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Economy based on the sustainable development should aim to minimize the consumption of non-renewable resources and to replace the energy from non-renewable fuels, by the energy from renewable sources. The authors show the analysis and diagnosis of the amount of renewable energy generated in Poland, compared to countries in Baltic Sea Region. The authors put emphasis on the development barriers in this sector in Poland, that is especially time-consuming, capital-consuming and complex investment process. Complex administrative procedures, infrastructure, legal and planning constraints permits cause that the dynamics of development in this sector is low.

**Keywords:** renewable energy, energy policy, energy consumption, Baltic Sea Region

**Introduction**

For the last two millennia we have been using the resources of fossil fuels, which unfortunately, over time, get gradually depleted. We must be aware that the amount of fossil fuel resources is limited, therefore, a policy of sustainable development and rational use should be pursued.

The issues concerning energy evoke a lot of different emotions and for years have constituted a problem for the economy and the world politics.
A huge impact on the energy policy has: the amount of deposits held, the transmission infrastructure, the prices of materials, the production capacity and the most important – the safety. The materials and the energy consumption have been constantly increasing and it is likely to result in the increase in their prices as the depletion of resources progresses. The national reserves of the primary energy with the annual consumption of 6 EJ would be enough for only 100 years (Sądecka, Myszograj and Bochenski, 2009). Despite having a relatively high amount of the primary energy resources by Poland, as well as a favorable ratio of the energy input to energy received, the structure of the resources is unfavorable, ineffective, and constitutes a major threat to the environment.

The EU draws a great attention to the energy security, the increase in efficiency (the climate and energy package will be planning to improve the 20% efficiency 2020), the environmental protection and the development of the alternative energy sources. The Baltic countries have also started a regional cooperation concerning energy issues and created, inter alia, Baltic Sea Region Energy Co-operation (aims at promoting sustainable development, security and the prosperity in the region and creating a competitive, efficient and well-functioning energy market), Baltic Marine Environment Protection Commission or Bioenergy Promotion project. During the realization is also the project South Baltic Offshore Wind Energy Regions that is mainly devoted to developing the offshore wind farms in the South Baltic area. As a result of its execution, this region is will be equipped in the safe and green energy. The main participants of this programme are Poland, Germany, Denmark, Sweden and Lithuania. Beside this, there is also the possibility to apply to the project called South Baltic Cross-border Co-operation Programme 2007–2013\(^1\) within the priority axis 2.2 Energy saving and renewable energy. Its primary objective is to strengthen the sustainable development in the South Baltic area through the joint actions, which aim at increasing its competitiveness and enhancing the integration among people and the institutions.

In the case of Poland it is also possible to obtain the financial support from the Operational Programme Infrastructure and Environment within the measure 9.4: Energy production from renewable sources, the measure 9.5: Production of biofuels from the renewable sources, the measure 9.6: Networks facilitating

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\(^1\) More information about this project can be found at address: www.en.southbaltic.eu, 1.1.2012.
reception of energy from renewable sources and an industry: 10.3 Development Activity. On the other hands, one can also apply to the National Fund Program (NFOŚiGW) within the utilization of geothermal resources, more precisely the use of thermal waters for energy production.

1. **ENERGY CONSUMPTION IN THE COUNTRIES OF THE BALTIC SEA**

The economic development results in steadily increasing the global demand for energy, which is the key and the engine of any economy. Thus, the countries of Baltic Sea Region are no exception. It should be noted, however, that they are significantly different in accordance with both the production and the consumption per capita, which is shown on the Figure 1.

According to the Figure 1, much more energy, approximately 80% of the total production in the world is consumed by the developed countries. However, the energy is indeed still available, but the costs of its use are gradually increasing. Therefore, the energy saving is rather financial but it includes above all pro-ecological activities. The largest energy consumption occurs in the Scandinavian countries, which have a reputation as being the most mature and open to the public electricity markets across Europe. In addition, a relatively cheap energy is used there to heat houses. The lowest level of the energy consumption can be observed in Latvia, but taking into consideration the growth rate in 2011 compared to 2000, the consumption increased there by 52% (for example, in Norway by 11%, in Sweden declined by 3%).

The energy consumption in Poland is also on a relatively low level (it constitutes approximately 55% of the average consumption per capita in the EU) and in 2011 compared to 2000, the consumption increased only by 7%. The problem, however, is the high energy intensity of the Polish economy, which is indirectly caused by the industrial structure and the considerable energy consumption by households, and directly by the low energy efficiency. Primary the energy intensity of GDP (in constant prices, without taking into account the purchasing power of currency), despite an explicit downtrend is more than twice the average EU-27.
2. **ALTERNATIVE ENERGY SOURCES**

The civilization progress and especially the development of industry have become synonymous with the growing demand for fossil fuels. However, their intensive exploitation and the environmental pollution (the greenhouse effect, the acid rains, the adverse effects on the health and life of humans, animals and plants) have forced the mankind to the gradual elimination of natural fuels and searching for the new, unconventional and renewable energy sources (water, wind, biomass, the solar radiation, the heat the interior of the Earth), which would not be so burdensome to the environment.

![Map of electricity consumption in kWh per capita in 2011](image)

**Fig. 1.** The electricity consumption in kWh per capita in 2011

Source: own compilation (data from Eurostat).

The renewable energy sources are characterized by:²

² Based on the information on the page www.energia-odnawialna.net
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- being pro-ecological – having the minimal impact on the environment (the effective reduction of the greenhouse gas emissions) and on the human,
- being inexhaustible,
- fuel efficiency,
- the fixed cost per unit of the energy obtained,
- the flexibility,
- the accessibility and the universality.

Fig. 2. The shares of the renewable energy in the primary energy production (without the transformation) in 2003–2010


The increased interest in the renewable sources of energy occurs with the increasing awareness of the limited conventional fuels resources and the increase of their prices. Moreover, the activities undertaken by a majority of countries aiming among others at reducing emissions greenhouse gas being mainly responsible for the greenhouse effect and at contributing to the improvement of energy security and finally at becoming independent of conventional fuel imports, give possibility and ability to continue the economic development and job creation. The most popular sources of renewable energy include:

1. Solar energy – It is the safest, the most inexhaustible and the biggest energy source. It can be used directly (solar collectors, photovoltaic cells) or indirectly (modern architecture). The leader in solar energy production is Germany, which greatly outdistance the other Baltic
countries. For example, the Figure 3 shows that in 2010 nearly 40% of the total solar energy produced in the European Union was produced by Germany, which represented 4.43% of produced renewable energy. On the other hand, the solar energy sector in Poland operates in conditions of full competition, so its development may contribute to a decrease of the equipment prices, which has being reported in recent years.

![Fig. 3. The share of the individual renewable energy sources in the countries of Baltic Sea region in 2010](source: own compilation (data from Eurostat – [epp.eurostat.ec.europa.eu](http://epp.eurostat.ec.europa.eu)).)

2. **Wind energy** – All the countries bordering the Baltic produce electricity using wind power. The kinetic energy of the wind (at least 15 km/h) causes the rotation of the turbine and produces the electricity. It has many drawbacks: the dependence on the weather, the high cost of construction, the interference with the landscape, interfering with radio and TV, the risk to birds. Despite the numerous shortcomings, the European Wind Energy Association (EWEA) foresees more than ten-fold increase in the installed capacity of the offshore wind energy for the South Baltic area, which is stimulated by great natural recourses and economic conditions in this region. Thus, more and more wind farms have been built in the last few years. They are particularly popular in Denmark, where the first ever commercial offshore wind farm was built in Vindeby in 1991. The share of the wind power with
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the help of the Danish government, mainly the Danish Energy Authority, has become a driving force for the development of a growing number of wind farms, which in the next few years will be able to produce about 18 TWh of electricity per year. This is more than half of the current Danish energy consumption. In Germany, in turns, the German government passed the Renewable Energy Act, where the achievement by 2020 at least 30% share of electricity from renewable sources including significant share of the wind energy was defined as main objective. In 2010, for example, the production volume accounted for 25.4% of the total wind energy produced. Also in Poland the development of wind power has taken on a sharp acceleration – thanks to grants from the EU and new investments, for example, in the two years the power of wind farms in Poland will be growing from 1.5 GW to 3 GW. According to studies carried out at Maritime Institute in Gdansk, the technical potential of Polish sea area can be estimated at 20 GW. However, after taking into account the protected areas under programme: Nature 2000, the real technical potential is equals about 7.5 GW. Unfortunately, many projects are not implemented due to some legislative problems. It is mainly a consequence of the outdated Maritime Areas of Poland and Maritime Administration Act passed in 1991. Therefore, the high risks associated with the implementation of projects as well as the technical and organizational constraints have a negative impact on developing the wind farm projects in Poland.

3. The energy of water – Water is one of the greatest potentials of energy – you can store and obtain a large amount of energy e.g. by using the hydroelectric power plants. Water is a relatively cheap source of energy, and hydroelectric power plants are able to flexibly customize the generated power according to the demand. Their disadvantage is the limited number of locations where you can build them, the dependence on rainfall, the high installation costs and the interference with the natural environment. The leader is Norway, which produces 32.1% of the total energy produced from water in the EU. Moreover, the energy obtained from water represents nearly 90% of the total domestic production of renewable energy in this country. But the energy from
water is also obtained in Sweden (18.1%) and Germany (5.6%). The hydropower in Poland has a small share in the energy production, because there are no favorable conditions for the construction of hydroelectric plants.

Fig. 4. The change in the structure of renewable energy in Poland in 2001–2010

4. Biomass – the organic matter (accumulated solar power in the form of plants). It is considered the largest potential energy source in the world. The use of biomass for the energy purposes requires burning or fermentation of the organic matter or chemical changes (biofuels). In this context the forest biomass derived from: the wood industry, the agriculture and fishing is very often considered. Poland is seen as a country that could play a significant role in the production of biomass for energy purposes in the EU. According to our estimates, the potential for energy crops will have been 1.0 to 4.3 million ha by 2020 (Faber, 2008). In recent years the special attention has been given on the biogas, although the technology of production is known more than

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3 According to the data contained in the National Action Plan for energy obtained from renewable sources, the theoretical potential is estimated at 23 TWh per year, the technical potential – to 12 TWh per year, and economic – to 8.5 TWh per year.
100 years. In many countries, the biogas is used as the fuel for transport. Sweden, which has the world’s largest number of vehicles powered by biogas, can serve as an example. In 2010, nearly 68% of the total production of renewable energy came from biomass, and for years this indicator has remained at a similar level. The largest share over 95% of biomass in the domestic renewable energy production belongs to the South Baltic countries such as Estonia, Poland and Lithuania. However, taking into account the overall size of the biomass produced in the EU, the unquestioned leader is Germany, which in 2010 produced 22.85% of energy from biomass in the EU, whereas second place has Sweden with 10.1%. The share of Estonia and Lithuania did not exceed 1%.

