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DETERMINANTS OF ORGANIZATIONAL CULTURE THAT INFLUENCE INNOVATION. THE CASE OF PRODUCTION COMPANIES IN POLAND

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The purpose of this paper is to present the results of a study aimed at identifying factors of organizational culture that influence innovation of enterprises, as well as to determine the strength of this effect. The foremost and most crucial statistical correlation has been noticed between the innovativeness of a company and the introduction of innovation in the company's mission and vision, creativity of employees, strong commitment to work, open communication and good flow of information, the image of the company, regular work on innovation, competitiveness as a priority, use of information technology in the flow of information and decision-making in the innovation process. The research shows that the number of product innovations implemented (brand new and upgraded) and process innovations (brand new and upgraded) increases together with the enterprise size.

Key words: innovation, culture, determinants.

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ФАКТОРИ ОРГАНІЗАЦІЙНОЇ КУЛЬТУРИ, ЯКІ ВПЛИВАЮТЬ НА ІННОВАЦІЇ. ПРИКЛАД ВИРОБНИЧИХ ПІДПРИЄМСТВ У ПОЛЬЩІ

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Подано результати дослідження, спрямованого на визначення факторів організаційної культури, які впливають на інновації підприємств, а також визначення сили цього впливу. Найважомішу статистичну кореляцію виявлено між інноваційністю компанії та впровадженням інновацій в місію і візію компанії, творчість працівників, наполегливість у роботі, відкрите спілкування та відмінний інформаційний потік, імідж компанії, регулярну роботу над інноваціями, конкурентоспроможність як пріоритет, використання інформаційних технологій в потоці інформації та прийняття рішень в інноваційному процесі. Дослідження показують, що кількість реалізованих продуктових інновацій (нові та вдосконалені бренди) і процесних інновацій (нові та вдосконалені) збільшуються разом з розміром підприємства.

Ключові слова: інновації, культура, детермінанти.

Statement of the problem

Innovation is a major force in economic development (Freeman & Soete, 1997, pp. Verspagen 2006, p. 487–513). Therefore the knowledge of factors that promote or constrain innovation benefits the welfare of many people. According to A. Kaasa and M. Vadi (2010, p. 583–604) innovation is often hindered by problems that can be explained by tapping into concepts of culture. Culture is even mentioned as the first issue when the 'Big 10' Innovation Killers are presented (Wycoff 2003, p. 17–21). Generating a culture of innovation is the necessary ingredient for economic progress (Samli, A.C. 2011).

Organizational culture means the shared experiences, values, norms, assumptions and beliefs that shape individual and group behavior. Every organization has a culture; the issue is whether and how that culture inhibits or supports innovation. Individual creativity as a basis for initiating innovation is not only influenced by organizational factors (i.e. organizational culture), but also greatly depends on the surrounding (societal) culture as a whole. A. Kaasa and M. Vadi (2010, p. 583–604) Coping with different situations is associated with two opposing processes – tradition and innovation – and that some cultures have an accumulated experience that prefers the former and others the latter.

Most companies have default innovation cultures in which various values, norms, assumptions and beliefs all compete for influence over employees' actual behavior. The dominant ones that win out ultimately shape the culture. Innovation culture can be defined as a multi-dimensional context which includes the intention to be innovative, the infrastructure to support innovation, operational level behaviors necessary to influence a market and value orientation, and the environment to implement innovation (Dobni C. Brooke 2008, pp. 539–559).

Analysis of recent research and publications

The question for leaders today is not if culture is important for success but how culture can drive successful innovation. It is important to answer the questions what leaders can do to influence the kind of culture that leads to innovative behavior. Ahmed (1998, p. 30–43), Filipczak (1997, p. 32–40), Martins E., Martins N. (2002, p. 58–65), O'Reilly (1989, p. 9–25), Pinchot & Pinchot (1996, pp. 9–10) among others have worked on identifying values, norms and assumptions involved in promoting and implementing innovation. However, very few empirical studies, especially quantitative research, appear to have been carried out to support the research findings. Therefore the purpose of the article was to present the results of a study aimed at identifying factors of organizational culture that influence innovation of enterprises, as well as to determine the strength of this effect.

