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On the Apparent Dependence of the Activities of Innovative Enterprises in the Mazovia Voivodeship on the Awareness of Pro-Innovative Management

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Abstract:

Purpose: *This article points out the relationship between the actual innovativeness of the company and the articulation of the need for innovation by representatives of the management, the presence of structures responsible for the implementation of innovation, and the impact of pro-innovation motivation of employees.*
Approach/Methodology/Design: *The objective was achieved based on dichotomous and explanatory features as well as quality features of nominal scale. The dependence of the whole system of dichotomous variables was evaluated based on the logistic regression model. The results were also supported by the correlation coefficient ϕ (fi), appropriate for the assessment of the relationship between pairs of dichotomous variables.*
Findings: *The actual innovativeness of the company, which translates into implemented innovations, does not depend on the management's conviction about the need to introduce innovations, the existence of an innovation-dedicated unit, employee motivation and the exchange of information about innovations.*
Practical Implications: *Organizations seeking to maximize would often conduct pro-innovation activities aimed at implementing innovation. Managers appreciate the results that suggest that there is a strict dependence of activities on the pro-innovative awareness of the management staff, and thus construct them in this regard.*
Originality/Value: *The originality of this article is the unique original research that so far has not been paid attention to in the research aspect.*

Keywords: *Motivation, innovation, pro-innovation awareness, management.*

JEL codes: *O30, O31, D91.*

Paper type: *Research article.*

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1. Introduction

In today's world, every company, regardless of the form of business it operates with a profit in its articles of association, strives to maximize profit. Of course, there are companies which provide their services with lower required earnings, it is a situation in which costs are higher or equal to profits. There is a relationship between the innovativeness of an enterprise and articulation of the need to introduce innovations by the representatives of management and the presence of structures responsible for the implementation of innovations, the influence of pro-innovative motivation of employees and the flow of information about innovations (Rubenstein-Montano 2001; Wojtaszek 2016; Kuźmiński *et al.,* 2020).

There are many factors that influence pro-innovative attitudes. These include the presence of formal structures of the company dedicated to innovations for pro-innovative attitudes (since the costs of such cells are incurred, effects are expected), internal conviction of the staff to implement innovations in the company (willingness to look for, discern the pro-innovative offer, recognize their own innovative potential), conviction that appropriate motivation of employees favors the development of various types of innovative attitudes (it is mainly about counteracting the inertia of the company's work environment, the visibility and willingness to adapt innovative solutions) and the exchange and flow of information as a factor conducive to implementing innovations in the company (Wasiluk, 2017).

In this article a hypothesis has been put forward. Is there a relationship between the actual innovativeness of the company and the articulation of the need for innovation by representatives of the management, the presence of structures responsible for the implementation of innovation, the impact of pro-innovative motivation of employees and the flow of information on innovation?

To this end, dichotomous and explanatory features and quality features on a nominal scale were identified. The dependence of the whole system of dichotomous variables was evaluated based on the logistic regression model. The results were also supported by the correlation coefficient ϕ (fi), appropriate for the assessment of the relationship between pairs of dichotomous variables.

2. Theoretical Conditions for Innovation and Motivation

Innovation stems from market needs and the desire to develop market niches. The more market expectations are high or above standard, the greater the chances of creating an innovative solution. The key to innovation is to constantly observe and even watch the competition and modify services and products existing on the market (Birkinshaw, 2008). The important role of innovation in the development of an enterprise, and consequently the need to strengthen the innovativeness of an organization, i.e., its ability to create new solutions in various areas of functioning, is indicated by crowds of researchers of this issue and confirmed by managers. It relates to searching for and using many sources of innovation, which among others, they

include employee innovation or the application of the open innovation model. For obvious reasons, large corporations, especially multinational ones, are leading the way in this area, using various, often complex systems for developing employee innovation. Entrepreneurs and managers in small and medium-sized enterprises seem to be less (Aghion and Tirol, 1994).

