include traditional, linear models defined as "*pushed by science*" (push model) and *pulled by market*" (pull model) (Jasiński, 1998, p. 13–15; Stawasz, 1999, p. 26) described in detail in the literature. The extremity of the first models of the implementation of innovative process, their "passive character" as compared to the external environment and the need to take into account the non-linearity of innovative processes signaled by many authors (Janasz, 1999, p. 73; Kline, 1985, p. 36–44) have resulted in the development of subsequent models of the implementation of an innovative process. The best known examples of subsequent descriptions of the implementation of an innovative process include: the "*chain-linked model of the innovative process*" suggested by S.J. Kline and N. Rosenberg (Kline, Rosenberg 1986, p. 289–290) and the "*integrated model*" described by R. Rothwell and W. Zegveld (Rothwell, Zegveld, 1985) or simultaneously by P. McGowan (McGowan, 1996).

Further research on the essence of the implementation of innovative projects, the development of the innovation theory and the practice concerning innovative activities led to the creation of subsequent evolution models of innovative processes. The authors of the new proposals integrated the implementation of the innovative process with virtually each area of a company's activity, showing that the resources owned by the company determine its innovative potential – namely the ability to effectively and efficiently implement innovative projects (Norek, 2012). Additionally, the Authors of the new models indicated the role and significance of an organization's learning and knowledge management with regard to the possessed innovative potential. The currently binding models of the implementation of innovative projects include the model of: "the 5th generation innovative process" (Rothwell 1995), the systematic approach to the innovative process, the spiral innovation process (Oslo Manual 2005), the efficient management of innovation (Tidda, Bessant, Pavitt, 2001).

Analyzing the contemporary models, it may be clearly stated that the Authors of each of the new proposals emphasize the significance of the stage related to diffusion and popularization of the implemented innovation.

The diffusion of innovation, defined by the Oslo manual, means the "dissemination of innovation by market and non-market channels, starting from the first implementation at any place in the world" and "the way in which innovations are subject to dissemination by market and non-market channels, from the first implementation to the contact with various consumers" (Oslo Manual, 2005, p. 80).

The diffusion of innovation may essentially apply to two groups of market participants:

1. Diffusion on the part of suppliers – namely companies offering products and services. The diffusion of innovation in this group includes the popularization of a similar product offer (imitation) or using similar process-related, organizational or marketing solutions. Diffusion on the part of suppliers may be a result of a formalized transfer of technology consisting in purchasing relevant licenses or rights to use innovations introduced by other companies (Jasiński, 2006).

2. Diffusion on the part of buyers – covering the participants of consumer markets. The issues concerning diffusion in this group include the principles of introducing new products and services to the market, promoting original techniques and methods of operation or finally the popularization of innovative ideas and concepts. Therefore, the main purpose of activities releted to the implementation of diffusion processes on the part of buyers is to make the greatest number of buyers or adaptators accept the innovation (since innovation does not always require a purchase).

To sum up the above discussions, it may be concluded that the diffusion of innovation determines the principles of market commercialization of innovative products and services and is an element of the innovative process which is directly responsible for the market success of new products and services. Therefore, it may be concluded that innovations would not have an economic significance without diffusion processes (Klincewicz, 2011, p. 22), which makes many researchers acknowledge the issues of diffusion as crucial for a successful implementation of innovative processes (Klein, Sorra, 1996; Angle, Van de Ven, 2000).

Furthermore, emphasizing the significance of innovation diffusion issues, it should be indicated that knowledge with regard to the diffusion of innovation is necessary to create product and marketing strategies in companies introducing innovative products and services.

Research on issues related to the diffusion of innovation may be important to explain the problems of companies with regard to an effective implementation of innovative processes. The significance and importance of innovation diffusion in the process of effective implementation of innovative activities are confirmed by works of numerous researchers.