The formulation of objectives

The structure of the paper reflects the main research questions. The goal of the first part of the paper is to discuss culture as determinants of innovation. In the second, the survey in the Polish organizations is to be carried out.

Presentation of main materials

As point Jaider Vega-Jurado et. al. (2008, p. 616–632), there is no consistent body of theory related to the factors that determine the innovative performance of the firm. Several authors research some innovative competences:

- Technological competences (generally measured by R&D intensity).
- Human resource competences, which include, among other things, a firm's knowledge and skills, accumulated either through the training of its workforce.
- Organizational competences, which are related to administrative styles, the formalization of internal communication systems, and the interdependence of work teams.

Some authors highlight methodological differences between studies, related to the nature of innovation (radical vs. incremental), the technological intensity of industrial sector (low vs. high tech), the characteristics of the firm (small and medium sized vs. big enterprise) and even geographical region, as reasons for the diversity of the results (Souitaris, 1999, p. 287–305).

The methodological difficulty involved in integrating existing theoretical perspectives has led researchers to separately analyze industry characteristics and firm's internal capacities as determinants of innovation (Jaider Vega-Jurado et. al. 2008, p. 616–632). As a result, they pay little attention to identifying the links between the two groups of factors (Keizer et al., 2002; Nieto and Quevedo, 2005). Cohen and Levinthal proposed the concept of absorptive capacity, defined as “the ability of a firm to recognize the value of new external information, assimilate it and apply it to commercial ends” (Cohen and Levinthal, 1990, p. 128). This concept acknowledges that internal capacities are a key element in a firm's technological development, and highlights their dynamic and cumulative nature. Table 1 highlights some determinants influencing innovation.

Table 1

Factors that influence innovation

Authors	Determinants
1	2
Martins E., Martins N. (2002)	<p>Determinants of organizational culture that influence innovation:</p> <p>Strategy (customer focused marketing orientation, integration of core values, reaction on change, knowledge of management with the future perspective)</p> <p>Purposefulness (understanding of vision, mission, goals and objectives, involvement, availability of standards)</p> <p>Trust relationship (trust, support for change)</p> <p>Behaviour that encourages innovation (idea generating, risk taking, decision making)</p> <p>Work environment (integration of goals and objectives, conflict handling, cooperating teams, participation, control of own work, developing better work methods)</p> <p>Customer orientation (flexibility in customer service, improvement of service, understanding of customer needs)</p> <p>Management support (open communication, availability of equipment and resources, tolerance of mistakes, adaptation of rules and regulations)</p>
D. Wan, Chin Huat Ong, Francis Lee (2005)	<p>Communication channel (frequent internal communications),</p> <p>Decentralized structure,</p> <p>Organizational resources (existence of special innovation funds)</p> <p>Belief that innovation is important</p> <p>Willingness to take risks</p> <p>Willingness to exchange ideas</p>
C. Annique (2000)	<p>Cross-functional communication frequency,</p> <p>Shared mental model of cooperation,</p> <p>Overlapping knowledge,</p> <p>Organization level personnel management practices – selection, reward and control on reward,</p> <p>Orientation, training and development,</p> <p>Team-based work pattern</p>
J. Vega-Jurado, et. al. (2008)	<p>Industrial technological opportunity</p> <p>Non-Industrial technological opportunity</p> <p>Legal methods of protection</p> <p>Strategic methods of protection</p>
Tidd, Bessant, Pavitt (2005)	<p>Shared vision, leadership and will to innovate; appropriate structure, key individuals, effective team working, continuing and stretching individual development, extensive communication, high involvement in innovation, external focus, creative climate, learning organization.</p>

