

The Level and Determinants of Organizational and Marketing Innovativeness in Industrial Enterprises Functioning in the Polish Market on the Basis of Data for the Years 2010–2012

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Abstract

The main aim of the article is to present a recognition of the factors influencing the innovative activity (organizational and marketing) of industrial enterprises in Poland. It was decided to specify 5 potential variables explaining innovative activity of enterprises. Multiple regression was used to test the significance of factors. The results show that the share of micro companies in the given division of manufacturing turned out to be a significant factor in determining the level of activity in the scope of marketing-related innovativeness. Companies owned by foreign subjects display higher activity in the sphere of innovative activity. The share of bank credits in short-term liabilities turns out to be a serious barrier to implementation of organizational innovations.

Keywords: organizational innovativeness, marketing innovativeness, enterprises, Poland

Introduction

It is both endogenous (internal) and exogenous (external) factors that are distinguished as regards their influence on innovativeness in an organization. Among the first group there are the following: organizational structure, strategy of organization, accessibility of resources and new technologies, R&D intensity, organizational culture, communication, motivation of employees and their engagement (Alves et al., 2007), the size of the enterprise, readiness and motivation on the part of the management to take risk (Francik and Pocztowski, 1991).

The external factors are, in turn, connected with the intensity of the relation between organizations and their environment. S. Rychtowski (2004)

includes the following in the set of external conditionings of innovativeness: services-oriented processes which cover the system of scientific research, information system (scientific-technical, economic and organizational), sociopolitical climate, legal norms and administrative regulations (the innovation policy of the state), all-market conditions (market mechanisms, economic calculation, prices), system of education and trainings, connections within the market and outside the market with partners who are sources of information and technology, technical infrastructure. On the other hand, A. Francik and A. Poczowski include competition in the market, market increase trend, rate of technological progress, economic situation, influence of the state on the economy, branch synergy linked to the choice of introducing innovation in the group of exogenous factors (Francik and Poczowski, 1991).

Organizations are affected by the environment in which they function (de Propriis, 2002). Organizational innovations relate to the sphere of 'organization and management', as well as that of relations with the environment (Brzeziński, 2001). Interactions between organizations and the environment, as well as flows of knowledge, which are connected with them, are thus regarded as beneficial to accelerating innovativeness (Cohen and Levinthal, 1990; Lundvall, 1995). D. Mowery and N. Rosenberg perceive innovations as a process of acquiring knowledge which, in its greater part, remains outside formal actions oriented towards research-and-development, and in which the key role is played by organizational aspects. In the authors' opinion, organizational innovations are also an indicator of the significance which decision-makers assign to modern management as a factor determining effectiveness of activity and economic effectiveness of a company. A lack of perfecting of management systems (lack of organizational effectiveness), however, can result not only from underestimating the role of management as a determiner of effectiveness, but also – for instance – from limitations of the financial character, or that connected with accessible intellectual potential. Numerous studies deal with the influence of direct foreign investments on the innovativeness of economic subjects. Concrete benefits obtained from the flow of knowledge and skills from branches of supranational corporations into local companies can appear in the form of the following: projects, specifications, production know-how, quality control, techniques of mobilizing towards higher productivity, personnel trainings, etc. (Kuzel, 2005: 353–370). At the same time, foreign investments exert a vital influence not only on direct raising the technological level of companies in the host country, but on regional innovativeness as well, including effectiveness of innovations (Fu, 2007).

It follows from Cho and Pucik's studies that there a relation exists between innovativeness, quality and results obtained by a company (a rise in the value of effects, profitability and market value). Simultaneously, Cho and Pucik claim that the influence of the quality on the growth follows, in part, under the influence of innovativeness, similarly as the influence of innovativeness on profitability, in part, remains under the influence of the quality (Cho and

Pucik, 2005). A proper management of innovations¹ leads to improvement in results (financial but not only these) of the organization (Hull, 2004; Hull and Tidd, 2003; Jiménez-Jiménez and Sanz-Valle, 2011; Scott, Haozhe and Patricia, 2009; Ulusoy, Kilic and Alpan, 2011; Jiménez-Jiménez and Sanz-Valle, 2011; Lin Wang and IYu, 2010; Tidd and Bessant, 2009). Tidd et al. (2005) maintain that managing innovations can have a positive effect on the growth of an organization through improvement in effectiveness, quality, positioning and share in the market. In this very same way, extra-technological innovations – e.g., of the organizational kind – can have a good effect on productivity (Hall, 1994). S. Yamin, A. Gunasekaran and F. Mavondo (1999) arrive at similar conclusions in their work, in which – while examining Australian enterprises – they notice a positive correlation between innovativeness and return on assets (ROA), as well as return on investment (ROI), or the share in the market. In turn, the hypothesis concerning a positive influence of innovations on financial results of companies is not confirmed in J. Darroch's studies (Darroch, 2005). Tidd and Bessant draw attention to considerable difficulty in building the model of dependence between innovativeness and results obtained by companies (Tidd and Bessant, 2009).