The efficiency of the innovative processes may be analysed on two grounds:

1. Diffusion of innovation – describes the efficiency of company's introducing innovative goods and services to the market;
2. Absorption of innovation – specifies company's ability to adopt in own activity innovative solutions created by other companies.

Accepting the previously suggested understanding of the efficiency of innovative activity, in the process of efficiency evaluation, both on the ground of diffusion and absorption, a series of indicators may be applied. This may be exemplified with:

1. Innovation sale level.
2. Success indicator related to the sale of innovation.
3. Innovation level of the researched companies.
4. Customers' acceptance level in relation to new products and services.
5. Efficiency level of diffusion processes for new products and services.

In this article the author shall analyse the efficiency of the innovation diffusion processes in Polish companies of small and medium businesses sector.

3. The analysis and evaluation of innovation activity's efficiency of Polish companies of small and medium businesses sector. Research Method.

On examining the causes of low innovation of companies from the small and medium businesses sector (Norek, 2013) the author has paid special attention to the barriers related to the efficiency of the innovative process implementation. The author has performed a detailed analysis of the relation between the company's innovation level, the sale of innovative products and services, indicator of the achieved success and interrelation between the customers' acceptance of a new product or service and possibility of its market commercialisation.

On the analysis of the above features and results of diffusion processes the author has formed the following research thesis: *Innovative activity implemented by the researched companies is inefficient.*

The set research goal has been implemented on the basis of logical induction method based on the analysis of processes of innovation diffusion in the companies of small and medium businesses sector. The research includes the evaluation of all the key determinants influencing the efficiency of the innovative activity. The research has been conducted with the use of the research questionnaire consisting of 43 questions, divided into eight categories – stages of the innovative process implemented in the company. The detailed methodology of the research has been described in other publications by the author (Norek, 2011).

Within the evaluation of individual categories, the companies performed the evaluation of the selected aspects of functioning within a given area. The research was conducted with a use of an Internet questionnaire during the period from April 2012 to August 2012.

200 companies from three regions of Poland were selected for the analysis:

1. Zachodniopomorskie – region of an average innovation level;
2. Podkarpackie – region of a low innovation level;
3. Mazowieckie – region of a high innovation level.

200 companies were selected for analysis. They were selected in a purposeful manner to ensure an appropriate research structure: 45% (90 companies) of production companies, 55% (110 companies) of service companies. The division due to the size of the examined companies was as follows: 39% (79 companies) micro enterprises, 47% (94 companies) small enterprises, 13% (27 companies) medium enterprises. The sample for comparative researches was standardized with statistical methods taking into consideration the structure of individual provinces' economy: size of the company and dominant type of

I: *Structure of the research sample*

Size of the companies	Region	Type of activity		Total sum
		Production	Service	
Small	Mazowieckie	17	22	39
	Podkarpackie	16	15	31
	Zachodniopomorskie	8	16	24
SUM		**41**	**53**	**94**
Micro	Mazowieckie	17	16	33
	Podkarpackie	9	11	20
	Zachodniopomorskie	10	16	26
SUM		**36**	**43**	**79**
Medium	Mazowieckie	4	5	9
	Podkarpackie	5	4	9
	Zachodniopomorskie	4	5	9
SUM		**13**	**14**	**27**
Total sum		**90**	**110**	**200**

II: *Key indicators describing effectiveness of implementation of innovation diffusion in examined companies*

Group	Category	< 1%	2%–10%	11%–20%	21%–30%	> 30%
Usługi	Sale of innovations	27%	27%	22%	18%	6%
	Success indicator	31%	29%	19%	17%	5%
	Level of innovation	29%	24%	23%	19%	5%
Produkcja	Sale of innovations	25%	30%	22%	14%	9%
	Success indicator	15%	23%	27%	25%	10%
	Level of innovation	24%	22%	26%	20%	8%
All	Sale of innovations	26%	28%	22%	16%	8%
	Success indicator	23%	26%	23%	21%	7%
	Level of innovation	27%	23%	25%	19%	6%

the conducted activity. The author is fully aware that the analysed sample is not representative, however it is an amount sufficient to perform the analysis and make conclusions. Structure of the research sample is presented in Tab. I.