According to Ahmed (1998) a primary determinant of innovation is culture. Possession of positive cultural characteristics provides the organisation with necessary ingredients to innovate. Successful organizations have the capacity to absorb innovation into the organizational culture and management processes of the organization (Syrett and Lammiman, 1997; Tushman and O'Reilly, 1997). Innovation "is an environment, a culture – almost spiritual force – that exists in a company" and drives value creation (Buckler 1997). Culture has multiple elements which can serve to enhance or inhibit the tendency to innovate. A. Kaasa and M. Vadi (2010) point that culture affects innovation because it shapes the patterns dealing with novelty, individual initiatives and collective actions, and understandings and behaviours in regard to risks as well as opportunities. Jakubavičius et al. (2003) describes the innovative organizational culture as characterised by orientation to changes, constant use of information channels, teamwork, decentralization, risk tolerance and management, low level of bureaucracy, promotion of initiative. Tidd, Bessant, Pavitt (2005) distinguish among such components of innovative organizations (under discontinuous conditions): shared vision, leadership and will to innovate; appropriate structure, key individuals, effective teamworking, continuing and stretching individual development, extensive communication, high involvement in innovation, external focus, creative climate, learning organization. Mintzer (2004) relates the culture of innovations to such characteristics as managerial tolerance of failures, minimal bureaucracy, tolerance of risk, promotion of employee initiative, openness to new ideas, cooperation across the employees and departments. Jucevičius (2012) emphasise the practices and managerial values that, in broadest sense, represent the democracy of the workplace. The aspects of

organizational life, such as openness, flat hierarchies, participative management, fluid communication, initiatives from the bottom, seem to be of hygienic value as far as the performance in innovations in concerned. However, as any other rule, this one too seems to have the exceptions. If successfully implemented, an innovation culture will provide a competitive advantage, and may eventually result in industry leading performance. Martins E. and Martins N. (2002) summarize determinants of organizational culture that influence innovation which are presented in table 1.

In the scope of research were included 86 production companies from Warmia and Mazury. Taking into consideration the age of the companies that participated in the research, the largest share was of companies between 11 to 20 years (43 %). The companies aged 21–70 and 6–10 constituted a large group with 23 % and 22 % respectively. The smallest groups, which participated in the research, were the companies aged up to 5 years (8 %) and above 70 years (4 %). Enterprise size was defined based on the number of employees. In the research, micro enterprises, employing up to 9 workers constituted, 15 %; small enterprises employing between 10 to 49 people constituted 27 %; medium-sized enterprises employing 50 to 250 people constituted 31 % and large enterprises employing over 250 people constituted 27 % of all the companies. Most of the companies included those with domestic capital (74 %). Foreign capital prevailed in one in four companies (26 %).

On a basis of literature study and earlier own research, were chosen organizational culture determinants which may influence innovation in organization. Respondents were asked to assume their attitude towards ascertainment reflecting the organizational culture factors influencing the process of introducing innovations in a company through assessment measured in five-level Likert scale (1 – strongly disagree, 2 – disagree, 3 – neither agree nor disagree, 4 – agree, 5 – strongly agree). The correlation between the coefficients and the statement: “due to innovations our company is developing” was the area of research. Correlation between the declaration of innovativeness of the company and organisational culture was measured by means of Pearson product-moment correlation coefficient. Correlation coefficient indicates the relationship direction. If variables have positive correlation, together with the increase of one value, the other values increase. If these have negative correlation, together with the increase of one value, the decrease of the other value follows. What is more, if the absolute value of correlation coefficient is closer to one, then the dependence between the variables is stronger. Afterwards, correlation coefficient significance test was conducted. The null hypothesis says that correlation coefficient equals zero (Alternative hypothesis says that correlation coefficient is other than zero. Both hypotheses were verified on the basis of p-value of significance value $\alpha=0,05$.

Characteristics of organisational culture factors in businesses, which develop due to innovations, have been illustrated in box plots, correlating the median with first and third quartile. Variation in response and dominating responses have been defined on the basis of the graphs.