Fig. 5. The share of the energy from various renewable energy sources in the electricity production from renewable energy carriers (GWh) in Poland in 2001–2010


5. Geothermal energy – the energy accumulated in the depths of the Earth in the form of hot rocks and water. The heat from Earth’s in-

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This subject has been taken among others when implementation of the Polish–Swedish project: WAB - Wetlands, Alga and Biogas – a Southern Baltic Sea Eutrophication Counteract Project (see in details: www.wabproject.pl).
terior is mostly used in geothermal power plants or in the form of geothermal heat pumps (for heating the building). In many countries the geothermal energy is one of the most promising renewable energy sources because it contributes the significant ecological effects and the realization of sustainable energy strategies. The systematic increase in installed capacity and production and development of new technologies can be observed. The geothermal energy is increasingly used also in Poland because of the low cost of energy. However, the installation cost is relatively high, and during the exploitation of the geothermal lode harmful gases are emitted (radon and hydrogen sulfide). Considering the Baltic Sea region, Poland has the largest but still small share in the production of geothermal energy in the EU. The theoretical estimation of geothermal energy resources in Poland reaches even 387 thousand EJ. Thus, Poland has a significant potential for the geothermal energy, and rich resources. They are mainly connected with groundwater at 20–130 °C temperatures, which occurs at depths of 3–4 km.

3. **ANALYSIS OF SELECTED RELATIONSHIPS BETWEEN MACROECONOMIC VARIABLES AND THE PRODUCTION OF RENEWABLE ENERGY**

As previously mentioned, the interest in the renewable energy should be concerned from the different points of views. The key aspects mainly concern ecology including environmental actions and social activities with an emphasis on new jobs, the promotion of the region. However, the economic dimension such as the economic development at the regional level, the lower operating costs, an additional source of income are very important as well. It is therefore, essential to demonstrate that between the production of the renewable energy and its main components and selected macroeconomic variables are the correlation relationships, which may indicate further opportunities for the development of this branch of power industry.
As shown on the Figure 7 there is a positive relationship between the renewable energy and the level of disposable income. It is clear however, that each year it becomes a bit weaker and independent of the level of the economic development of the Baltic Sea region. It follows that the income grows more slowly than the volume of the production of the renewable energy. However, this can have a positive connotation in the coming years, as maintenance costs related to expenditure on electricity will be systematically reduced.

It can be seen on the Figure 8 that there is positive correlation between the relationship between GDP per capita and the selected types of renewable energy. However, the trend of changes in the coefficients of linear correlation is not so obvious. The coefficients show an upward trend until 2008, though they have rather moderate or even the weak dependence. Obviously, it may have the connection with the economic situation in the world. The period between 2009–2010 shows a systematic attempt to recover from the global crisis. Thus, improving the climate in financial markets is reflected in the economy situation, which results in a slight growth. The economic development in subsequent years may result in an increased production of renewable energy through a pro-investment activities in the Baltic countries.
Fig. 7. The correlation between the production of the renewable energy and the disposable income in 2005–2010


Fig. 8. The correlation between the production of renewable energy and GDP per capita in 2005–2010


Also, in the case of studying the interaction between the renewable energy production and the amount of the investment in fixed assets in the Baltic countries there is a clear impact of the crisis, which is shown on the Figure 9. In
2007, for example, the values of the coefficient dropped heavily. This means that the investment in fixed assets dropped sharply, whereas the investment in renewable energy showed an upward trend. Later on, the values of the coefficient steadily increased, and finally in 2009 reached the positive values. In 2010 the correlation coefficient amounted to about 0.15, which is the very weak but still positive correlation between the studied variables. This shows that in the next years we could expect accelerated development of this segment of the economy, since the operators are no longer afraid to invest and can count on the greater support.

![Graph showing the correlation between the production of renewable energy and the amount of investment in fixed assets in 2005–2010.](data:image/png;base64,iVBORw0KGgoAAAANSUhEUgAAAgAAAAACCAIAAAAKUPfIAAAAgAElEQVR42mO2wQwC8QgBEQEAEgFgQAAAABJRU5ErkJggg==)

Fig. 9. The correlation between the production of renewable energy and the amount of investment in fixed assets in 2005–2010

Source: own compilation (data from Eurostat – [epp.eurostat.ec.europa.eu](http://epp.eurostat.ec.europa.eu)).

The impact of the global crisis is also seen in the case of examining the relationship between the renewable energy production and the production growth rate, which is depicted in the Figure 10. However, turning point came here in 2008, when the industry slowed significantly, primarily due to a restrictive financial policy and the investment restrictions. The upward trend may indicate that the process of recovery from the crisis has already begun. However, it should be noted as well that in 2010 the value of this indicator oscillated around zero, which may mean that these variables were independent. It may also indicate how economically diverse are the Baltic countries.
4. **BARRIERS TO THE OPERATION AND PROSPECTS FOR DEVELOPMENT OF RES IN POLAND**

In the case of the Poland, the market of renewable energy sources began to be formed in the nineties, but the renewable energy has not had the priority in the economic policy of the state by now. However, according to EU guidelines we have to meet the primary objective of the energy policy – 15% share of renewable in the structure of gross final energy consumption in 2020.\(^5\) The national targets for energy obtained from renewable sources by 2020, when taking into account the impact of other measures of the energy efficiency policies on the final energy consumption and measures necessary to achieve national objectives in the overall share of RES in the final energy use, are presented in the National Action Plan energy from renewable sources. It is the result of the obligation under Article 4(1) of Directive 2009/28/EC of the European Parliament and Council of 23 April 2009, which concerns the promotion of energy from renewable sources that finally amends and subsequently repeals Directives 2001/77/EC and 2003/30/EC.

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\(^5\) *The Polish Energy Policy by 2030*; the document undertaken by the Council of Ministers on November the 10th, 2009, p. 19.
The Act was also passed on energy efficiency (from 15/04/2011), which determines the national target to ensure the efficient energy management. It is possible only by the accelerated development of the use of all types of renewable energy sources, especially the wind power.

However, the same assurance and plans will not bring the desired results. The renewable energy requires first of all support from national authorities in the form of the creation of appropriate economic instruments (often the policy support is limited due to the fiscal problems) and the regulation required for its development. The planned measures to increase renewable energy will require introducing a number of changes in legislation concerning: definitions, goals and the necessary means to achieve these objectives, as well as the rules for calculating the share of renewable energy, the administrative procedures, the uniform rules and reporting.

The specificity of the Polish economy highlights the barriers to the use of renewable energy sources. Among the most important barriers one can distinguish:

- Political barriers: lack of diversification of energy sources, the monopolistic policy, lack of mechanisms supporting the reduction in the energy intensity of the economy, no concept of the state information policy in the field of renewable energy sources, no timetable for achieving the national climate and energy package,

- Legal barriers: lack of appropriate regulations and records detailing the program and the policy concerning the use of renewable energy sources (energy, the environmental and the agricultural policy), lack of the instruments supporting the development of the sector; the unrestricted interpretation of the rules of preparing an expertise concerning the impact of the investment on the environment, the delays in the implementation of regulations concerning mainly the climate and energy packages and the implementation of the Directive 2009/28/EC in Poland,

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- Institutional and organizational barriers: lack of knowledge and experience in the use of RES, the dispersal of the power and responsibilities, lack of professional business organizations in the renewable energy sector, the limited international cooperation, the small scale technology, which increases the investment costs per unit, lack of the local development plans,

- Information barriers: lack of knowledge about the distribution of resources and the procedures concerning the location of the investment and the access to technology and funding, lack of knowledge about the issue of using RES at all levels of administration,

- Environmental barriers: an inefficient system of information and reporting, ambiguous procedure for environmental decisions,

- Technical barriers: the technological standstills, the need for reserving the energy supply in the conventional system; the failures of equipment, the neglecting renewable energy in the industrial policy,

- Economic barriers: the high costs associated with the use of renewable energy compared to conventional energy, the high cost of preparing the investment compared to its value, the long payback period, no defined economic and tax mechanisms in the state budget, no strategies for spending money from environmental funds, the low price competitiveness of renewable energy with fossil fuels prices, the low debt capacity of the investors.

In addition to shaping the RES market conditions in Poland, which result from the EU and international commitments, an equally important role of the following factors should be emphasized: firstly, the ecological conditions such as the climate protection and improving the quality of the environment, secondly, the political conditions including the energy security, diversifying sources of supply, the security, fuel and energy supplies, thirdly, the technical-logistics conditions like the connection from renewable energy sources to power system, and lastly the above-mentioned economic reasons.

Conclusions

Despite the high potential of the renewable energy sources in Poland (the energy generated from wind and biomass is considered as the biggest chance) and a significant improvement in the investment conditions (e.g. the number of
support mechanisms such as the Structural Funds), the Polish government should support projects leading to the use of environmentally safe and cost-effective economically energy obtained from unconventional renewable sources through the additional instruments such as the support to encourage the wider application of renewable energy sources including the grants, the income tax holidays and exemption from VAT. In addition, the actions should be taken in order to create suitable conditions that enable to take the investment decisions concerning the production, the transmission, the distribution and the application of renewable energy sources to ensure energy security, the social needs and the environmental protection. The costs of production of energy from renewable sources are still high, so obtaining a green energy under market conditions on a large scale is not possible without undertaking appropriate measures that aim at ensuring the profitability of its production.

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www.en.southbaltic.eu.
www.energia-odnawialna.net.
Abstract

Aim of the article: to present the findings of the diagnosis of the determinants of the employees’ commitment in the West Pomeranian Oncology Centre in Szczecin.

Background: Nowadays work commitment is a sine qua non condition of the development and the competitiveness of every organization. In health care institutions the staff’s commitment seems especially essential due to the correlated with patients’ satisfaction, which is one of measures of quality of treatment.

Methods and the participants of the study: 309 employees of the hospital were examined by means of an inquiry questionnaire.

Findings: The employees of the hospital declare a rather high level of work commitment. However, a detailed analysis reveals areas of dissatisfaction and reasons of lack of job satisfaction. These are primarily: strong competition among employees and lack of feeling that it is people who are the most precious resource for the hospital management. The employees of the hospital lack an individual who could encourage them and would support in development.

Conclusions: Work commitment is not only a derivative of reward. Very essential factors are interpersonal relations on all stages, the atmosphere at work and opportunity of self-fulfilment.

Keywords: commitment, raising the level of commitment, determinants of commitment
Introduction

In the information society era people are the biggest capital of every organization. Their knowledge, skills and experience are one of the key factors determining the efficiency of an enterprise.

A condition essential for translating the employees' potential into business results is their work commitment (Rostek, 2006; Harter, Schmidt, Killam and Agrawal, 2009). Hence employers pay increasingly bigger attention to employees’ satisfaction as they realize that this satisfaction translates into employees’ commitment to completion of their professional tasks. This, in turn, has a direct influence on the performance and the development of the organization. In the case of a health care institution, an increase in employees’ commitment to their work translates into better relationship with patients and an increase in the level and the quality of the examined services.

The present article is a fragment of the report from the study carried out by the authoress in the West Pomeranian Oncology Centre in Szczecin (WPOC).

1. THE INITIAL RESEARCH ASSUMPTIONS

The main aim of the study was to obtain responses to questions about the level of WPOC employees’ commitment to knowledge exchange and the factors determining such, a level of employees’ inclination to mutual knowledge transfer. A premise to undertake research in this area was detection of an opportunity to improve the functioning of a health care institution through increasing the effectiveness of its employees.