Due to character and volume of this publication, the Author will only present selected research results allowing to clearly evaluate the potential of the examined companies with regard to the diffusion of innovation. The Author examined in detail, among others, the following characteristics describing the process of innovation diffusion:

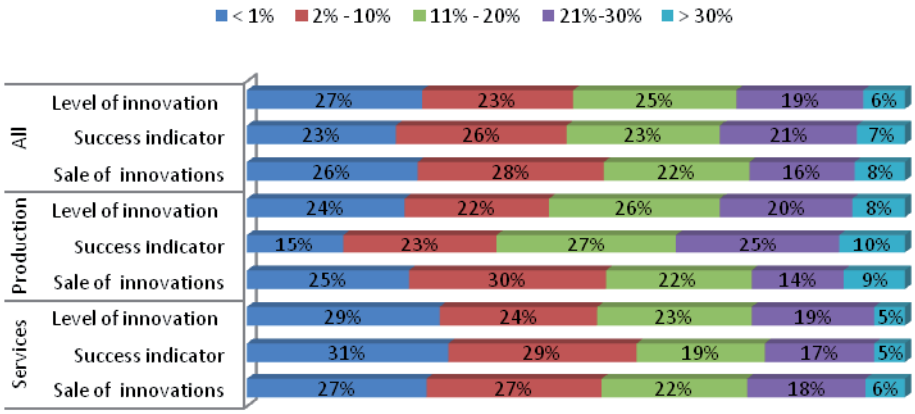
1. Level of innovation sales.
2. Indicator of success related to innovation sales.
3. Level of innovation of examined companies.
4. Level of acceptance of customers with regard to new products and services.
5. Level of effectiveness of diffusion processes for new products and services.

The level of innovation of a unit is defined as a share of new products or services in its offer in the period of the last three years, regardless whether they were a market success. The notion of "success indicator", on the other hand, should be understood as the share of new products or services in a company's offer in the last five years which, after implementation, gained approval of the market. The evaluation here is supplemented by indicators with regard to the relations of revenue and profit from the sale of new products/services as compared to the company's turnover in the last three years. Those companies for which the values of the abovementioned indicators exceeded the level of 30% should be considered as distinctive in this respect. If, on the other hand, they oscillate within the range of 1%, these entities are in the weakest group of the examined ones. Such a description of ranges is generally adopted in the research concerning the innovativeness of companies or innovation audits. The aggregated results have been presented in Tab. II.

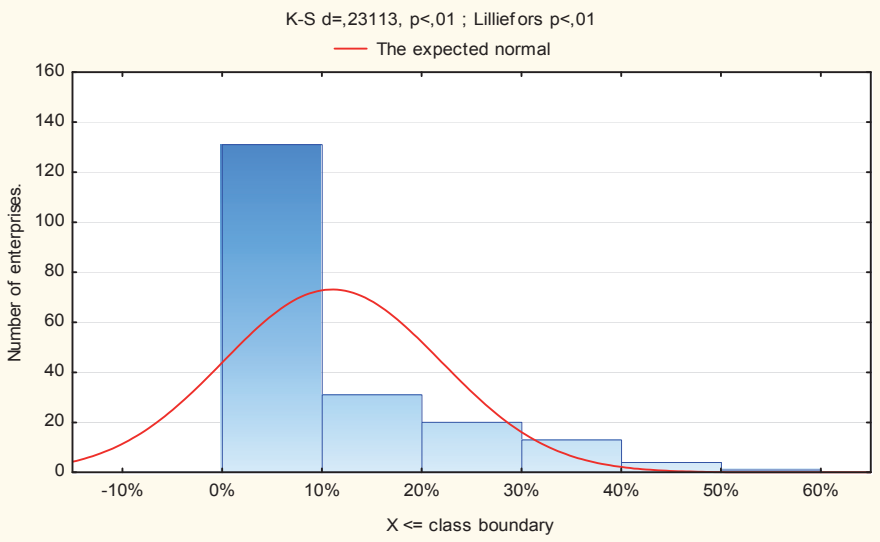
The obtained results indicate that half of the examined companies (50%) has a low innovation level (innovation level < 10%) which classifies them in the category of non-innovative companies. Only 6% of the examined companies may be considered as innovative, namely such which implemented new products or services in the period of the last three years (innovation level > 10%). These results show that the examined companies do not have a sufficient innovative potential which makes it