In the next stage of the analysis, it has been proved if there is a correlation between the characteristics of businesses such as size, age and majority stake and the number of innovations introduced (no innovations implemented, 1–3 innovations implemented, more than 3 innovations implemented). Chi-squared test has been used for the statistical significance assessment of correlation between those variables in view of its quality character. Null hypothesis assumes that there is no correlation between variables, whereas, alternative hypothesis points that such a correlation exists. Verification was conducted on the significance level $\alpha=0,05$. The strength of the correlation between the variables was defined on the basis of Cramér's V and a contingency coefficient. The value of both coefficients is [0, 1]. The closer the values to 1, the stronger the correlation is. A Statistica software has been used to make calculations.

Having analysed the data, it can be proved that factors shaping organisational culture of the businesses participating in the research exert an influence on innovativeness. It refers to both the characteristics of the businesses and their employees. On the basis of the research, nine strong and influential factors have been distinguished, together with nine factors with moderate impact and eight factors without any crucial influence on the level of innovativeness of businesses.

The foremost and the most crucial statistically correlation has been noticed between the innovativeness of a company and the introduction of the innovation in the company's mission and vision ($R=0,685$). Innovative companies have in mind the introduction of new solutions at the stage of determining the course of its main directions. High values of linear correlation coefficient allow to establish that innovativeness exerts an influence

on the workers' creativity, deep commitment at work as well as open and two-way communication. Strong correlation could also be noticed in case of company image ($R=0,558$). The data collected allow to conclude that work over innovations regularly and using information and computer technologies in communication and decision-making in innovation processes are also of crucial importance. Another interesting aspect connected with the analysis is dependence between innovativeness and competitiveness. Companies, which treat competitiveness as a priority, implement innovations and declare that owing to this, the company is developing. In case of the lack of the ability of handling conflicts, the correlation proved negative, which may indicate that the fewer problems the company has with solving its inner conflicts, the more often it develops due to implemented innovations. Table 2 presents the responses made by respondents from innovative companies to the factors mentioned above.

Table 2

Factors of organisational culture, which have a strong influence on the innovativeness of companies

Lp.	Factor	Due to innovations our company is developing
1	The company has a vision and a mission from which comes the need for innovation	0,685*
2	In the company work creative people	0,608*
3	In the company there is a strong commitment to work	0,603*
4	Open communication and clear communication	0,572*
5	The image of our company in the market is very good	0,558*
6	Regular work on innovation, not only when see an opportunity in the market	0,537*
7	The priority of the company is competitiveness	0,508*
8	Technologies used in the company support the flow of information and decision-making in processes of innovation	0,501*
9	No ability to deal with conflict within the company	-0,627*

* The correlation coefficient significant at the level $\alpha=0,05$

Statistical analysis by means of Chi-squared test proved that there exists a significant statistic correlation between the number of the innovations implemented and the size of business and its majority stake (table 3).

Table 3

Dependence between enterprise size and the type of majority stake and the innovativeness of the company based on Chi-squared test

No.	Dependence	Statistical testing	p	Cramer's V	Contingency coefficient
1	Enterprise size and a number of brand new product innovations	20,576	0,000	0,331	0,424
2	Enterprise size and a number of upgraded product innovations	13,384	0,010	0,276	0,364
3	Enterprise size and a number of brand new innovations processes	13,157	0,011	0,290	0,379
4	Enterprise size and a number of upgraded innovations processes	9,934	0,042	0,246	0,328
5	Majority stake and the number of marketing innovations	7,576	0,023	0,304	0,291
6	Majority stake and the number of organisational innovations	12,156	0,002	0,372	0,348

Source: Own elaboration based on the research

After statistical verification, it may be deduced that the size of an enterprise is significant when introducing product innovations (brand new and upgraded) and processes (brand new and upgraded). It is indicated by p -value lower than 0,05. When analysing the percentage composition of the responses it may be noticed that the number of innovations implemented increases together with enterprise size. Cramer's V measure of association and contingency coefficient indicate that the correlation is moderately strong.

The results of the analyses also indicate that there exists a statistically essential correlation between the majority stake of the company and the number of marketing innovations introduced and the number of organisational innovations. P-value for Chi-squared test is lower for the assumed level of significance. A detailed analysis of the distribution of majority stake of enterprise and the number of innovations allow to observe that among the joint venture companies, more marketing and organisational innovations are implemented than in those dominated by domestic capital. Cramer's V measure of association and contingency coefficient indicate that the correlation is moderately strong.