Fulfilment of the primary objective of the study required gathering information among other things about the general level of the employees’ commitment. The article introduced the findings of this part of the study.

Both the determinants of commitment as and the issues of influence of employees’ motivation on patients’ satisfaction and on the business results of an health care institutions, are topics undertaken by numerous explorers (Wagner, 2006; Zangaro and Soeken, 2007; Simpson, 2009; Freeney and Tiernan, 2009).

If the group of factors determining the level of the employees’ commitment includes elements which can be formed without having to incur any additional financial outlays, then this is one of the ways to improve the efficiency and the quality of treatment. Perhaps it will be sufficient to introduce changes in
the management style, changes in the model of internal communication, changes in the organizational culture, a more individualized approach to employees or reorganization of the incentive system, to considerably raise the level of the employees’ commitment, leading to improvement of the efficiency and the quality of work, and consequently to an increase in the patients’ satisfaction (Bacon & Mark, 2009).

The findings of the study can form the basis for the hospital management to undertake suitable labour-saving activities (implementation of methods, tools and management practices suitable for the current situation), which are simultaneously a contribution of the West Pomeranian Oncology Centre in Szczecin in the fulfilment of one of the strategic aims indicated in “The development strategy of health care in Poland for 2007–2013”, which is Improving the efficiency of the health care system (Ministry of Health, 2005).

Diagnosis of the level of the employees’ commitment and then identification of factors determining it would make it possible to undertake steps aiming to constantly increase this level. Finally, it would contribute to easier achievement of the operating objective, formulated as The maximization of health advantages through increasing the efficiency and the quality of treatment.

2. BASIC INFORMATION ABOUT THE RESPONDENTS

The study was carried out in 2011 in the West Pomeranian Oncology Centre in Szczecin (WPOC). The authoress applied an inquiry questionnaire in its traditional paper form. The questionnaires were returned in the collective form, which allowed maintaining anonymity in a fuller manner.

The hospital employs 369 individuals altogether (including 13 doctors) based on employment contracts. Additionally in form of civil law agreements there are 51 doctors employed.

The medical department employs 307 individuals, the rest of the employees work in the administration and maintenance department.

The authoress asked for filling the questionnaire both the hospital employees with the employment contract as and doctors with contracts. The investigation excluded employees on maternity leaves, with long-lasting medical leave and employees with whom contact was difficult due to other reasons.

Thanks to high commitment on the part of the hospital management and plenipotentiaries responsible for quality and training, 309 filled questionnaires
were received, mainly from persons employed in form of an employment contract.

Over 80% of respondents were women. Over 66% of respondents were in the age range of 40–60 years, and 32% in the age range 20–40 years.

Participation of respondents in individual occupational categories was as follows: doctors (11%), nurses (32,4%), ward attendants (13,6%), other medical staff (22,3%), administration employees (15,8%). 4,9% of respondents did not respond to the question about their position.

As regards education, the distribution of respondents was as follows: elementary education (4,9%), basic vocational (12,3%), secondary (51,1%), higher (29,1%) and 2,6% – no response.

Analysing the respondents as regards their seniority: seniority in WPOC shorter than 10-years – 31% of respondents. Similarly, it is approximately 34% of respondents work in WPOC longer than 20 years.

3. ANALYZING THE RESULTS OF THE SURVEY

The questionnaire contained 11 questions in order to diagnose the determinants of commitment. The investigated elements concerned areas suggested in the literature (Bakker and Demerouti, 2008; Macey, Schneider, Barbera and Young, 2009; Harter, Schmidt, Killam and Agrawal 2009), such as: a) satisfaction from the workplace, b) self-fulfilment and self-development, c) the management style and the organizational culture d) bonuses.

Apart from questions of concerning various elements influencing the employees’ commitment, the questionnaire also included a direct question about the level of commitment to one’s work.

The employees of WPOC in Szczecin declare a high (46,3%) and a very high level (42,7%) of commitment. In the group of 33 respondents who declare an average level of commitment only 3 respondents indicated that they are rather dissatisfied with their workplace, 12 individuals feel undervalued by their superiors, 11 respondents consider that they are badly rewarded, 10 of them is dissatisfied with their relationship with their superior, and 7 individuals do not know what they are expected at work.

Below is a detailed analysis of elements which can shape the level of commitment. The percentage data demonstrating how responses to individual questions were formed have been placed in Table 1.
3.1. Employees’ satisfaction from their workplace

The vast majority of employees (93.5%) is satisfied with their workplace, including 32% who are very satisfied.

It is interesting that those who are dissatisfied and those very dissatisfied declare a high and very high level of work commitment. The analysis of the responses shows that their dissatisfaction can result from the management’s relation other than expected and the relationship with their superior, lack of possibility to do what they can do best, lack of basic information, i.e. what they are expected to do at work and inadequate, in their opinion, reward. The group of malcontents includes representatives of four (from the five investigated) professional groups (except for nurses). They are employees who working relatively long in WPOC.

Similarly, the 5.2% (16 individuals) group of those rather dissatisfied with their workplace has a prevailing number of employees with long-time seniority (seniority of 13 employees in this group considerably exceeds 10 years). Two times more individuals than in the satisfied group regard interpersonal relations as bad both in relations with their superiors as and with their colleagues, and they also claim that they are not allowed to do what they know best. An almost 6 times bigger percentage of individuals, with relation to the satisfied group, claimed that they do not gain useful knowledge and experience at work.

3.2. Self-fulfilment and self-development

3.2.1 Occupation in accordance with one’s skills

93.5% of employees consider that fulfilling their tasks as part of their duties in the hospital is exactly what they can do best.

Among 20 employees who maintain that they do not fulfil themselves at work, i.e. they do not have any opportunities to do what they do best, as many as 5 employees are nor satisfies with their workplace. It is worth paying attention to this proportion: among the whole staff of WPOC the percentage of employees dissatisfied with their workplace is about 7%, and in the group of employees who cannot fulfil themselves is 25%. Therefore lack of opportunities for employees to do tasks in which they feel most confident might be an essential reason for their dissatisfaction with their workplace.

Moreover, a five times bigger of employees than the self-realizing group maintains that they are not clearly informed what they are expected to do at
work and as many as a 10 times bigger percentage of employees consider that their work does not gain any useful knowledge and experience.

The group of employees who do not fulfil themselves also includes those who indicate, considerably more frequently than others, existence of strong competition among employees and also feel that they are undervalued as employees and neglected as people.

Half of the group of those who do not fulfil themselves at work often think of resigning from work with WPOC.

This group does not include administration employees, yet it includes 2 doctors, 7 nurses, 3 ward attendants. The remaining employees are other medical staff.

3.2.2 Gaining useful knowledge and experience

Over 96% of employees consider that they gains useful knowledge and experience at work, which is a result which many organizations could envy WPOC.

Those (only 12 individuals) who maintain that they do not gain useful knowledge and experience are employees with secondary and higher education. The group does not any doctor yet it includes one administration employee, two ward attendants, four nurses and five other medical workers.

Except from one person, all employees are aged 40 and more.

They are individuals who relatively seldom regard themselves as optimistic, courageous, self-confident and altruistic.

The group includes a relatively big number of employees dissatisfied with their workplace, with interpersonal relations at work, with the manner in which the staff is treated by the managers and perceiving their own working environment as competitive. A relatively high number of them think of resigning from work in WPOC.

More, nearly a 10 times bigger percentage of employees from this group (than from the group of those who claim to gain useful knowledge and experience at work) regard the value of the possessed knowledge as rather low.

3.2.3 Motivating for development

As regards the area of self-fulfilment and self-development at work, the “poorest” were responses to the question about a person who encourages and motivates for self-development. Over 25% of respondents claim that there is no
motivating person at work. Another 25% is capable of indicating such a person but without being particularly convinced. So, as many as half of the employees are not motivated in a manner suitable for improving their knowledge and skills!

The group of employees without a mentor includes relatively more individuals dissatisfied with their workplace, who do not regard their colleagues as an essential source of knowledge. This group also includes a several times greater percentage of individuals, than in the motivated group, with reservation to interpersonal relations in the hospital and the managers’ attitudes towards employees.

3.3. The management style and the organizational culture

3.3.1 Competition at work

Over 25% employees notices strong competition at work. They are not satisfied with interpersonal relations in the hospital, especially among peer colleagues. Moreover, they were negative about the level of returning, appraising and rewarding for knowledge sharing. Their colleagues are not an essential source of knowledge for them. More, they claim that the hospital lacks of suitable activities of the superiors aimed at encouraging knowledge exchange and facilitating this exchange.

Individuals from this group transferring their knowledge feel anxious about losing their position.

Over a half of this group are negative about the communication system facilitating knowledge exchange and information spreading.

3.3.2 The human capital as a resource of the organization

Over 26% of the staff (82 individuals) feel that employees are not the most important resource for the hospital management.

This group includes relatively many individuals who:
– are negative about relations with their superiors and colleagues,
– are not capable of indicating employees who motivate them for development,
– are dissatisfied with their position,
– claim that they are not clearly informed what they are expected at work, and
– are dissatisfied with their reward.
They are mostly elderly employees and relatively quite a lot of them has higher education. This group includes as many as 13 doctors.

3.3.3 Information as regards tasks and expectations

13.5% of respondents (41 individuals) think that their superiors do not sufficiently clearly transfer to them information what they are really expected to do at work. It is very difficult for an employee to feel fulfilled in the organization when he or she has to find an answer to the question “What am I doing here?”, when he or she has to guess what their superiors expect them to do and what they count on. Such information is essential for employees to know their place in the organization, could identify themselves with its objectives and fulfill them, that is practically, so that they could effectively fulfill their tasks.

Employees from this group definitely more frequently than others claim that employees are not the most precious resource for the management and they are negative about interpersonal relations in the hospital and they do not feel that there is anybody at work who cares for them as human beings.

3.3.4 Interpersonal relations

Moreover 14.7% (45 individuals) cannot indicate a person at work who cares for them as human beings.

Nearly 19.5% of employees consider that in WPOC there are improper relations between employees and their superiors and almost as many (18.4%) are negative about relations among colleagues. The strong positive correlation between responses to questions about interpersonal relations indicates that this is more or less the same group of employees. These individuals relatively more often than other signal lack of an individual who would motivate them for development.