In the domestic conditions of Poland, studies dealing with the dependence between innovativeness and selected factors were carried out by, among others, A. Świadek (2012), M. Pichlak (2012), T. Kraśnicka (2013), Z. Mikolas, G. Głód, T. Ingram, W. Głód, M. Wronka (Kraśnicka, 2013). For instance, A. Świadek examined 415 businesses dealing with the manufacture of food products. It follows from the study that the innovation-related activity is the domain of large enterprises, with a mixed ownership structure (possessing both foreign and domestic capital within their structures of financing).

The research carried out by M. Pichlak demonstrated a positive relation between the level of innovativeness and effectiveness of companies (it was financial indexes and subjective assessment of effectiveness of an organization declared by the respondents which were made use of in the overall evaluation) (Pichlak, 2012).

In 2011, a research team under the leadership of T. Kraśnicka conducted a research survey (Stage I) concerning the level and conditionings behind innovativeness of enterprises and also their influence on a company's results. The research included a sample consisting of 250 companies based in Silesian Voivodship (Poland). It was found out that the identified dimensions of innovativeness do not correlate in any considerable or firm way with economic results, financial liquidity, and only very weakly – with estimated dynamics of incomes. At the second stage of the research, carried out in 101 businesses based in Silesian Voivodship in 2012, weak relations were revealed between product-related

¹M. Karlik defines managing innovations as a set of actions which include: changing the company's strategy, taking decisions with regard to innovative activities, organizing, controlling innovation-related activity of a company and supporting pro-innovative attitudes directed towards company's resources and applied with the intention of attaining company's targets in the sphere of innovation in an effective and efficient way.

and marketing-oriented innovations and results obtained by the manufacturers (Kraśnicka 2013).

In view of the significance of innovativeness for raising competitiveness of enterprises, studies which deal with establishing determiners of innovativeness have been conducted for years now. The paper is an attempt at empirical verifying of hypotheses concerning determinants of innovative activity (organizational and marketing) of industrial enterprises, as well as working out a model to explain the influence of a group of selected factors (determining the force and direction of the factors influence) on this activity. Data relating to twenty-four divisions of manufacturing were analyzed. Multiple regression was used in order to examine the influence of selected independent variables on the dependent variable.

Material and Methods

The authors of the present article have focused on organizational and marketing innovativeness as areas of actions supporting product- and process-related innovativeness. On the basis of a survey of studies, it can be thought that both of the basic areas of innovativeness remain in a relation with economic effectiveness. Facilitation of product- and process-oriented innovations remains then in a direct relation with economic effectiveness. As it has been indicated above, innovations in the sphere of organization and marketing are also interesting for the reason that they testify to appreciation or a lack of appreciation, on the part of decision-makers responsible for organizational matters, of the role of modern management from the point of view of the effectiveness of a company's activity. The aim of the article is, accordingly, to attempt to empirically verify the theses connected with determiners of pro-innovative activity of industrial enterprises within the sphere of organization and marketing, as well as to build a model explaining the influence of a group of selected factors (determination of the force and direction of the impact of the factors) on this activity.

The following research hypotheses have been accepted for the needs of this research:

- The form of ownership influences the organizational innovativeness/marketing innovativeness (the higher the share of foreign ownership, the higher the share of innovative enterprises).
- The size of economic subjects influences the organizational innovativeness/marketing innovativeness (the higher the share of micro subjects, the lower the share of innovative enterprises).
- The profitability of subjects influences the organizational innovativeness/marketing innovativeness (the higher the profitability, the higher the share of innovative enterprises).

- The liquidity of economic subjects influences the organizational innovativeness/marketing innovativeness (the higher the liquidity ratio, the higher the share of innovative enterprises).
- The share of bank credits in short-term liabilities of subjects influences the organizational innovativeness/marketing innovativeness (the higher the share of credits, the lower the share of innovative enterprises).

