

ENTREPRENEURSHIP AS A BASIS FOR PROMOTION OF THE STRATEGY OF DEVELOPMENT OF POLISH INDUSTRIAL ENTERPRISES

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ABSTRACT

Innovation activity is a key area for achievement of the strategic goals of industrial enterprises. This study is aimed at establishment of a relationship between strategic development indicators and the level of innovation activity of manufacturing enterprises in Poland. To achieve this, the authors compared theoretical thinking with the implementation of the theory based on empirical testing methods. A method of questioning was used in this study to select indicators that reflect the relationship of innovation with the indicators of the development of manufacturing enterprises. The results found: (1) accuracy and reliability of statistical processing tools; (2) the activation of innovation activity promotes the implementation of the development strategy; (3) the relationship of the indicators of the innovation level and the index of production of manufacturing enterprises; (4) the relationship between indicators of innovation level and profitability of assets of manufacturing enterprises; (5) the relationship of indicators of innovation level and growth rates of investments of manufacturing enterprises. The authors of the study recommend to assess the level of innovation activity of manufacturing enterprises based on quantitative dependencies between certain indicators, which provides the basis for effective management of innovations as the basis for provision of enterprise development strategy.

Keywords: Innovation Development Level, Manufacturing Industry Enterprises, Strategy, Innovative Activity Management, Profitability of Assets.

JEL Classifications: M5, Q2

INTRODUCTION

Active scientific research suggests that innovation is critical for business development strategies and that enterprises-innovators excel non-innovative enterprises in achieving competitive advantage (Reinhardt et al., 2018). Studies are under way to discuss the nature of innovation in order to achieve competitive advantages not only for Poland but also for Ukraine and the Czech Republic (Kozubikova & Zoubkova, 2016; Ilyash et al., 2018). Innovations are not a separate business activities, but they take the form of processes that encourage change and

need to be successfully completed. Successful innovations are the result of managerial, marketing, scientific and technical, organizational, and financial activities. Market participants work together with employees, technology and all of them are dynamic and relatively independent (Portna, 2015a, 2015b). However, as noted by Dang & Xu (2018), there is still a critical need to improve the management of innovation as the basis for enterprise development strategies. This study is aimed at establishment of a relationship between development indicators and the innovation activity level of manufacturing enterprises in Poland.

REVIEW OF PREVIOUS STUDIES

The innovative type of economic development assumes that the growth of production and improvement of its quality is based on the introduction of scientific and technological innovations. According to Bondar & Iershova (2015), an innovative model of economic development generates fundamental changes in thinking, production, management, communication and causes a change in economic relations. This conclusion is confirmed by the results of a survey of 246 company executives, of which almost 51% consider innovation to be an important condition for maintaining a company's competitiveness, a driver for rapid and profitable revenue growth (14%), and a prerequisite for maintaining strategic business development (35%) (<http://www.pwc.com/gx/en/issues/innovation/innovation-survey.html>).

According to the Innovation Union Scoreboard 2017 rating, Poland is in a group of "*moderate innovators*" with a result below the EU average. In order to improve its own position, Poland pursues a consistent policy of support of innovative entrepreneurship. The expenses of Polish companies for innovation activities in the period 2000-2017 has almost tripled, reaching \$514,503 billion a year (<https://www.imf.org/external/pubs/ft/weo/2018/01/weodata/index.aspx>). And despite of the fact that the different ratings of competitiveness indicate improvements in the relevant indicators of the national economy of Poland in recent years, further intensification of innovation activity of enterprises is required (Karpenko et al., 2018).

Modern research in the field of innovation management proves that the concept of "*innovative activity of enterprises*" is still not sufficiently formalized and structured and used more often in the most general sense. Carboni & Medda (2019) investigate the factors affecting the innovation activity of enterprises, as well as its impact on the indicators of strategic development of enterprises. We agree with Zizlavsky (2016) who states that the success of management of innovation activity depends on internal factors: general enterprise management systems, personnel and information security systems. Ershova (2014) has substantiated in his studies the role of accounting and analytical information for ensuring innovation activity management and ranked factors that ensure the quality of accounting information. Bondar & Iershova (2015) define the role of strategic information for management of enterprise innovation activities. The mechanism of management of innovative activity requires improvement of methods of assessment of the impact of innovation level indicators on the enterprise development indicators. Currently, there is a certain gap between these groups of indicators (Drobyazko et al., 2019).

HYPOTHESIS

The innovation activity level is one of the main factors in ensuring the strategic development of industrial enterprises, which depends on the production index; return on assets and investment growth.