The employees who are positive about relations with their colleagues and superiors indicate them as essential sources of knowledge and as those who set a good example “from the top”. They feel valued by them in situations when they transfer them their knowledge and share their skills with them. Individuals who are positive about interpersonal relations are mostly satisfied with the communication system in the organization.
Table 1.
Responses to questions about determinants of work commitment (in %)

<table>
<thead>
<tr>
<th>Questions</th>
<th>Responses</th>
<th>strongly agree</th>
<th>agree</th>
<th>quite agree</th>
<th>rather disagree</th>
<th>disagree</th>
<th>strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am very committed to my work</td>
<td></td>
<td>42.7</td>
<td>46.3</td>
<td>10.7</td>
<td>0.3</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>I am very satisfied with my job</td>
<td></td>
<td>32.0</td>
<td>42.2</td>
<td>19.3</td>
<td>5.2</td>
<td>1.0</td>
<td>0.3</td>
</tr>
<tr>
<td>Working in this hospital I have an opportunity to do what I do best</td>
<td></td>
<td>29.0</td>
<td>39.7</td>
<td>24.8</td>
<td>4.6</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Doing my work I get useful knowledge and experience</td>
<td></td>
<td>26.4</td>
<td>49.2</td>
<td>20.5</td>
<td>2.0</td>
<td>0.7</td>
<td>1.3</td>
</tr>
<tr>
<td>There is someone in the hospital who encourages me to develop</td>
<td></td>
<td>10.5</td>
<td>38.9</td>
<td>25.5</td>
<td>14.1</td>
<td>7.5</td>
<td>3.6</td>
</tr>
<tr>
<td>There is strong competition between employees in my workplace</td>
<td></td>
<td>11.7</td>
<td>35.6</td>
<td>27.0</td>
<td>16.0</td>
<td>6.8</td>
<td>2.9</td>
</tr>
<tr>
<td>Hospital management treats employees as its most valuable resource</td>
<td></td>
<td>20.3</td>
<td>25.2</td>
<td>27.8</td>
<td>15.0</td>
<td>7.8</td>
<td>3.9</td>
</tr>
<tr>
<td>I am clearly informed what I am expected to do at work</td>
<td></td>
<td>19.1</td>
<td>42.4</td>
<td>25.0</td>
<td>9.5</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>I think that good relationships prevail among colleagues of the same level in our hospital</td>
<td></td>
<td>17.1</td>
<td>38.1</td>
<td>26.4</td>
<td>9.0</td>
<td>5.4</td>
<td>4.0</td>
</tr>
<tr>
<td>I think that good relationships prevail between superiors and subordinates in our hospital</td>
<td></td>
<td>14.6</td>
<td>36.1</td>
<td>29.9</td>
<td>9.5</td>
<td>6.8</td>
<td>3.1</td>
</tr>
<tr>
<td>My supervisor or someone else at work cares about me as a human being</td>
<td></td>
<td>19.7</td>
<td>39.7</td>
<td>25.9</td>
<td>9.5</td>
<td>3.9</td>
<td>1.3</td>
</tr>
<tr>
<td>I think my salary is adequate to my work</td>
<td></td>
<td>13.4</td>
<td>32.2</td>
<td>27.7</td>
<td>14.0</td>
<td>5.5</td>
<td>7.2</td>
</tr>
<tr>
<td>I hardly ever think about resigning from my job at the hospital</td>
<td></td>
<td>42.6</td>
<td>28.9</td>
<td>11.1</td>
<td>4.9</td>
<td>4.3</td>
<td>8.2</td>
</tr>
</tbody>
</table>

Source: the author’s study.

### 3.4. Reward

Nearly 27% of respondents claim that the reward which they receive is not suitable for their work.

This group has comparatively more than among the entire examined population, employees dissatisfied with the relations with their colleagues and those who do not feel the most essential supply in the eyes of the management.
What is interesting, the investigation did not reveal any relationship between satisfaction from a bonus and work commitment.

Conclusions

1. West Pomeranian Oncology Center (WPOC) employees see themselves as people committed to their jobs and open to new experiences.
2. An important reason of employees’ dissatisfaction is that they do not have opportunities to do tasks at which they are best.
3. Employees who claim that they do not get useful knowledge and experience are often those who do not do what they can do best.
4. More than 25% of the WPOC employees are not able to identify a person who motivates them to develop their knowledge and skills.
5. Relationships prevailing in the organization are positive, especially for those employees who are assured by their managers that people are the most important and the most valuable asset in the organization, and receive clearly informed about the requirements and expectations placed upon them.
6. An employee who knows what he or she is expected at work is mainly a person who thrives in the organization. He or she is positive about the management’s attitude towards employees and has no problem to point to someone who cares about him or her as a human being.
7. Employees remaining in positive relationship with their colleagues are usually satisfied with their relationship with supervisors as well.
8. The study has shown a strong correlation between good relationship among employees and their satisfaction from their jobs and from their salaries.
9. The study has shown no relationship between work commitment and employees’ satisfaction with their pay for work.
10. Mainly people who are not satisfied with their jobs or have no opportunity to do what they can do best, think about resigning from their jobs.
11. The study has revealed no relationship between thinking about job resignation and dissatisfaction with salaries.
12. Other medical personnel is significantly more dissatisfied than other occupational groups. They are negative about interpersonal relation-
ship at all levels, they do not feel well treated as human beings (they feel lack of care and attention), they claim there is no person to motivate them for development. This occupational group rates their salaries relatively worse than others.

References


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THE IMPLEMENTATION OF LOYALTY FORECAST MODEL IN IDENTIFYING KEY CLIENTS OF AN ENTERPRISE

Abstract

Managing product range by means of the, so called, portfolio methods\(^1\) implementation is widely known in the theory of marketing and applied in many enterprises functioning practice. Much less attention, both in professional literature and in marketing practice, has been paid to clients’ portfolio analysis, so far. However, in the conditions of growing competition, the issues of enterprise clients’ portfolio management have become the tool which may exert an extensive influence on increasing both effectiveness and competitiveness of enterprises.

The hereby paper discusses the concept of clients’ loyalty probability forecast model, which may be used in the process of establishing an optimum portfolio of clients by means of identifying and selecting key clients of an enterprise. The verification of suggested model correctness in the process of consumer loyalty establishment will be performed based on a selected Polish travel office operations.

**Keywords:** clients portfolio, key client, MLP neural network method, model of clients loyalty forecast, verification of clients loyalty forecast model accuracy based on empirical data from selected tourism organizer.

\(^1\) The term ‘portfolio methods’ originates from financial analyses of portfolio securities owned by an enterprise, the main objective of which was to undertake allocation decisions and obtain a balanced set of assets. The first portfolio analyses were performed in the 60s of the 20\(^{th}\) century.
**Introduction**

The concept of relations marketing puts emphasis on activities focused on maintaining the existing clients. It is assumed that capturing new clients is an important task for a company, however, it is more important to keep the existing ones. Research indicates that company results depend on a limited number of relations, while winning new customers is much more expensive than activities aimed at keeping the loyal ones. Analyses of many enterprises resulted in the conclusion that increasing the level of maintained clients by 5% results in better profitability measured by net present value from 20 to 85%. (More in: Fonfara (2004), pp.104–105).

The selection of key clients is performed based on identification and selection matrix including two types of this value determinants, which define the relationship between a supplier and a client as well as a client and a supplier, namely:

- client’s attractiveness – factors resulting in an enterprise interest in an existing or potential client,
- relative power of an enterprise – factors resulting in client’s distinguishing a given supplier from competitive ones.

Both criteria are determined by many more detailed quantitative and qualitative factors, specific for a given enterprise, which should refer to long-term company goals. Proper weight should be assigned to particular partial factors. Client’s attractiveness is decided by a set of determinants selected in adequate proportions, e.g.: scale of transactions, opportunities for development, financial stability, client’s availability, the level of current relation development, matching strategic goals of a supplier and a client, client’s flexibility towards new, emerging products, client’s appreciation for supplier’s offer, competition level, client’s market position. In order to define factors which determine supplier’s power client’s point of view should be accepted as well as determinants according to which an enterprise may be evaluated by him/her. They may include as follows: price, service level, quality, reaction rate to the notification of needs,

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2 The article was written within the framework of a research project 2011/03/D/HS4/03420 entitled “Loyalty of travel agencies clients in Poland – determinants, models, research results” sponsored by the National Center of Science.
bonds and attitudes, technical innovations, product or service practical usefulness, long-term stability, trust and reliability.

**Relative power of a supplier**

<table>
<thead>
<tr>
<th></th>
<th>Small</th>
<th>Big</th>
</tr>
</thead>
<tbody>
<tr>
<td>Big</td>
<td>Potential key clients</td>
<td>Key clients</td>
</tr>
<tr>
<td>Small</td>
<td>Occasional clients</td>
<td>Maintained clients</td>
</tr>
</tbody>
</table>

Specifying client’s attractiveness and supplier’s relative power results in distinguishing four categories of an enterprise clients (Cheverton, 2001, pp. 206–209):

- “key clients” represent the category most desirable by enterprises, since they are the clients most satisfied with the existing cooperation. Key clients may also be taken advantage of in the role of lead users – as individuals frequently using company services who, in a survey, are capable of indicating areas requiring innovation or improvement and are helpful in establishing long-term relations with a client (See: Keiningham et al. (2009) and Reichheld (2006));
- “prospects potential key clients” i.e. a group of clients cooperation with whom stands the chance of becoming exemplary if only the company modifies its way of functioning. In this case the main objective is to find out what are the clients’ expectations, reasons of their dissatisfaction, as well as company adjustment to meeting their needs. In order for the cooperation with the discussed group to be successful no savings

Fig. 1. Managing clients’ portfolio

should be done regarding the provision of adequate resources and professional service. These clients with whom cooperation is not developing, or no changes are expected in this matter, should be excluded from the group of customers with future potential;

– “maintained clients” who, in many respects, constitute the most difficult category, since the decision about quitting any investments in them, as well as directing means and efforts elsewhere, i.e. where they are more necessary, turns out difficult, but indispensable;

– “occasional clients” – customers served by an enterprise when such activity meets current objectives of the company. They are not offered any promises which the company will not be able to meet but, at the same time, these clients are not referred to as unnecessary. This category of clients constitutes an income source which allows for cooperation development with key clients and potential key clients.

The identification and selection of clients in order to group them by category does not always mean the resignation of one in favour of the other. What is does mean is planned allocation of resources. Time and energy saved, owing to the application of more efficient methods for serving both the maintained and occasional clients and revenues obtained as the result of cooperating with them, may in the future be invested in company development. In the process of key clients management an important role is played not only by these basket components which result in high profits, but also in managing this basket. Therefore proportions between long and short term financial inflows should be properly formed as well as between the resources invested and the return on investment. Correct assessment of investment dynamics and earning revenues from clients portfolio, as the result of key clients management, brings about numerous advantages for a company.

1. **THE MODEL OF TRAVEL OFFICE CLIENTS LOYALTY FORECAST USING MLP NEURAL NETWORK**

The process of maintaining clients starts mainly from the selection of proper ones, while the strategic component of loyalty programme construction is to define key clients to whom it will be addressed (more in: Berry, Linoff (2004)). When an enterprise has a data base at its disposal it may be used for
performing an in-depth segmentation and identification of possible sub-segments (Kwiatek (2007), p. 132 and further).

Fig. 2. Assumptions of clients loyalty forecast model
Source: authors’ compilation.

Based on a given travel office clients’ loyalty forecast model, the existing customers may be divided into groups representing different levels of risk of leaving, on the one hand, and different chances for making further purchase, on the other, as well as design and direct adequate marketing activities to these
clients who will most probably return to a given travel office and will stay its regular clients for a long time.