On the basis of data supplied by the Central Statistical Office (Dzida et al., 2013; GUS, 2011; GUS, 2012; GUS, 2013) and those found in the database provided by *rynkometr.pl* (Rynkometr, 2014), a special database was made with reference to divisions of manufacturing (data for the years 2010-2012). The Central Statistical Office and the Rynkometr each publish aggregate statistics (the NACE 2-digit level). The data concerning twenty-four divisions of the manufacturing² according to PKD (Polish Classification of Activities) were then subject to analysis (the NACE 2-digit level of industry disaggregation). From a purely practical perspective, the NACE 2-digit level of industry disaggregation is particularly useful when referring to data that are not easily available in a comparable format at firm level. From an analytical point of view, the NACE 2-digit level of industry disaggregation facilitate investigations into the impact of specific characteristics on innovations. It should be mentioned that most sectors at the two-digit aggregation level contain a variety of industries, which can differ in technological opportunities.

Due to the complexity of the analyzed dependences it is multiple regression (Szewczyk and Ciesielska 2011) which was used to examine the simultaneous influence of selected explanatory variables on the dependent variable:

$$Y = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \dots + \alpha_k X_k + \varepsilon,$$

where:

Y – dependent variable,

$X_1, X_2, \dots, X_k$ – independent variables,

$\alpha_0, \alpha_1, \alpha_2, \dots, \alpha_k$ – parameters,

ε – residual error.

²Division 10 – Manufacture of food products, 11 – Manufacture of beverages, 12 – Manufacture of tobacco products, 13 – Manufacture of textiles, 14 – Manufacture of wearing apparel, 15 – Manufacture of leather and related products, 16 – Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials, 17 – Manufacture of paper and paper products, 18 – Printing and reproduction of recorded media, 19 – Manufacture of coke and refined petroleum products, 20 – Manufacture of chemicals and chemical products, 21 – Manufacture of basic pharmaceutical products and pharmaceutical preparations, 22 – Manufacture of rubber and plastic products, 23 – Manufacture of other non-metallic mineral products, 24 – Manufacture of basic metals, 25 – Manufacture of fabricated metal products, except machinery and equipment, 26 – Manufacture of computer, electronic and optical products, 27 – Manufacture of electrical equipment, 28 – Manufacture of machinery and equipment n.e.c., 29 – Manufacture of motor vehicles, trailers and semi-trailers, 30 – Manufacture of other transport equipment, 31 – Manufacture of furniture, 32 – Other manufacturing, 33 – Repair and installation of machinery and equipment.

The authors also decided to include in the examination the following variables, which can influence the level of innovative activity in the sphere of organization and marketing:

- X_1 – share of foreign enterprises in economic subjects in total (Rynkometr, 2014),
- X_2 – share of micro enterprises in subjects in total (Rynkometr, 2014),
- X_3 – sales profitability ratio (the mean value for the years 2010-2012) (GUS, 2011; GUS, 2012; GUS, 2013),
- X_4 – liquidity ratio of the first degree (the mean value for the years 2010-2012) (GUS, 2011; GUS, 2012; GUS, 2013),
- X_5 – share of bank credits in short-term liabilities (the mean value for the years (2010-2012) (GUS, 2011; GUS, 2012; GUS, 2013).

In turn, the following were accepted as dependent variables:

- Y_1 – share of enterprises declaring introduction of organizational innovations in the years 2010-2012 (Dzida et al., 2013),
- Y_2 – share of enterprises declaring introduction of marketing innovations in the years 2010-2012 (Dzida et al., 2013).

The selection of the variables has been based on substantial premises described in the previous section of this article, and also on statistical ones (an analysis of the correlation between variables, coefficient of determination R^2 , as well as corrected coefficient of determination $\bar{R}^2$) (Nowak, 1994; Szewczyk and Ciesielska, 2011; Czyżyński, 1995). The process of selection consisted in determining coefficients of variation, coefficients of correlation between the variables³, and also on building the initial model which contains all assumed variables. In the next phases of the process, there followed elimination of the explanatory variables which did not influence the dependent variable in any significant way. The statistical significance of individual parameters was examined by means of Student's t-test (t-stat), while the total significance with the use of Fisher-Snedecor test (F-stat). The accepted level of significance was $\alpha = 0.05$.