The degree of appreciation, such competences of employees as their creativity and innovativeness, therefore it is possible to formulate a thesis about the need to manage innovative activity also in this category of entities. In this context, the aim of the article is to identify the scope of personnel activities. The project is based on a management approach aimed at using and increasing innovativeness of SME employees, based on qualitative research carried out in nine intentionally selected small and medium enterprises. The research aimed at answering the question how the managers influence the innovative behaviour of employees and what methods they use to reach the potential the creativity and innovation of their employees (Dahlander and Gann, 2010).

In the literature we find well-established knowledge about the key elements of an innovative enterprise. These include in particular:

- A common vision, leadership, and the will to create an innovative company,
- an organizational structure that enables creativity, learning and cooperation,
- important roles to facilitate, stimulate or promote innovation,
- effective teamwork,
-full and continuous involvement in innovative activities (including those of a rationalization nature),
- a creative climate and a motivating system,
- orientation (O'Sullivan, 2000).

It turns out that a high level of involvement in innovation, concerning not only the managerial staff, but also all employees, plays an important role in building an innovative company, as it is assumed that "*the ability to work creatively and solve problems has the right teach*" - if you create the right conditions for using these skills. According to J.P. Deschamps there are two equivalent innovation processes (models): "top-down" (*top-down innovation*) and "bottom-up" (*bottom-up*). The second model concerns staff and operational managers at the bottom-up level and consists in the generation and implementation of innovative ideas that can help to better satisfy the company's customers' needs, performance improvement or other aspects of its functioning. However, this requires action on the part of managers to encourage development of creativity at every level of the organization, and a special role is attributed to a consciously created pro-innovative organizational culture (Ramus, 2011).

Employees' innovativeness is understood - by analogy to the organization's innovativeness - as the ability, inclination, and willingness to generate and implement new solutions. It is revealed through innovative behaviours perceived as intentional

generation, promotion, and implementation of new ideas, created by employees in the workplace, in the organization. Innovative employees can identify opportunities - to modify processes, procedures, services, products, can find new applications for existing methods or materials or equipment. They can not only generate new ideas, but also finding solutions to current problems, contributing to develop the organization. At present, it is quite common to appreciate the potential of employees, or rather, there are no requests for efforts to engage employees in innovative activities - the effect of innovation is more important than engagement. It is directed to the managers, especially the top management, and the problem is the subject of research conducted on many levels (Wojtaszek and Miciuła, 2019).

Innovation is the ability to create something new, i.e., it is a way to make creative ideas come true and put them into practice. Innovation occurs through the implementation of a new or significantly improved product, service, or production process into production, including new marketing activities and organizational changes resulting in a different approach to work and the company's relationship with the external environment (Kuźmiński and Wojtaszek 2020).

A new solution is an innovation only when it is applied in the company's activity. Innovations lead to increased efficiency and thus to increase the company's competitiveness on the market. In some companies the slogan "innovation or death" is promoted (innovate or die), or bankruptcy, the exchange and flow of information as a factor in the implementation of innovation in a company.

Innovation is about transforming ideas and creative inventions into useful goods, services, or technologies. It includes research, organizational, financial, and marketing activities. Innovation plays a different role in each stage of the company life cycle. An innovative enterprise can transform an original concept into a useful result, to stimulate employees' creativity and to face the competition.

The acceleration of creative invention occurs when a company creates the conditions for an improved product or activity. Creative ideas are necessary, but there must also be an appropriate internal and external environment for innovation to take place. Employees must not only be creative, but also well prepared in terms of qualifications and experience. A new idea is presented in a different light and verified. The innovation can be technological, organizational and marketing in nature.

Improving the innovative skills of the staff is done by promoting the benefits of training and qualification improvement by employees, spreading knowledge and inspiring employees to keep it up to date. Employees with a creative mindset are provided with secure employment to reduce the fear of dismissal if they make mistakes when implementing innovations. In this way, a group of workers emerges who become advocates of progress. The avant-garde of innovation is characterized by self-confidence, perseverance, energy, and a tendency to take risks. The introduction of innovation is fostered by darts and competent management, creating

a susceptible a basis for inspiring and promoting the vision and strategy of the company's development (Scott and Bruce, 1994).