METHODS

The sample was taken from the medium and large enterprises of the manufacturing industry of Poland, which implement innovations. The experts selected the middle and senior managers who work at selected enterprises. A questionnaire was proposed for the 45 experts who participated in this study. The questionnaire method was used to determine the significance and relevance of innovation activity, its impact on the indicators of enterprise development and the selection of indicators that reflect their interconnection. The methodology of calculations was based on the application of coefficients of the rank correlation of Ch. Spirman. Data were calculated on 14 industry groups of manufacturing enterprises in Poland. For each industry group, a ranking place (rank) was determined for each of the selected indicators. Then, coefficients of correlation between the indicators of development and indicators of the level of innovation activity were determined.

RESULTS AND DISCUSSION

The level of activity of innovation activity of manufacturing industries has been properly analyzed using descriptive statistics, growth rates as a percentage. A questionnaire for the selection of indicators, which suggested to measure the level of activity of innovation and development of enterprises, was proposed to experts from among the managers of the higher and middle level industrial enterprises of Poland. The results of the indicators characterizing the development of the enterprise are: production index, I_{pn} ; return on assets, R_a ; the growth rate of investments, I_i , which was calculated as the average annual for 5 years (2012-2017) on the basis of the reporting data of enterprises. As a result, the development of enterprises is characterized by the following areas: production, financial condition and cost of the enterprise. The degree of coherence of expert opinions in the determination of these indicators was estimated by the coefficient of concordation, which was $W=0.865$. For the level of innovation activity of the enterprises, the following indicators were selected by experts: the share of expenses for technological innovations in the total amount of financial investments (P1); the share of expenses for information and communication technologies in the total amount of financial investments (P2); the share of innovative products in the total volume of production (P3). The degree of coherence of expert opinions in the determination of these indicators was estimated by the coefficient of concordation, which was $W=0.785$. At the same time, the selected indicators were also calculated as the average annual for 5 years (2012-2017) The industrial groups of manufacturing enterprises of Poland (together-14 groups) were selected for calculation. Each of them has a rank for each of the selected indicators. Then, coefficients of correlation between the indicators of development and indicators of the level of innovation activity were determined. 1-3).

Industry	Ipn		P1		P2		P3	
	%	Rank 1	%	Rank 2	%	Rank 2	%	Rank 2
1. Production of food and beverages	103.8	11	0.5	13	0.22	11	4.5	9
2. Textile production (2)	101.4	14	0.7	12	0.27	14	4.0	11
3. Production of skin and items made of skin (3)	103.8	12	0.2	14	0.28	10	2.0	14
4. Production of items made of wood (4)	104.8	7	0.8	11	0.21	12	2.8	12
5. Production of paper; publishing and polygraphic activities (5)	103.9	10	1.5	7	0.54	2	4.1	10
6. Production of coke and oil products (6)	103.1	13	1.5	8	0.2	13	4.9	8
7. Production of products (7)	104.6	8	2.4	3	0.4	4	9.9	3
8. Production of rubber and plastic items	117.5	1	1.7	6	0.31	7	8.0	5
9. Production of non-metal mineral products (9)	106.2	4	1.3	10	0.33	6	2.7	13
10. Metallurgical production and metal processing (10)	104.4	9	2.0	5	0.3	8	5.3	7
11. Production of machines and equipment (11)	109.7	3	1.3	9	0.4	3	6.4	6
12. Production of electrical, electronic and optical equipment (2)	105.3	5	2.7	2	0.58	1	10.0	2
13. Production of vehicles and other transport equipment (13)	115.5	2	2.1	4	0.34	5	19.7	1
14. other productions (14)	105.1	6	2.9	1	0.29	9	8.6	4
amount of squares of deviations	x	x	238		184		216	
coefficient of correlation, r^2	x	x	0.48		0.6		0.53	

The results of Table 1 indicate a rather high degree of correlation with the cost of information and communication technology (P2). This is primarily due to the priority area of this sphere in innovation policy at all levels of management of the national economy. The small value of the cost of technological innovation (P1) in ensuring the growth of production (Ipn) is due to the fact that the introduction of innovations requires significant further costs, which enterprises cannot always afford. In most industries, these costs make up for 12-15%, which are not sufficient for dynamic innovation development, so their impact does not show up to an adequate degree. If we talk about the susceptibility of industries to innovation (as evidenced by the sum of rank deviations), then such are the production of food products, vehicles, and metallurgical production. The least susceptible ones are woodworking, rubber, plastics and chemical production.