![MLP neural network scheme](image)

**Fig. 3.** MLP neural network scheme


Based on historical data it is possible – by means of data analysis model – to construct a model for travel office clients’ loyalty probability forecast. The process of travel office clients’ loyalty probability forecast will be performed with usage of MLP neural network (see: Tadeusiewicz (1993), Bishop (1995),...
The implementation of loyalty forecast model in identifying key clients…

and Ripley (1996)), which general scheme is presented at the picture below. Multi-layer MLP neural networks represent the development of classical perceptron concept (Rosenblatt (1958), pp. 386–408) and are composed of one input layer, one output layer and one or more hidden layers.

In the suggested model each client describing variable stands for one neuron of input layer. Output layer is represented by “loyalty level” variable understood as the probability of client’s return after making the first purchase.

Input layer neuron values are presented as \( X = [X_1, X_2, \ldots, X_L] \), hidden layer/layers neuron values as \( Z = [Z_1, \ldots, Z_K] \) and output layer neuron values as \( Y = [Y_1, Y_2, \ldots, Y_J] \).

Hidden layer neurons represent \( h(.) \) activation function values of linear input layer neuron combination with wages \( \{w_{kl}\} \), \( 1 \leq k \leq K, 1 \leq i \leq L \) following (1). In (1) sigmoid function represents the activation function. It is also possible to use other functions (see e.g.: Walesiak, Gatnar (2004), however, this particular function was applied in Rossi and Connnan-Guarez’s proposal.

\[
Z_k = \frac{1}{1 + e^{-(w_{k0} + \sum_{i=1}^{L} w_{i}X_i)}} \quad (1)
\]

Whereas output neuron values are calculated as values of SOFTMAX transformation (see e.g. Bishop [1995]) of hidden layer linear neurons combination with wages \( \{\omega_{lj}\} \), \( 0 \leq l \leq L, 1 \leq j \leq J \) according to (2)

\[
Y_j = \frac{\sum_{r=1}^{J} e^{\omega_{lj0} + \sum_{k=1}^{K} \omega_{lk}Z_k}}{\sum_{r=1}^{J} e^{\omega_{lj0} + \sum_{k=1}^{K} \omega_{lk}Z_k}} \quad (2)
\]

The process of perceptron learning consists in such choice of \( \{w_{kl}\} \) and \( \{\omega_{lj}\} \) weights so that the difference between theoretical values (achieved from perceptron transformations with input data) and real values could be the smallest. This difference is expressed by means of a well known, from multiple regression analysis method, least square criterion.

\[
Q(\mathbf{w, \omega}) = \sum_{j=1}^{J} \sum_{i=1}^{N} (y_i - f_j(x_i))^2 \quad (3)
\]

where: \( N \) – number of observations,

\( f(.) \) – superposition of (2) and (3) functions
Therefore sequential minimization of \( Q(w, \omega) \) function is the purpose of learning. It is performed by applying the generalized delta rule with minimization by means of the highest gradient drop method.

Starting with the same weights in subsequent \( r + 1 \) step of network learning the modification of synaptic weights for each layer is performed in the following way:

\[
\omega_{jk}^{(r+1)} = \omega_{jk}^{(r)} - \eta \cdot \sum_{i=1}^{N} \frac{\partial Q_i(w, \omega)}{\partial v_{jk}^{(r)}} + \lambda \cdot T(w, \omega) \quad (4)
\]

\[
w_{kl}^{(r+1)} = w_{kl}^{(r)} - \eta \cdot \sum_{i=1}^{N} \frac{\partial Q_i(w, \omega)}{\partial w_{kl}^{(r)}} + \lambda \cdot T(w, \omega) \quad (5)
\]

Where \( \eta \in (0, 1) \) means the coefficient of learning speed, \( \lambda \) – penalty coefficient and \( T(w, \omega) \) – penalty function equal to

\[
T(w, \omega) = \sum_{l=1}^{L} \sum_{k=1}^{K} w_{kl}^2 + \sum_{k=1}^{K} \sum_{j=1}^{J} \omega_{jk}^2 \quad (6)
\]

or:

\[
T(w, \omega) = \sum_{l=1}^{L} \sum_{k=1}^{K} \frac{w_{kl}^2}{1 + w_{kl}^2} + \sum_{k=1}^{K} \sum_{j=1}^{J} \frac{\omega_{jk}^2}{1 + \omega_{jk}^2} \quad (7)
\]

Error backward propagation algorithm (generalized delta method) in this case operates following two steps:

1. Forward pass consists in calculating theoretical \( \hat{f}_j(x_i) \) values.

2. Backward pass – \( \delta_{ji} = y_i - \hat{f}_j(x_i) \) error value is calculated, which allows for synoptic weight values modification, first output, next input values and on their basissynoptic weights of hidden layers are modified according to formulas (4) and (5).

When the learning process is over perception memorizes due weights for hidden layer (layers) and output layer which are applied in the prediction of variable values – the regress and, based on regression variable values.
2. **THE VERIFICATION OF CLIENTS LOYALTY FORECAST MODEL CORRECTNESS FOR A SELECTED TOURISM ORGANIZER**

For a selected tourism organizer\(^3\) a model was constructed to forecast which of its existing clients will repeat the purchase. The model will be applied soon after the first purchase, therefore its construction should be limited to data available after finalizing the first order. Network provided with such knowledge – based on historical data referring to clients of one of tourism organizers – may be used in calculating the probability of a specific client’s return to a certain service provider.

We have historical data at our disposal, which refer to the purchase already made (value of the first purchase, number and category of offers purchased so far, last minute offers purchased, etc.), method and place of purchase (from the organizer, at an agent’s office, in an online travel office), the form of payment (whether it was an instalment purchase), client’s profile (age, sex, education, number of household members, income level) as well as client’s activity before, during and after making the purchase (whether the client was contacting the travel office before or right after the purchase).

The model covering observations for 111 clients of an analyzed travel office included the following input layer variables referring to (see: Dudek, Michalska-Dudek (2011), pp. 25–28).

**An order**, namely:
1a. value of the first purchase – a variable measured in quotient scale,
1b. number of purchased products – a variable measured in interval scale,
1c. category of purchased products – a variable measured in ordinal scale,
1d. method of purchase – a variable measured in nominal scale,
1e. form of payment – a variable measured in nominal scale,
1f. whether it was an instalment purchase – a dummy variable.

**A client**, including:
2a. region of client’s residence – a variable measured in nominal scale,

\(^3\) Tourism organizer (tour operator, producer of tourism service packages) deals in combining elements of a tourism product (originating from partial service providers, e.g. accommodation, food and catering, transport, insurance, tour guide services etc.) in a coherent package, as well as selling services directly to tourists, or by means of subsequent links in the distribution system.
### Table 1

**Historical data of the analyzed tourism organizer**

<table>
<thead>
<tr>
<th>No.</th>
<th>Historical data – variables of model input layer</th>
<th>Regressand (output layer variable) „Loyalty”</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Data about an order</td>
<td>Data about a client</td>
</tr>
<tr>
<td></td>
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<td>1b</td>
</tr>
<tr>
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<td>8870</td>
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<tr>
<td>34</td>
<td>4030</td>
<td>1</td>
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</table>
The implementation of loyalty forecast model in identifying key clients...  

|   | 7340 | 6590 | 8260 | 7620 | 9020 | 7770 | 6450 | 1630 | 5140 | 4300 | 7010 | 8500 | 9810 | 2320 | 5700 | 7320 | 3320 | 8500 | 7150 | 4130 | 2730 | 7280 | 3330 | 6500 | 4320 | 3260 | 9900 | 6790 | 4350 | 8540 | 9290 | 6000 | 7920 | 9300 | 2860 | 8000 | 9270 | 6290 | 3240 | 1450 | 5860 | 3090 |
|---|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
2b. location size of client’s residence – a variable measured in ordinal scale,

2c. client’s age – a variable measured in interval scale,

2d. client’s sex – a dummy variable,
2.e client’s education – a variable measured in ordinal scale,
2f. number of household members – a variable measured in interval scale,
2.g income category – a variable measured in ordinal scale.

**client’s activity:**

3a. information whether a client was contacting the supplier before or just after the purchase – a dummy variable.

Regressand variable (output layer variable) will be represented by “loyalty” variable. For historical data this variable will take 0 value if a client did not make next purchase and one if he did, while for new clients it will be a <0,1> interval variable, understood as the probability of a new client return after making the first purchase.

The table 1 presents input layer variables in a model covering 111 cases of an analyzed travel agency clients.

In order to verify model correctness retrograde cross-validation technique will be applied. For 20 randomly selected cases, out of 111 analyzed, and referring to a given tour-operator clients whose decision about making or not another purchase was known in the analyzed travel office, a dummy variable referring to this decision was compared with theoretical values of “loyalty” output layer variable in a model. Table 2 presents adequate variable values.

If it is accepted that the 0,5 value of “loyalty” variable divides clients into two classes: 0 – a client who did not return after the first purchase and 1 – a client who did return after the first purchase, then there is only one position for which the result of model prediction is different from real value. Such situation occurs when a client with the variable level of loyalty = 0,75 was indicated by the model as the client who did not return after making the original purchase (Client 6). However, none of clients characterized by the model variable level of <0,5 returned to the company after making the first purchase.

---

4 Where “1” means that a given client returned to an organizer in order to make another purchase, while “0” means that a client did not make the second purchase in the analyzed travel office.
Table 2

Theoretical values and real values of “loyalty” variable

<table>
<thead>
<tr>
<th>No.</th>
<th>Theoretical values from the model</th>
<th>Real values</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.084919</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0.084919</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>0.084968</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0.7488</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>0.085243</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
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<td>0.7488</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>0.086503</td>
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<td>10</td>
<td>0.748424</td>
<td>1</td>
</tr>
<tr>
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<td>0</td>
</tr>
<tr>
<td>15</td>
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</tr>
<tr>
<td>16</td>
<td>0.748751</td>
<td>1</td>
</tr>
<tr>
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<td>0</td>
</tr>
<tr>
<td>20</td>
<td>0.084919</td>
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</tbody>
</table>

Source: Authors’ compilation based on calculations made applying net package of R environment.

Conclusions

In times of current global crisis, growing competition, as well as increasing and changing clients’ expectations, tourism enterprises are forced to search for new, more effective methods of entering into, maintaining and strengthening their contacts with clients. Client focus as the philosophy of functioning becomes more and more important. It leads to correcting the strategy of tourism sector companies and focusing mainly on obtaining proper satisfaction level and loyalty of a client. Tourism sector companies change the way of perception in their relations with clients. Focus shifts from transaction towards partnership and the aim of such movement is to establish long lasting relations with clients. New areas of activities become noticed and, apart from winning clients, atten-
tion is also directed towards establishing and maintaining lasting contacts with them.

Due to the fact that in the times of economic downturn among promotional activities the most efficient are those focused on a certain effect and measurable at the same time, therefore it is clients’ loyalty establishing which should grow in importance also at tourism services market.

From the perspective of an enterprise functioning, repetitive purchase usually requires lower service costs, establishing contacts, sales and marketing which are depreciated in a long run. Positive correlation of clients maintaining indicator should also be emphasized as well as income earned by enterprises.