III: *Average % share of profit from the sale of innovation*

Size of the companies	Type of activity		Total Average
	Production	Service	
Small	9.8%	8.9%	9.35%
Micro	8.24%	6.49%	7.37%
Average	13.34%	12.78%	13.06%
Total Average	**10.5%**	**9.39%**	**9.93%**



1: *Key indicators describing effectiveness of implementation of innovation diffusion processes in examined companies including type of conducted activity*



2: *% Share of profit from the sale of innovation in the surveyed companies and the expected normal distribution*

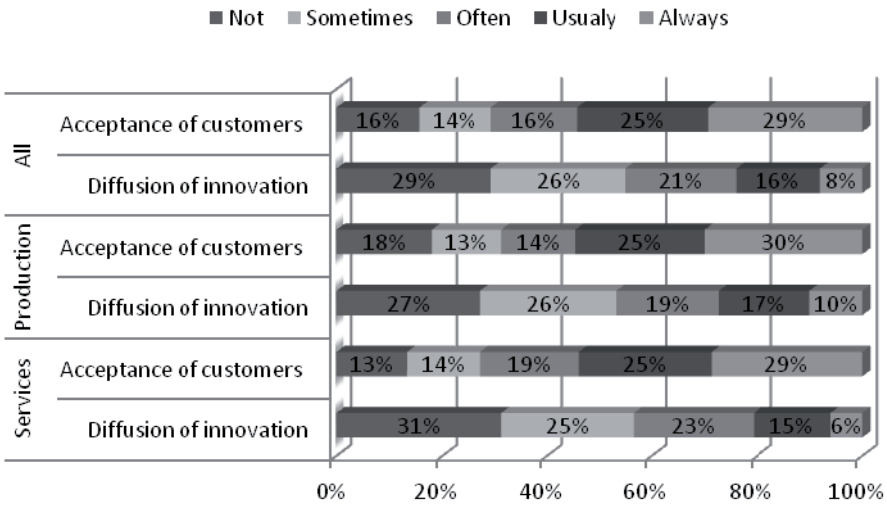
possible to implement innovative projects. The Author's other research confirms this thesis and indicate that the examined companies demonstrate the lowest innovative potential in the following areas: evaluating and planning innovative activities, communication and organization or financing innovative operations (Norek, 2012). The detailed results providing the percentage share of profit on the sale of innovative products in the total profit of the researched companies are presented in Tab. III.

Tab. III Średni Udział % zysku ze sprzedaży innowacji

The abovementioned results may be supplemented by an indicator describing the market acceptance of the introduced innovations – namely, in fact, describing the effectiveness of the diffusion process. This indicator is very unfavorable for the examined companies. As much as 49% of the examined companies evaluate the indicator of success below 10%. On the other hand, only 7% percent of the implemented innovations obtained the market's acceptance – indicator of success above 30%. The obtained values should be considered as a clear proof of poor effectiveness of the

IV: *Dependence of customer acceptance for implemented innovations and effectiveness of diffusion*

Group	Category	Not	Sometimes	Often	Usually	Always
Services	Diffusion of innovation	31%	25%	23%	15%	6%
	Acceptance of customers	13%	14%	19%	25%	29%
Production	Diffusion of innovation	27%	26%	19%	17%	10%
	Acceptance of customers	18%	13%	14%	25%	30%
All	Diffusion of innovation	29%	26%	21%	16%	8%
	Acceptance of customers	16%	14%	16%	25%	29%



3: *Dependence of customer acceptance for implemented innovations and effectiveness of diffusion*

implementation processes of the implementation of innovation diffusion in the examined companies resulting from an inadequate potential in this aspect.