This strongly motivates employees to take initiatives that deserve recognition. Freedom of conduct helps workers to adapt to innovative solutions. The features of the innovation process are not only to trigger initiatives and consolidate positive actions, but also to recognize the associated stress and identify ways to alleviate it. Regardless of the type of the organization being run within it, there should be a tendency to convince the staff to implement innovations and, at the same time, a tendency to look for, discern the pro-innovative offer and recognize one's own innovative potential. Enterprises should consciously strive to achieve the assumed objectives aimed at increasing the maximization of profit and make changes aimed at increasing the quality aspects in the organization (Lazonick, 2010). There should be units responsible for the innovation process in companies. It is important that they are formally present in the structure of an enterprise dedicated to pro-innovation (since the costs of such units are incurred, effects are expected).

The employer commissions the work and expects appropriate results from its execution, which is the same as the fact that also in each structure of the enterprise certain cells must perform tasks at the right level. Model conditions of awareness in the aspect of the willingness of pro-innovative attitudes to actual innovativeness of enterprises significantly allow to generate positive actions in the organizational environment. It is probably related to the motivational process and innovation of different kinds or origins.

Motivation is the internal readiness and willingness to do something, and regarding economic operators it is the willingness and willingness to work. It can result from many factors, e.g., efforts, incentives or prospects for further action and is also a function of human resource management. An analysis of the literature and postulates of the theoreticians of the subject indicates that motivation should first be based on stimulating readiness and willingness in an employee to undertake a specific activity – work. Then the employer may build and shape the motivational system implemented within and based on the objectives of the organization. Motivation to achieve objectives of indirect utility is called external motivation. The source of external motivation is usually the consequence of external coercion. Therefore, it can be assumed that the element indirectly shaping the employee's motivation is the type, form, and way of conveying a specific request - task, as well as the value of benefit resulting from the correct performance of the task. It can be pointed out that only a motivated employee has the possibility to indicate changes aimed at generating various types of innovation (Zhdankin *et al.*, 2019).

The authors of this article conclude that proper motivation of the employees is conducive to the development of innovative attitudes of various types. Here, it is mainly necessary to indicate counteracting the inertia of the company's working environment, the projection, and the tendency to adapt innovative solutions.

3. Materials and Methods

The research hypothesis is stated as: Is there a relationship between the actual innovativeness of the company and the articulation of the need for innovation by management representatives, the presence of structures responsible for the implementation of innovation, the impact of pro-innovation motivation of employees and the flow of information on innovation?

The survey covered 310 enterprises of section C located in Mazovia voivodship in section C of REGON. The survey was attended by representatives of the management staff, who were asked about a narrow range of factors potentially influencing the innovative attitudes of enterprises:

- the scale of the company's operations;
- presence of formal company structures dedicated to internal innovation;
- convincing the management of the need to implement innovations in the company;
- to convince the management that adequate motivation of employees fosters the development of various types of innovative attitudes;
- the conviction that the exchange and flow of information is a factor in the implementation of innovation in a company;
- the innovation activities actually undertaken;
- the type of innovation being implemented.

The respondents answered specific questions (Table 1 below) "yes" or "no", determined the scale of the company's activity and informed about the type of innovations introduced. The process of implementing innovations in enterprises is long, often laborious.

Thus, the study identified four dichotomous traits (including one explained) and two quality traits of nominal scale. The dependence of the whole system of dichotomical variables was evaluated based on the logistic regression model (Gortmaker, 1994). The results were also supported by the correlation coefficient ϕ (fi), appropriate for the assessment of the relationship between pairs of dichotomous variables. The linear regression model is a tool for analysis of dichotomical observations (with Bernoulli distribution).

Let *p* be the probability of success in Bernoulli's decomposition. 1-p will therefore be the probability of failure. The expression is the quotient of chances:

$$Odd = \frac{p}{1-p} = e^{\propto} e^{\beta X}$$

where α-static regression constant in the model, β- logistic regression coefficient for independent variable *X*.