Pearson product-movement correlation coefficient was used to identify seven more factors of organisational culture in the further stages of the research, which have a moderate influence on the innovativeness of companies (table 4).

Table 4

Factors of organisational culture, which have a moderate influence on the innovativeness of companies

Lp.	Factor	due to innovations our company is developing
1	Good knowledge about the needs and preferences of our products' users, we make research in this field systematically	0,494*
2	The innovation process in company can be divided into specific stages (phases)	0,418*
3	The company is flexible	0,413*
4	Planning innovation ahead before competitors bring them to market	0,400*
5	Entering new products into new markets, diversifying business	0,400*
6	Setting goals for innovative projects and assessing the degree of realization drawing up reports of innovative activities	0,398*
7	Management strongly supports innovation	0,378*

* The correlation coefficient significant at the level $\alpha=0,05$

Table 5

Factors of organisational culture, which have not influence on the innovativeness of companies

Lp.	Factor	due to innovations our company is developing
1	Our suppliers are involved in the innovation process	0,128*
2	Staff can achieve their goals in a creative way	0,094
3	Employees do not have the time to implement their ideas	0,048
4	In the enterprise there is a large bureaucracy	-0,087
5	The company does not have a teamwork	-0,256
6	The company does not have support for change	-0,261
7	Qualifications of staff involved in innovation are low	-0,280

* The correlation coefficient significant at the level $\alpha=0,05$

Based on the correlation coefficients, it has been proved that there exists a statistically significant correlation between innovativeness of a company and a very good knowledge of the needs, users' preferences and consumers' surveys as well as introducing new products to the market or diversification of operation, which was moderately strong. A group of factors directly connected with the innovativeness also has a significant meaning. Among these are: emphasising particular stages in innovation processes, planning innovations in advance before they are introduced by competitors, and setting goals for innovative projects as well as analysing the completion stage of the project objectives through producing reports concerning innovations. Pearson product-movement correlation coefficient is between 0,398–0,418 and they are statistically significant. Correlation between innovativeness and company flexibility is moderate. Management support also favours the innovativeness of the company ($R=0,378$).

The analysed data indicate that the age of the enterprise does not differentiate the number of innovations implemented. These conclusions were supported by chi-squared test. In case of juxtaposing age with a number of product innovations (brand new, upgraded), process innovations (brand new, upgraded), organisational and marketing innovations, probability values are higher than it was expected. If there are no grounds on which null hypothesis, saying that there is no correlation between the variables, can be rejected.

In this research, no correlation between innovativeness and organisational culture factors presented in table 5 was proved. Pearson product-movement correlation coefficients have low values and they are not statistically significant.

Conclusions

Taking into consideration the influence of organizational culture coefficients on the innovativeness of companies based on the results of the research, one may assume that some of them have a strong or moderate influence; and in case of other the correlation was not proved. The foremost and the most crucial statistically correlation has been noticed between the innovativeness of a company and the introduction of innovation in the company's mission and vision, creativity of employees, strong commitment to work, open communication and good flow of information, the image of the company, regular work on innovation, competitiveness as a priority, use of information technology in the flow of information and decision-making in the innovation process.

The research shows that the number of product innovations implemented (brand new and upgraded) and process innovations (brand new and upgraded) increases together with the enterprise size. These results are compatible with the research results supplied by the Polish Central Statistical Office (Działalność... 2012). The results of the analyses also indicate that there exists a statistically essential correlation between the majority stake of the company and the number of marketing innovations introduced and the number of organisational innovations. Cramer's V measure of association and contingency coefficient indicate that the correlation is moderately strong.

Prospects for further research

More marketing and organisational innovations were implemented in companies dominated by foreign capital than in those with majority domestic capital. It is possible that companies with foreign capital are more expansive on the market. Still this problem might be studied deeper by author.

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