The financial dimension of the weaknesses of the implementation of innovation diffusion processes is characterized by the indicator of innovation sales. As much as 54% of the examined companies declare that profits from the sale of innovations are below 10% of the total profit, and only 8% of the examined companies declare over 30% of profit from the sale of innovations.

The obtained results indicate that production companies achieve slightly better results than service companies but this difference is small. The obtained results have been presented in graphic form on Fig. 1. The Fig. 2 presents a histogram of percentage share of profit on the sale of innovation in the researched companies with the expected statistical normal arrangement of this phenomenon – this histogram also confirms a low efficiency level of implementation of innovative processes by the researched companies defined by the profit on the sale of innovative products.

Another category analyzed in detail was the dependence between customer acceptance towards a new product or service and the effectiveness of its diffusion. The obtained results made it possible to clearly evaluate the effectiveness of the innovation diffusion process implementation in the examined SMEs companies. The aggregated results have been presented in Tab. IV.

As it seems from the obtained data, despite the fact that 29% of the introduced innovations always obtained customer acceptance, the diffusion of only 8% of them ended with a full market success. These results clearly indicate that the examined companies, in spite of the fact that they often have valuable, new products and services which obtain a positive customer evaluation, are very rarely able to carry out an effective process of their market diffusion. This is yet another confirmation of the thesis presented in the article that the examined companies have insufficient potential with regard to innovation diffusion. The obtained results have been presented in graphic form on Fig. 3.

Summary, discussion and recommendations for further directions of researches on the efficiency of innovation activity of the SME companies

The author of this article has formed a thesis that *Innovative activity implemented by the researched companies is inefficient*. This low potential in scope of the efficient implementation of diffusion processes is one (not the only – which is indicated by other, mentioned researches by the Author) of the determinants of the low innovation of Polish companies of the small and medium businesses sector.

In order to confirm the formed thesis, the author conducted empirical researches, the results of which have been presented in this article. The obtained results unambiguously confirm the low potential of the researched companies in scope of the implementation of the efficient innovation activity.

Despite the fact that 29% of the introduced innovations always obtained customer acceptance, the diffusion of only 8% of them ended with a full market success. As much as 54% of the examined companies declare that profits from the sale of innovations are below 10% of the total profit, and only 8% of the examined companies declare over 30% of profit from the sale of innovations.

The obtained results should induce to conduct in-depth research in this respect. In-depth research, type case study would be significant from the point of view of evaluating the effectiveness of innovative processes. The diffusion processes of particular innovations should be subject to a detailed and thorough analysis as part of that research. Such research could help indicate specific mistakes made by companies when implementing diffusion processes.

Research into the dynamics of changes of effectiveness of implementation of diffusion processes in time would also provide equally valuable information – this would enable drawing conclusions and evaluating whether SMEs are increasing their competencies in this aspect.

SUMMARY

In order to confirm the formed thesis, the author conducted empirical researches, the results of which have been presented in this article. The obtained results unambiguously confirm the low potential of the researched companies in scope of the implementation of the efficient innovation activity.

Despite the fact that 29% of the introduced innovations always obtained customer acceptance, the diffusion of only 8% of them ended with a full market success. As much as 54% of the examined companies declare that profits from the sale of innovations are below 10% of the total profit, and only 8% of the examined companies declare over 30% of profit from the sale of innovations.

The diffusion processes of particular innovations should be subject to a detailed and thorough analysis as part of that research. Such research could help indicate specific mistakes made by companies when implementing diffusion processes.

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