By transforming this expression, we also obtain a probability function depending on the quotient of chances:

$$p = \frac{Odd}{1 + Odd}$$

For example, if the success is that the company has implemented innovations, the failure is that it has not implemented them. In this study, the probability estimator is the frequency: the probability of success is 131/310=0.42. This is the percentage of forms that declared an innovation. These expressions are probability and chance estimators in the logistic regression model. Let the explained variable have a binomial distribution $Y_i \sim B(p_i, n_i)$ where quantity is known, and the probability is being looked for. Let us mark by X_i a certain vector of explanatory variables that carry additional information about the explanatory variable. then the probability of success for variable *Y* is a conditional expected value:

$$p_i = E(\frac{Y_i}{n}|X_i)$$

and is an approximate linear combination of the explained variables X_i:

$$ln\left(\frac{p_i}{1 - p_i}\right) = \beta_1 x_{1,i} + \cdots + \beta_k x_{k,i} + \beta_0$$

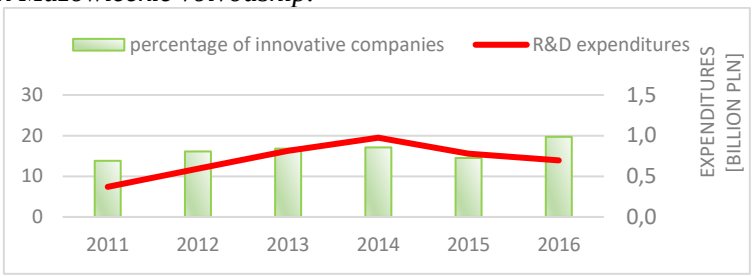
In simple terms, statistically significant model parameters allow to conclude that the explanatory (independent) variables influence the values of the explanatory (dependent) variable because they describe the probability of success. Consequently, there is a significant relationship between them, some specific regularity, allowing to classify the statistical unit. The aim of this study is to verify whether the existence of certain characteristics of a company such as: motivating employees, appropriate information exchange, existence of a dedicated unit, conviction of the need to innovate affects the actual (measurable) innovation of the company. If there is a significant convergence of responses confirming these conditions of business management and the actual implementation of innovation, the logistic model will show significant correlations of relevant parameters.

4. Discussion of the Results

The innovativeness and R&D activity in Silesian industrial companies remains at a relatively stable level, where some periodical trends can be observed. Certainly, the percentage of companies declaring that they carry out innovation activities is increasing (according to Statistics Poland) from 84 in 2011 to 154 in 2016 companies out of 100 thousand however, the amounts for R&D are clearly decreasing (Figure 1). Such activity is conducive to innovation, as it aims at developing new products. On the other hand, the percentage of innovative companies is variable, with slight increasing trend depending on the influence of the economic situation. The same can

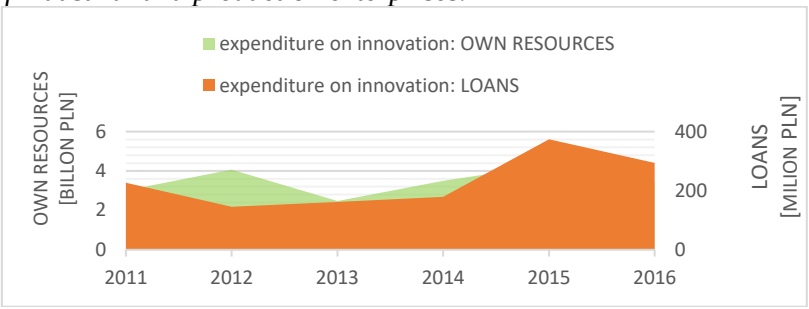
be said about own resources of enterprises allocated to innovative activities. They are at quite an even level and despite the good market situation since 2011 they do not exceed the level from the beginning of this period. Entrepreneurs have also limited lending of their innovative activities (Figure 2). After 2011 the share of funds coming from credits has significantly decreased.

Figure 1. *Innovative companies conducting R&D activity and the amount of outlays on R&D in Mazowieckie voivodship.*



Source: *Own study based on GUS BDL (2020).*

Figure 2. *Sources of financing innovation in the Mazowieckie Voivodeship in the sector of industrial and production enterprises.*



Source: *Own study based on GUS BDL (2020).*

The percentage of positive answers to the question, by scale and type of innovation is presented in Table 1 and the Table 2. Significant deviations in the structure between groups can be observed.