If it is supplemented by the fact that winning a new client may costs event five times more than maintaining the existing one, clients’ loyalty should be considered one of the more important indicators for the evaluation of enterprises functioning at tourism market, while the application of loyalty programs as fully recommended.

It is possible to divide clients into groups characterized by a different level of leaving threat, on the one hand, and different probability of making further purchase on the other, after using information obtained from the model forecasting clients’ loyalty towards a given travel agent (“perspective” group – loyal clients and “non-perspective” group – disloyal ones), design and apply adequate marketing activities for these potential clients who will probably remain long-term clients, and additionally, it is also possible to indicate certain events which will precede leaving, or influence keeping a client.

Different activities should be undertaken with reference to both groups of clients distinguished by the model, by travel office managers. Clients classified as “disloyal” may become the target of pre-emptive measures, while the perspective ones may become the recipients of new product offers – cross-selling, or offers for extending the existing cooperation – up-selling.

An adequately designed loyalty programme allows to identify and encourage the most valuable clients to participate in it and, at the same time, helps to save financial resources by an enterprise as the result of “encouraging” less valuable clients. Additionally the loyalty model may also indicate some events which precede client’s leaving or influence keeping the particular client.

The presented model may become a useful tool not only for big and wealthy tourism organizers, but also for intermediaries and agents functioning in tourism sector who would be able to reach loyalty programmes participants
in a targeted manner and minimize losses resulting from sending special offers (treatment, privileges) to unprofitable and not prospectively attractive clients.

Among open issues, next step further research topics following should be distinguished:

- opportunities for extending the hereby model so that it does not only forecast the probability of client’s return after the first purchase, but also has the potential of indicating client’s return probability after each $n$-th ($n \geq 1$) purchase,
- information about which input variables (data referring to an order, clients’ profiles or their activities) influence loyalty level the most,
- possibilities for indicating certain events which precede client’s leaving or influence keeping the client.

References


The implementation of loyalty forecast model in identifying key clients…


Abstract

The modern model for the innovative activity indicates that one of the key factors for success of innovative activity of enterprises is properly implemented the introduction of new solutions to market. The problem of diffusion of innovation involves a number of issues related to the process of spreading and promoting innovation in the market. It is widely recognized that the powers of innovation diffusion is an important determinant of the capacity of firms.

Key success factors in the process of diffusion of innovations have been described in the classical model of EM Rogers, indicating that there are several categories of buyers who take the opposite approach to news. The practice also indicates that the innovations introduced to the market must be defined features for the success of the market. Meanwhile, many small and medium enterprises have difficulties with the introduction of new products and services to market.

The purpose of this paper is to present the problems associated with diffusion of innovation in the SME sector business activity in Poland, with particular emphasis on the barriers in this area. Commonly available statistical data, the Author's empirical research results from the period 2009–2011 and results of other studies conducted by the University of Szczecin were used to prepare this publication.

Keywords: innovation, West Pomerania, innovation diffusion
Introduction

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

1. ESSENCE OF INNOVATION DIFFUSION IN CURRENT INNOVATIVE PROCESSES

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

- “the 5th generation innovative process” (Rothwell, 1995),
- the systematic approach to the innovative process,
- the spiral innovation process (Oslo Manual, 2005),
- the efficient management of innovation (Tidda, Bessant and Pavitt, 2001).

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

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

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

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

2. Diffusion on the part of buyers – covering the participants of consumer markets. The issues concerning diffusion in this group include the principles of introducing new products and services to the market, promoting original techniques and methods of operation or finally the popularization of innovative ideas and concepts. Therefore, the main purpose of activities related to the implementation of diffusion processes on the part of buyers is to make the greatest number of buyers or adaptors accept the innovation (since innovation does not always require a purchase).
To sum up the above discussions, it may be concluded that the diffusion of innovation determines the principles of market commercialization of innovative products and services and is an element of the innovative process which is directly responsible for the market success of new products and services. Therefore, it may be concluded that innovations would not have an economic significance without diffusion processes (Klincewicz, 2011, p. 22), which makes many researchers acknowledge the issues of diffusion as crucial for a successful implementation of innovative processes (Klein, Sorra, 1996; Angle, Van de Ven 2000).

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

One of the oldest innovation diffusion models has been described by Tarde who brought diffusion down to imitation or the willingness to become similar to others. In fact, this model explained the mechanism in which fashions were formed but completely omitted a number of dependencies which may be observed in relation to innovation.

The currently used innovation diffusion models are based on research conducted by E.M. Rogers who made the effectiveness of innovation diffusion dependent on the attributes of innovation itself, the individual features of its the potential users and the phenomena in the environment in which the innovation is being implemented. Rogers described five features which have the greatest effect on the effectiveness of the innovative process in a model which is referred to as PZNTO in Polish-language literature (because of the first letters of the key features) (Rogers 1962).

In this model, which is widely described and commented in the literature on the subject, the diffusion of innovation depends on:

- P – relative advantage over other, earlier solutions.
- Z – compliance with experience and values of potential buyers.
- N – low complexity.
- T – testability.
- O – observability.

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

2. **ANALYSIS AND ASSESSMENT OF THE SELECTED FEATURES OF THE DIFFUSION PROCESSES FOR COMPANIES FROM THE WESTERN POMERANIA REGION. RESEARCH METHODOLOGY.**

When examining and analyzing the reasons of poor innovation of SMEs from the Western Pomerania region (Norek, 2011), the Author paid special attention to barriers related to the diffusion of innovation. The Author analyzed in detail the dependencies between a company’s level of innovation, the sales of innovative products and services, the indicator of success and the dependence of acceptance of a new product or service by customers and the possibility of its actual market commercialization.

When analyzing the abovementioned characteristics and effects of diffusion processes, the Author formulated the following research thesis: **SMEs from the Western Pomerania region have a poor potential with regard to the diffusion of innovation.**

The formulated research objective was completed on the basis of the logical induction method based on the analysis of innovation diffusion processes in SMEs. All key determinants affecting the effectiveness of innovation diffusion were evaluated in the research. The research was conducted with the use of a survey containing 43 questions, divided into eight categories – stages of an innovative process implemented in a company.

The companies performed self-evaluation of a few to a dozen or so aspects of their activity in a particular area as part of the evaluation of particular categories. All questions at the stage of creating measurement tools were scaled from 1 to 5 (1 being the lowest grade, and 5 the highest grade) – such a structure made it easy to compare the received results and evaluate them. Average values were calculated from the obtained results – for particular detailed aspects, for particular areas and for a comprehensive evaluation. The research was conducted by means of an on-line survey in the period from April 2011 to July 2011.

300 companies from the Western Pomerania region were selected for analysis. They were selected in a purposeful manner to ensure an appropriate research structure: 50% of production companies, 50% of service companies. The division due to the size of the examined companies was as follows: 56%
(170 companies) micro enterprises, 33% (100 companies) small enterprises, 10% (30 companies) medium enterprises. Author is fully aware that the analyzed sample is not a representative sample but it is a number sufficient enough to conduct analyses and draw conclusions.

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

- Level of innovation sales.
- Indicator of success related to innovation sales.
- Level of innovation of examined companies.
- Level of acceptance of customers with regard to new products and services.
- Level of effectiveness of diffusion processes for new products and services.

The level of innovation of a unit is defined as a share of new products or services in its offer in the period of the last three years, regardless whether they were a market success. The notion of “success indicator”, on the other hand, should be understood as the share of new products or services in a company’s offer in the last five years which, after implementation, gained approval of the market. The evaluation here is supplemented by indicators with regard to the relations of revenue and profit from the sale of new products/services as compared to the company’s turnover in the last three years. Those companies for which the values of the abovementioned indicators exceeded the level of 30% should be considered as distinctive in this respect. If, on the other hand, they oscillate within the range of 1%, these entities are in the weakest group of the examined ones. Such a description of ranges is generally adopted in the research concerning the innovativeness of companies or innovation audits. The aggregated results are presented in Table 1.
The obtained results indicate that half of the examined companies (50%) has a low innovation level (innovation level < 10%) which classifies them in the category of non-innovative companies. Only 6% of the examined companies may be considered as innovative, namely such which implemented new products or services in the period of the last three years (innovation level > 10%). These results show that the examined companies do not have a sufficient innovative potential which makes it possible to implement innovative projects. The Author’s other research confirms this thesis and indicate that the examined companies demonstrate the lowest innovative potential in the following areas: evaluating and planning innovative activities, communication and organization or financing innovative operations (Norek, 2012).

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

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

The obtained results indicate that production companies achieve slightly better results than service companies but this difference is small.

The obtained results have been presented in graphic form on figures No. 1 and No. 2.

![Fig. 1. Key indicators describing effectiveness of implementation of innovation diffusion processes in examined companies including type of conducted activity](image)

Source: own elaboration.
Fig. 2. Key indicators describing effectiveness of implementation of innovation diffusion processes in examined companies

Source: own elaboration.

The aggregated results have been presented in table no. 2.

Table 2
Dependence of customer acceptance for implemented innovations and effectiveness of diffusion

<table>
<thead>
<tr>
<th>Group</th>
<th>Category</th>
<th>Not</th>
<th>Sometimes</th>
<th>Often</th>
<th>Usually</th>
<th>Always</th>
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<tr>
<td>Services</td>
<td>Diffusion of innovation</td>
<td>31%</td>
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<td>23%</td>
<td>15%</td>
<td>6%</td>
</tr>
<tr>
<td></td>
<td>Acceptance by customers</td>
<td>13%</td>
<td>14%</td>
<td>19%</td>
<td>25%</td>
<td>29%</td>
</tr>
<tr>
<td>Production</td>
<td>Diffusion of innovation</td>
<td>27%</td>
<td>26%</td>
<td>19%</td>
<td>17%</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Acceptance by customers</td>
<td>18%</td>
<td>13%</td>
<td>14%</td>
<td>25%</td>
<td>30%</td>
</tr>
<tr>
<td>All</td>
<td>Diffusion of innovation</td>
<td>29%</td>
<td>26%</td>
<td>21%</td>
<td>16%</td>
<td>8%</td>
</tr>
<tr>
<td></td>
<td>Acceptance by customers</td>
<td>16%</td>
<td>14%</td>
<td>16%</td>
<td>25%</td>
<td>29%</td>
</tr>
</tbody>
</table>

Source: own elaboration.
Another category analyzed in detail was the dependence between customer acceptance towards a new product or service and the effectiveness of its diffusion. The obtained results made it possible to clearly evaluate the effectiveness of the innovation diffusion process implementation in the examined SMEs from the Western Pomerania region.

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

The obtained results have been presented in graphic form on Figure No. 3

Fig. 3. Dependence of customer acceptance for implemented innovations and effectiveness of diffusion

Source: own elaboration.
Conclusions

The Author of the article formulated a thesis that SMEs from the Western Pomerania region have a poor potential with regard to the diffusion of innovation. This poor potential with regard to an effective implementation of diffusion processes is one (but not the only one – which is indicated by the Author’s other quoted research) of the determinants of poor innovativeness of SMEs from the Western Pomerania region.