Results and Discussion

Variable X_1 (the share of foreign enterprises in economic subjects in total) was included in the model due to the need for verifying the initially observed, clearly higher, level of organizational and marketing innovativeness among private industrial companies which remain in the hands of foreign owners. It reflects

³Coefficient of variation is the measure of variability of the data. Independent variables should be characterized by suitably high variability (with $v^*=0.1$ being the critical value of the coefficient).

the conviction that a peculiar ‘business culture’ was and is ‘imported’ into our country by enterprises having foreign head-offices (Janasz, 2011). Variable X_2 (the share of micro enterprises in subjects in total) was included in the initial model due to the fact that, in the authors’ opinion, a scarce financial and intellectual potential, which companies of micro-size class usually have at their disposal, effectively inhibits introduction of significant organizational innovations and does not allow extensive marketing. Variables X_3 and X_4 , being selected measures of economic effectiveness, are examined due to the fact that it is most probably not only innovative activity that leads, by the assumption, to strengthening the economic situation of an enterprise, but in itself it is a factor which facilitates or even stimulates perfection, including innovativeness. More profitable enterprises are thus frequently better organized, and this – in return – raises the effectiveness of their activity. Variable X_5 represents, in the authors’ opinion, a potential destimulant. If, then, the share of bank credits in short-term liabilities is high, a company – with high probability – is experiencing financial problems, and the credits are not of the pro-investment or developmental character, but play the rescuing role. This is clearly visible in years of crisis, e.g., in 2008 in Poland (Iwin-Garzyńska, 2010). A high averaged value of this measure should then negatively affect the organizational innovative activity and marketing innovative activity. Y_1 and Y_2 are independent variables representing the share of companies which are active in the sphere of organizational and marketing innovations: (Y_1 – share of enterprises indicating introduction of organizational innovations in the years 2010–2012, Y_2 – share of enterprises indicating introduction of marketing innovations in the years of 2010–2012).

An analysis of the values of coefficients of correlation (Table 1) leads to the conclusion acknowledging a strong positive correlation between the share of companies indicating introduction of organizational innovations in the years 2010–2012 (Y_1) and the share of foreign enterprises (X_1). In turn, a strong negative correlation occurs between the share of enterprises indicating introduction of organizational innovations (Y_1) and the share of micro companies (X_2), as well as the share of bank credits in short-term liabilities (X_3), Y_1 and X_5 and between Y_2 and X_2 . A strong negative correlation occurs also between the share of enterprises indicating introduction of marketing innovations (Y_2) and the share of micro companies (X_2). The assessment of diagnostic usability of models was made on the basis of coefficient of determination R^2 (determining the degree of adjusting the model to empirical data) and corrected coefficient of determination $\bar{R}^2$ (the choice of a model during excluding successive explanatory variables at the successive stages of multiple regression).

Table 1. Pearson's linear correlation coefficients.

	Y_1	Y_2
Y_1	1.00	0.57
Y_2	0.57	1.00
X_1	0.88	0.26
X_2	-0.72	-0.43
X_3	-0.19	0.16
X_4	-0.40	-0.17
X_5	-0.70	-0.30

Source: Authors' own calculations done in Microsoft Excel

The obtained results (Table1) point to the fact that industrial businesses owned by foreign subjects display considerably higher activity in the sphere of innovative activity of the organizational character. The obtained result provides another argument supporting the thesis that these companies indeed contribute to spreading of new solutions in managing industrial enterprises and are a carrier of the peculiar 'business culture'. It seems that traditional companies originating from developed economies pay greater attention to the level of modernity of their management systems and local (native) managers, while associated with them, learn to apply and appreciate the significance of modern managing for obtained results. These enterprises, to the evidently greatest extent, organizationally support the processes of implementation of basic types of innovation: the process- and product-related ones. It can be thought that this type of innovativeness is at a higher degree – as regards foreign enterprises – an ordered process.

A large share of bank credits in short-term liabilities turns out to make a substantial obstacle in implementing organizational innovations. The high values of this coefficient can signal financial problems. In such a situation management boards concentrate – obviously – on them as the key questions from the point of view of survival, whereas auxiliary and supporting questions are marginalized. Despite the fact that the return-on-sales coefficient has not proved a statistically significant determiner of innovative activity in the organizational sphere, then – if one were to accept a slightly more liberal level of significance 0.1, it would have to be included in the determiners of this class of innovativeness. Generally, it appears that a high profitability stimulates organizational innovativeness (other indicators of profitability were not examined due to the lack of data), while financial difficulties greatly hamper this type of activity.