Table 1. *Structure of the frequency of positive responses in terms of the scale of business activity (multiple responses)*

n=310	regional	The nationwide	international	Overall
Do you see a need to implement innovations/changes in your company?	2,9%	35,2%	11,0%	49,0%
Do you have a unit in your company responsible for implementing innovations?	1,9%	6,5%	0,3%	8,7%
Do you think that a motivated employee can contribute to innovation, to change?	9,4%	60,6%	16,8%	86,8%

Does your company offer opportunities for mutual exchange of information to implement the innovation process?	1,3%	4,8%	4,2%	10,3%
Were the innovations implemented in 2011-2016 in the company?	5,5%	29,0%	7,7%	42,3%

Source: *Own study.*

Table 2. *Structure of the frequency of positive responses in terms of type of innovation introduced (multiple responses)*

n=310	product	technological	marketing	process	No
Do you see a need to implement innovations/changes in your company?	9,4%	3,5%	2,3%	3,5%	30,3%
Do you have a unit in your company responsible for implementing innovations?	1,3%	1,3%	0,6%	0,6%	4,8%
Do you think that a motivated employee can contribute to innovation, to change?	11,6%	8,4%	5,5%	9,7%	51,6%
Does your company offer opportunities for mutual exchange of information in order to implement the innovation process?	2,6%	0,6%	0,0%	1,3%	5,8%
Were the innovations implemented in 2011-2016 in the company?	14,8%	10,0%	6,8%	10,6%	0,0%

Source: *Own study.*

The logit model requires that the first estimation be done without explanatory variables. The purpose of this operation is to check how successful the random (with a 0.5 probability) classification assignment is. The model in the zero option explains 57.7% of observations. The model parameters were evaluated using the input method. This method awards the variables that are significantly correlated with the explanatory variable. It has the advantage that it identifies the relationship of variables in pairs. The results of the analysis are presented in Table 3.

Table 3. *Evaluation of parameters of the logistic model: input method.*

	B	Standard error	Wald test	p-value	Exp(B)
Do you see a need to implement innovations/changes in your company?	-.299	.233	1.649	.199	.742
Do you have a unit in your company responsible for implementing innovations?	.115	.409	.079	.779	1.122
Do you think that a motivated employee can contribute to innovation, to change?	-.494	.340	2.114	.146	.610
Does your company create opportunities for mutual exchange of information in order to implement the innovation process?	.068	.380	.032	.858	1.070
Fixed model	.243	.329	.544	.461	1.275

Source: *Own study.*

The key information is the p-value, which is presented in Table 3. Values of this parameter above 0.05 indicate that a given variable (here presented in the form of a question) has no influence on whether the company has made any investments or not. None of the p-value values presented in the table is less than 0.05. Therefore, it can be concluded that the actual, measurable innovativeness of enterprises does not depend on the factors presented here. The result of the lack of correlation between the variables was also confirmed by the value of the parameter ϕ of correlation of dichotomical observations. Also, the evaluation of the correlation of pairs of variables shows that the introduction of innovation in a company is not influenced by the factors discussed above. The p-value is significantly higher than 0.05.

Table 4. *Correlation parameter value table* ϕ

Dependence of the variable: "Have there been any innovations since 2010" on:	correlation coefficient ϕ	p-value
Do you see a need to implement innovations/changes in your company?	-0,081	0,152
Do you have a unit in your company responsible for implementing innovations?	0,014	0,810
Do you think that a motivated employee can contribute to innovation, to change?	-0,090	0,113
Does your company create opportunities for mutual exchange of information to implement the innovation process?	0,010	0,857

Source: *Own study.*

The actual innovativeness of the company, which translates into implemented innovations, does not depend on the management's conviction about the need to introduce innovations, the existence of an innovation-dedicated unit, employee motivation and the exchange of information about innovations.

The authors point out that this conclusion may be caused by the situation in which it may turn out that the Mazowieckie Voivodeship, as compared to others, is more oriented towards its own goals than others. On the map of Poland, we distinguish companies less and more involved in their activities aimed at achieving the assumed objectives, including the resultant (financial) ones.

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