In order to confirm the formulated thesis, the Author conducted empirical research the results of which have been presented in this article. The obtained results clearly confirm the poor potential of the examined companies with regard to the implementation of innovation diffusion processes.

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

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

Another suggested direction of research is the study of the dynamics of diffusion of innovation. Such studies allow inferences about changes in the competence of enterprises in the diffusion of innovation. Interesting conclusions can also provide comparative studies carried out in other Polish regions.

References


Podręcznik Oslo, (2005). *Zasady gromadzenia i interpretacji danych dotyczących innowacji*, OECD.


Abstract

The paper explores the economical approaches on convergence (divergence) in different countries. The cluster model presented in our study shows the low convergence between Ukraine’s 27 regions. The sufficient industrial and scientific endowment inheritance creates opportunities to exploit potentials and to improve position in clusters. The research strengthens the dependence of regional cluster classification on the input factors of production combination in Ukrainian regions. The specific regional policy, oriented on priority innovation development, will be directed to stimulate economic growth, and smooth the regional inequalities and disparities.

Keywords: innovations, convergence, divergence, hierarchical cluster analysis

Introduction

The emergence of a global knowledge economy requires a radical transformation of innovation strategy in East European countries. Innovation is regarded as a basic driving force in the process of narrowing gaps with developing countries in global economy. Innovation is considered as important sources precondition towards a transition into self-sustaining innovation led-growth economy. Effective innovation system includes firms, research centers, R&D institutions which provide new goods creation, new processes and new knowledge.
The concepts of technological accumulation and creative destruction are the core of J. Schumpeterian theory. The author emphasizes the distinctness of R&D from other investments in physical or human capital. Schumpeter’s approach provides a detailed account of the economic and institutional determinants of long-run growth; and to conceive of the possibility that growth be made sustainable in an economy with limited natural input resources.

This paper is devoted to the analysis of the impact of innovations on convergence (divergence) in the Ukraine. The main goal is the definition of the causes of regional disparities, and estimation of the role of innovation activity for regional inequalities. The hierarchical cluster analysis for Ukraine’s 27 regions is applied for identification of strong and weak regions, and how these are affected by innovation policy.

Foray (2004, p. 368) argues that innovative capacity is related to a great extent to the ability to both systematically combine and make new uses of existing knowledge, rather than discovering new technological principles. Thus it is not the development of new knowledge that plays a significant role in the economic processes but it includes combination and reorganization. Trippl and Maier (2011) identify a set of mechanisms by which star scientists may influence the innovation dynamics of their regions. These included connections to the regional academic world (academic collaborations and provisions of talent for the scientific labour market) and to the policy world (advice of policy makers) as well as differentiated typology of models of knowledge sharing with the industrial world.

The assessment of Ukrainian competitiveness shows the markets concentration at national level and inadequate finance and human capital distribution in regions. The competition is still weaker at regional level. Concentration has a negative and highly significant effect on labor productivity growth. The financial shortage causes the reduction of the quantity of enterprises applied the innovations. The specific weight of such enterprises decreases from 18% in 2000 to 13% in 2008. The negative trend in financing innovation activities was strengthened under the impact of world financial crisis. Bulkin (2011) points out that the state didn’t play a significant role in financing innovation activity during the last years, where its’ share exceeded 1.7% in 2009 (InnoPolicy, 2011).

The level of innovative spending shrunk from the maximum spending 48.8% in fixed prices in 2007 by 26% and 5% in current prices in 2009. The
companies’ own funds are considered to be the most important source in financing innovation activities. In the period of the crisis spending has decreased by 29.3% in 2008 and by 56.5% in 2009 in comparison with the 2007 level. The share of bank loans as important source for innovative spending has grown from 6% in 2000 to almost one third of total spending in 2008. One can mention the period of a credit boom in the Ukraine with lending increase from 8% in 2006 to 33% in 2008. But due to the impact of the world financial crisis the share of credit was shrinking in Ukraine with the outbreak of and also reforms in the banking sector. The share of foreign capital financing innovations rose sharply from 1% in 2008 to 19% in 2009. The national investors’ share dropped down to the level of 0.4% in 2009 (InnoPolicy, 2011). The study of empirical results of convergence (divergence) shows that it isn’t adequately explained by the neoclassical model due not taking into account regional specifics. The most of the literature on the convergence (divergence) is based on the analysis of cross-sectional averages or starting values for time-series data. The use of this approach does not provide the estimation of unobserved regional specific differences, and does not account the important changes during the temporary changes. Cluster analysis is applied as an economic instrument for regional tendencies estimation. The key problems of regional policy are existence of gross regional product per capita misbalances, the implemented high technology product disparities. The analysis of economic literature strengthens the variety approaches for regional inequalities elimination.

1. THE REGIONAL DISPARITIES DEVELOPMENT IN UKRAINE

The preference of regional integration concludes in the joint solution of economic and social problems at the level of regions. The asymmetry of regional development is explained via different adequate provision of material and social well-being in the Ukraine. The concernment of economic mechanism elaboration is devoted to the regional inequalities reduction.
The Designation of the Ukrainian Regions

<table>
<thead>
<tr>
<th>Number</th>
<th>Region</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Autonomous Republic Crimea</td>
<td>AK</td>
</tr>
<tr>
<td>2</td>
<td>Vinnytsya</td>
<td>AB</td>
</tr>
<tr>
<td>3</td>
<td>Volyn</td>
<td>AC</td>
</tr>
<tr>
<td>4</td>
<td>Dnipropetrovsk</td>
<td>AE</td>
</tr>
<tr>
<td>5</td>
<td>Donetsk</td>
<td>AH</td>
</tr>
<tr>
<td>6</td>
<td>Zhytomyr</td>
<td>AM</td>
</tr>
<tr>
<td>7</td>
<td>Zakarpattya</td>
<td>AO</td>
</tr>
<tr>
<td>8</td>
<td>Zaporizhya</td>
<td>AP</td>
</tr>
<tr>
<td>9</td>
<td>Ivano-Frankivsk</td>
<td>AT</td>
</tr>
<tr>
<td>10</td>
<td>Kievskay</td>
<td>AI</td>
</tr>
<tr>
<td>11</td>
<td>Kirovohrad</td>
<td>BA</td>
</tr>
<tr>
<td>12</td>
<td>Luhansk</td>
<td>BB</td>
</tr>
<tr>
<td>13</td>
<td>Lviv</td>
<td>BC</td>
</tr>
<tr>
<td>14</td>
<td>Mykolayiv</td>
<td>BE</td>
</tr>
<tr>
<td>15</td>
<td>Odessa</td>
<td>BH</td>
</tr>
<tr>
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<td>Poltava</td>
<td>BI</td>
</tr>
<tr>
<td>17</td>
<td>Rivne</td>
<td>BK</td>
</tr>
<tr>
<td>18</td>
<td>Sumy</td>
<td>BM</td>
</tr>
<tr>
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<td>Ternopil</td>
<td>BO</td>
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<td>Kherson</td>
<td>BT</td>
</tr>
<tr>
<td>22</td>
<td>Khmelnitskiy</td>
<td>BX</td>
</tr>
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<td>23</td>
<td>Cherkasy</td>
<td>CA</td>
</tr>
<tr>
<td>24</td>
<td>Chernivtsi</td>
<td>CE</td>
</tr>
<tr>
<td>25</td>
<td>Chernihiv</td>
<td>CB</td>
</tr>
<tr>
<td>26</td>
<td>The city of Kiev</td>
<td>AA</td>
</tr>
<tr>
<td>27</td>
<td>The city of Sevastopol</td>
<td>CH</td>
</tr>
</tbody>
</table>


The regional development includes the estimation of the significant factors influencing the existence of disproportions between the sectors. The basic scientific task means the determination of regional disparities’ causes, and suggestion the scenarios for smoothing regional inequalities.

The global financial crisis has negatively affected the economic performance of East European countries. The reduction of the specific volume index of gross regional product (GRP) has been estimated in all Ukrainian regions in
2008 in comparison with the previous period of time. On the background of stagnation in industry, the worsening European debt crisis, which affects the Ukrainian exports, and modest expectations regarding the crop harvest, the World Bank and the European Bank for Reconstruction and Development forecast gross domestic product (GDP) growth of 2.5% in Ukraine in 2012.

Table 2

The Specific Gravity of the Innovation Products in the Total Volume of the Sold Industrial Products (%)

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>AK</td>
<td>12.3</td>
<td>14.5</td>
<td>7.9</td>
</tr>
<tr>
<td>AB</td>
<td>1.2</td>
<td>0.9</td>
<td>1.1</td>
</tr>
<tr>
<td>AC</td>
<td>14.7</td>
<td>5.8</td>
<td>24.6</td>
</tr>
<tr>
<td>AE</td>
<td>4.4</td>
<td>4.2</td>
<td>5.7</td>
</tr>
<tr>
<td>AH</td>
<td>3.8</td>
<td>5.8</td>
<td>5.5</td>
</tr>
<tr>
<td>AM</td>
<td>3.5</td>
<td>3.3</td>
<td>4.3</td>
</tr>
<tr>
<td>AO</td>
<td>28.7</td>
<td>3.5</td>
<td>3.6</td>
</tr>
<tr>
<td>AP</td>
<td>9.9</td>
<td>9.5</td>
<td>9.2</td>
</tr>
<tr>
<td>AT</td>
<td>3.3</td>
<td>3.1</td>
<td>1.7</td>
</tr>
<tr>
<td>AI</td>
<td>3.5</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>BA</td>
<td>9.3</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>BB</td>
<td>4.8</td>
<td>4.3</td>
<td>9.6</td>
</tr>
<tr>
<td>BC</td>
<td>4.3</td>
<td>3.4</td>
<td>3.3</td>
</tr>
<tr>
<td>BE</td>
<td>5.9</td>
<td>9.2</td>
<td>4.7</td>
</tr>
<tr>
<td>BH</td>
<td>7.5</td>
<td>17</td>
<td>18.1</td>
</tr>
<tr>
<td>BI</td>
<td>1.3</td>
<td>1.6</td>
<td>1.4</td>
</tr>
<tr>
<td>BK</td>
<td>2.1</td>
<td>1.2</td>
<td>0.4</td>
</tr>
<tr>
<td>BM</td>
<td>11</td>
<td>18.9</td>
<td>10.8</td>
</tr>
<tr>
<td>BO</td>
<td>2.3</td>
<td>2.3</td>
<td>0.5</td>
</tr>
<tr>
<td>AX</td>
<td>9.7</td>
<td>9.8</td>
<td>8.3</td>
</tr>
<tr>
<td>BT</td>
<td>6.4</td>
<td>4.3</td>
<td>4.7</td>
</tr>
<tr>
<td>BX</td>
<td>3.9</td>
<td>4</td>
<td>1.9</td>
</tr>
<tr>
<td>CA</td>
<td>1.2</td>
<td>1.5</td>
<td>1.9</td>
</tr>
<tr>
<td>CE</td>
<td>26.5</td>
<td>6</td>
<td>5.5</td>
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<td>15.5</td>
</tr>
<tr>
<td>CH</td>
<td>0.4</td>
<td>1.1</td>
<td>0.8</td>
</tr>
</tbody>
</table>

Source: State Statistical Committee in the Ukraine. [online]. Available at: www.ukrstat.gov.ua.
The data for the general level of innovation is relatively low in Ukraine. This becomes clear when looking at figures of 18% for the share of innovative enterprises over all sectors. For the industrial sector there are just 12.8 of innovative firms. Large firms (employees more 1000) are the main innovative drivers. From 1999 the share of innovative expenditure and domestic R&D fell from 69.7% to 54.2%. The same is true for the volume of expenditures in the innovations, and domestic R&D, which fell from 85.2% to 78.8%. The small and medium enterprises tend to use existing technologies and do not produce innovations by themselves (Fedulova, 2011).