Indicators	Ra		
	P1	P2	P3
amount of squares of deviations	252	304	313
coefficient of correlation, r^2	0.55	0.34	0.32

The results of Table 2 indicate a weak correlation between the indicators. The largest link has an indicator of the share of innovative goods in the total volume of products manufactured. This is to a certain extent due to the high cost of innovative products.

Indicators	Ii		
	P1	II2	P3
amount of squares of deviations	v	304	313
coefficient of correlation, r^2	0.55	0.34	0.32

The results of Table 3 indicate a weak dependence of investment growth rate (Ii) on indicators of innovation level. The most important factor is the share of innovative goods. Expenditures on information and communication technologies for the investment process of manufacturing enterprises do not have a noticeable effect. The smallest susceptibility is shown by such industries as woodworking, leather and footwear production, and metallurgical production. The most sensitive was the production of food products, coke and oil refining, as well as the production of electrical, electronic and optical equipment.

The link between the production index (Ipn) and the industry groups in the manufacturing industry with the return on assets (Ra) and the investment growth rate of investment (Ii) was estimated. Data from Table 4 were used for calculation.

Industry	Ipn	Ra	Iinv	Industry	Ipn	Ra	Iinv
(1)	103.8	106	102.5	(8)	117.5	106.1	106.3
(2)	101.4	101.6	114	(9)	106.2	109.1	121.3
(3)	103.8	103.5	108.4	(10)	104.4	110.8	102
(4)	104.8	100.5	115	(11)	109.7	104.8	106.1
(5)	103.9	106.8	111.9	(12)	105.3	104	117.8
(6)	103.1	116.9	114.6	(13)	115.5	101.7	115.3
(7)	104.6	115.7	115.5	(14)	105.1	107.2	111.5

Table 4 shows initial data based on which the production index is the resultant indicator (Y), and return on assets (x1) and investment growth rate (x2) are variable. The pair correlation coefficients were calculated, which are equal to $yx1=0.966$; $yx2=0.966$; $x1x2=0.969$. The coefficient of multiple correlation is 0.99736. The value of the correlation coefficients confirms that the relationship between the sign Y and the factors Xi is strong. Determination coefficient $R^2 = 0.97352$; $R=0.9478$. A more objective estimate is the corrected determination factor of 0.939, which means that 93.9% of the regression equation explains the behavior of Y. The observed t-statistic values for $ryx1$: $t_{obser}=13.45$. According to Student's table $t_{krit}(n-1; \alpha/2)=(13; 0.025)=2.16$. Since $t_{obser} > t_{krit}$, the correlation coefficient is statistically significant. The observed t-statistic values for $ryx2$: $t_{obser}=13.43$. Since $t_{obser} > t_{krit}$, the correlation coefficient is statistically significant. In our case, all the pair coefficients of the correlation $|r| < 0.7$, which means that there is no multicollinearity of factors. The biggest influence on the resultant attribute is given by the factor x1 ($r=0.9659$), which means that when constructing a model, it will enter the regression equation first.

The equation of regression, which establishes the relationship of the production index with the return on assets and the investment growth rate for a manufacturing enterprise, is built based on the average values for 2012-2017:

$$Y = 2.1634 + 0.4888X_1 + 0.4635X_2 \dots\dots(1)$$

Economic interpretation of model parameters: increase x_1 by 1 unit of meas. leads to an increase in Y by an average of 0.489 units of meas.; increase x_2 by 1 unit of meas. leads to an increase in Y by an average of 0.464 units of meas. The statistical significance of the equation is verified using the determination coefficient and Fisher's criterion. It is established that in the investigated situation, 94.78% of the total variability of Y is due to the change in the factors x_1 .

RECOMMENDATIONS

Based on the results of the study, the researchers determine that the activation of innovation as a factor in providing a strategy for the development of enterprises in Poland is possible within the framework of scientific and technological breakthroughs, the transition to an innovative way of development, creation of conditions for the initiation, development and implementation of innovative projects. It is recommended to assess the level of innovative activity of manufacturing enterprises based on quantitative dependencies between certain indicators, since the definition of these dependencies provides the basis for efficient management of innovations as a factor for ensuring long-term development of enterprises.

CONCLUSION

At the enterprises of the manufacturing industry of Poland, the problem of innovation development is especially significant in terms of the practice of economic activity. The studies carried out reflect the link between the indicators of development and the level of innovation activity. The methods of econometric and statistical studies used in this study made it possible to determine the indicators on which it is expedient to assess the innovation development level of enterprises, but also the model of the relationship between the indicators of enterprise development in the areas: production, finances, and value of enterprises.

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