The relatively high level of R^2 testifies to a good adjustment of the model to the empirical data. The sign of α_i parameter, for each explanatory variable, was in accordance with that of the coefficient of correlation, which means an accordance of the direction of the influence of explanatory variable X_i on dependent variable Y (coincidence). The values of F-statistics, as well as those of t-statistics point to the significance of the parameters of the model ($p < 0.05$).

Table 2. Regression output (Y_1 – the share of enterprises indicating introduction of organizational innovations in the years 2010–2012)

	Coefficient	Standard error	t-stat	p-value
Intercept	15.349*	4.304	3.566	0.002
X_1	1.438*	0.235	6.123	0.000
X_5	-0.344*	0.165	-2.085	0.049
F-stat	47.461			
Significance F	0.000			
R^2	0.819			
$\overline{R}^2$	0.802			

* significant at the significance level of 0.05

Source: Authors' own calculations done in Microsoft Excel

The model of multiple regression for the share of enterprises confirming the introduction of innovations in the area of organization presents itself in the following way:

$$\hat{Y}_1 = 15.349 + 1.438X_1 - 0.344X_5$$

Two explanatory variables (X_1 – the share of micro companies in subjects in total, X_5 – the share of bank credits in short-term liabilities) account for the 82% of the variability of the share of enterprises which indicated introduction of innovations in the sphere of their organization. If the share of foreign enterprises in economic subjects in total rises by 1%, and the share of bank credits in short-term liabilities remains unchanged, the share of enterprises confirming introduction of organizational innovations increases by 1.438%. If the share of bank credits in short-term liabilities rises by 1%, and the share of foreign companies in economic subjects in total remains unchanged, then the share of enterprises indicating introduction of organizational innovations decreases by 0.344%.

Table 3. Regression output (dependent variable: Y_2 – the share of enterprises which indicated introduction of innovations in the sphere of marketing in the years 2010–2012)

	Coefficient	Standard error	t-stat	p-value
Intercept	40.531	12.436	3.259	0.004
X_2	-0.323	0.146	-2.211	0.038
F-stat	4.887			
Significance F	0.038			
R^2	0.182			
$\overline{R}^2$	0.144			

*significant at the significance level of 0.05 Source: Authors' own calculations done in Microsoft Excel

The share of micro companies in the total number of subjects in the given section of processing industry turned out to be a significant factor in deter-

mining the level of activity in the scope of marketing-related innovativeness. The larger share of these subjects is connected with a considerable limitation of their activity in the sphere of marketing innovativeness. It can be thought that both the lower intellectual potential, which the companies have at their disposal, and their much lower financial resources provide a good explanation of the reason for this state of things. Companies of the micro-size class also more frequently have a local range of their activity, therefore an extensive marketing activity and innovativeness can be treated by them as unnecessary.

The model displays the property of coincidence: the values of Fischer-Snedecor F-statistics and those of t-statistics show the significance of the parameters of the model ($p < 0.05$). The relatively low level of R^2 testifies to a poor adjustment of the model to the empirical data.

The model of regression for enterprises indicating introduction of marketing-related innovations in the years 2010–2012 looks as follows:

$$\hat{Y}_1 = 40.531 - 0.323X_2$$

If the share of micro companies in economic subjects in total rises by 1%, the share of enterprises confirming introduction of marketing innovations decreases on the average by 0.323%. Explanatory variable X_2 (the share of micro companies) accounts for merely 18% of the variability of the share of enterprises indicating introduction of innovations in the area of marketing.

Conclusions

On the basis of the conducted research the following conclusions can be formulated:

1. Companies which are owned by foreign entities display a visibly higher level of organizational and marketing innovativeness among private industrial enterprises.
2. The share of bank credits in short-term liabilities turns out to be a serious barrier to implementation of organizational innovations; it can be a sign of financial problems faced by a company. It can de facto be thought that financial problems impede to a considerable extent the activity within the scope organizational innovativeness.
3. A substantial share of micro enterprises in the total number of subjects in the given sector of processing industry turns out to be a vital factor in decreasing the level of activity in the scope of marketing-oriented innovativeness.

Some potential limitations in the study should be mentioned. It should be noted that industries are heterogenous in terms of capital intensity and technology used. A deeper analysis of the differences in the industry structure should be based on more disaggregated data than 2 digit NACE-codes. Therefore a future studies on the current topic are therefore recommended.

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