The Ukraine’s regional innovation performance is extremely diverse. The financial shortage causes the reduction of applied innovations. The specific gravity of the innovation products in the total volume of the sold industrial products has been decreased since 2006. The insufficient level of innovations in regions requires the sufficient policy measures for setting new business links between and financing innovations (Fig. 1). The world financial markets fluctuations bring out regional disparities increase. The basic aim of the regional policy is devoted to adequate conditions creation for backward regions development. The regional imbalances cause the need for redistribution mechanism foundation into financing the development of depressed regions with low income per capita. The fiscal equalization could be provided until these regions could reach the level of fixed minimum income per capita. The determination of the regions, which are oriented on priority innovation development, will stimulate economic growth and smooth the regional inequalities and disparities.

2. **THE EFFECTS OF INNOVATIONS ON CONVERGENCE (DIVERGENCE) IN UKRAINE**

To investigate economic perspectives of convergence (divergence) of regional development, we apply hierarchical cluster analysis and estimate the basic parameters in Ukrainian regions. The choice of selected model variables is based on the standard Cobb-Douglas production function use, where:

\[
Y = A \cdot K^\alpha \cdot L^\beta
\]  
(1)

where

- \( Y \) – total production;
- \( L \) – labor unit;
- \( K \) – capital unit;
- \( A \) – total factor productivity;
£, β – the constant elasticities of labor and capital.

The production function specification is used for explanation of the minimum input requirements for production designated quantities of output on the basis of available technology. The parameters selection for cluster analysis is based on the application of Cobb-Douglas production function.

We assume that GRP is associated with total production in the region. The employment defines labor in the region. Industrial production index and fixed capital investment index determine regional capital. The number of organizations, conducting scientific research, total value of innovation costs per one thousand employed workers and foreign direct investment in region denote total factor productivity. We use annual data of economic performance from 2001 to 2005 for 27 Ukrainian regions. In detail the following variables are available and are considered where index i runs over all 27 regions, and index t over all time periods considered (years).

\[
\text{GRP}_{it} = F(\text{IPI}_{it}, \text{FCII}_{it}, \text{EMP}_{it}, \text{FDI}_{it}, \text{NIO}_{it}, \text{TVCI}_{it}),
\]

where \(\text{GRP}_{it}\) = Real Gross Regional Product per Capita (UAH);
\(\text{IPI}_{it}\) = Industrial Production Index, where 2000 = 100% (%);
\(\text{FCII}_{it}\) = Fixed Capital Investment Index (percentage from the previous year);
\(\text{FDI}_{it}\) = Foreign Direct Investment per Capita in Real Prices (UAH);
\(\text{EMP}_{it}\) = Employment of Working People from 17 to 70 Years (thousand people);
\(\text{NIO}_{it}\) = Number of Organizations, Conducting Scientific Research;
\(\text{TVCI}_{it}\) = Total Value of Innovation Costs per one Thousand Employees (%).

We apply industrial production index, fixed capital investment index, foreign direct investment per capita, employment, number of organizations, conducting scientific research, total value of innovation costs in the hierarchical cluster analysis for 27 Ukrainian regions in 2001 to 2005. The indicated period of time has been chosen due to the full set of data. We test the following hypothesis: the dependence of regional cluster classification on the input factors of production combination in regions.
We assess calculating distances between the most developed regions and the undeveloped regions in hierarchical clustering. We estimate the single linkage criteria, showing the distance between the closest neighboring points. The estimation results outline that the Kyiv region is distinguished from other regions. Capital Kyiv is considered to be outlier from other Ukrainian regions for all estimated periods of time.

The strong specialization by regions producing specific kinds of heavy industry products caused to the division between highly industrialized developed regions with high urbanization and backward rural regions with agrarian orientation in the Ukraine.

The centralized industrial organization and the inefficient regional structure formation resulted in the disproportionate regional division in the former Soviet Union. The present structure does not take into account the geographical location, the economic endowment, and regional specificity.

The application Ward’s method calculates the simple Euclidean distances from each case in a cluster to the mean of all variables. The graphical analysis of the line of the significant coefficients Ward’s method proves the basic three clusters determination. The three clusters differ in particular in regard to the levels of industrial development and scientific potential. One could mention the increase of heterogeneity with every step of econometric analysis. A hierarchical clustering model of 27 regions is graphically represented at the dendogram. Each region has various distributions. It is evident that the first cluster includes the cities of Kyiv, Kharkiv, Dnipropetrovsk and Donetsk.

The first cluster shows relatively higher than average level of economic estimation in comparison with two others. It distinguishes via the biggest industrial production concentration, the attraction of the significant financial flows of capital, the highest innovation capacity within regions, and more than average per capita income in comparison to Ukraine. The capital Kyiv inclusion from the cluster 1 demonstrates the estimation results for 2004. Within this period there was the structural break, which could be seen in the given assessment. The business activity decrease, macroeconomic instability and insufficient quality of institutions constitute a major impediment to Ukraine’s regional economic performance as reflected in the regional indicators for 2004. The regional content of the cluster 2 and the cluster 3 are shown as unstable and changeable for all estimation periods.
The industrial, scientific potential of these regions are significantly low in comparison to the cluster 1. The cluster 2 and cluster 3 include some regions, which are specialized in agrarian production. The cluster mobility shows the low spread in economic development between regions. The typical features for all clusters combine insufficient tax regulation (the highest tax rate of 60.3% in the world), and inadequate investment due to saving rate decline. The region transference between clusters could be explained by regional policy inconsistency. Some regions with average industrial potential move to the cluster 3. The industrial production reduction and low labor productivity in basic sectors of economy make worse the regional differences. In sum results suggest that there could be seen the dependence between all three regional clusters classification on the input factors of production combination in regions. It is important to mention that there are substantial differences between the cluster 1 and the clusters 2, 3, which strengthens the significant difference between the industrially developed regions and average developed regions, backward regions. The estimation confirms the low convergence between the first and the second, the third clusters. The relationship between main economic indicators of economic development of average developed and backward regions demonstrates less heterogeneity and more homogeneity.

In order to receive the consistent results on the regions list of average developed and backward regions we exclude the first cluster from hierarchical cluster analysis. The Ward’s method estimation proves the division between cluster 2 and cluster 3. The assessment results shows less heterogeneity between regions with every step of the hierarchical cluster analysis. The main regions Autonomous Republic Crimea, Zaporizhya, Kyivskay, Lviv, Odessa, Luhansk, Mykolayiv appear in all tests and form the cluster 2. This cluster includes regions with average industrial and scientific potential. The rest regions form the cluster 3 with lower than average development capacities. Some agrarian regions perform below the country’s average cluster 3. The cultural and geographical differences, insufficient endowments of crucial productive factors reflect the peculiarities of weak structural development. The table 1 presents the cluster classification of Ukrainian regions based on the main economic indicators in 2001–2005. The cluster 1 includes four regions with high industrial and scientific potential. Kyiv, Kharkiv, Dnipropetrovsk and Donetsk regions show the best performing capital, labor, R&D capacities in the country. The fixed capital investment per capita in Kyiv region is equaled to 1585 UAH in the first
quarter of 2009. Its value is the biggest in comparison with other regions. The bulk of all foreign capital is concentrated in the capital. FDI per capita makes up $ US 5176 at the same period. The Kyiv region has the highest capital accumulation and per capita income distribution in comparison to other regions.

The regions with the highest production and scientific potential attracted the bulk of all FDI into the country. The total amount of FDI inflows makes up $ US 49.4 billion in the Ukraine in 2012. The total amount of FDI inflows in Kyiv region reaches US $ 24.5 billion, the amount of foreign capital inflows in Dnipropetrovsk – $ US 8 billion, and foreign investment inflows in Kharkiv makes up $ US 2.7 billion.

Regions with lower industrial production index, fixed capital investment index, FDI inflow per capita, and small investment in R&D form cluster 2. The regions with low industrial potential make up cluster 3. These regions are traditionally specialized in agrarian production. The allocation of resources and structure of production anticipate the backwardness of these regions. Agricultural subsidies amount to US $ 1.1 billion in direct support and US $ 0.65 billion in tax exemptions (World Population Prospects, 2006). The absence of significant structural changes reflects serious problems existence in agricultural sector. The moratorium on the selling of agricultural land constitutes the impediment for market relations development. Labor market imperfection work evokes low labor productivity in the agrarian sector. The labor relationship between employer and employee does not create incentives for the best use of available talent in agricultural production and limits production modernization.

The hierarchal cluster analysis reflects the spread in the performance between regions and the need of the specific factors impacts assessment. The longer estimation period of research should be taken in consideration for ongoing statistical analysis. The comparison of gross value added per capita marks the significant difference between the industrialized region in the cluster 1 and the others clusters. The disparity of gross value added per capita of the city of Kyiv is more than six times the lowest Chernivtsi region.

The assessment of GRP per capita in Kyiv exceeds three times Ukraine’s average in 2005. The lowest gross regional product per capita is estimated in cluster 3, including Chernivtsi, Ternopil, Zakarpattay, Zhytomyr, Vinnytsya, Khmelnytsky, Kherson regions (Table 1). The State Statistics Committee of Ukraine assesses the negative real growth rate in Donetsk, Zakarpattay, Lviv, Odessa, Poltava, Kherson regions in 2005. The fixed capital investment distri-
The impact of innovations on convergence (divergence) in Ukraine

bution reflects the tendency of capital concentration in the regions belonging to cluster 1. The difference of the share of enterprises conducting innovations in the total volume of industrial enterprises of the city Kyiv is ten times more than in the lowest indicator in Rivne in 2005 (Table 2). The estimation data of gross regional product per capita, fixed capital investment, FDI, the share of enterprises conducting innovations proves that Kyivskay, Odessa, Mykolaiv, Poltava regions have sufficient industrial and innovation potential to improve their position and to move to cluster 1.

Table 3

The cluster classification of Ukrainian Regions in 2001–2005

<table>
<thead>
<tr>
<th>№ Cluster</th>
<th>Regions of the Cluster</th>
<th>The Title of the Cluster</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Kyiv (26)</td>
<td>High industrial and scientific potential</td>
</tr>
<tr>
<td></td>
<td>Kharkiv (20)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dnipropetrovsk (4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Donetsk (5)</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>Autonomous Republic Crimea (1)</td>
<td>Average scientific and industrial potential</td>
</tr>
<tr>
<td></td>
<td>Zaporizhya (8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kyivskay (10)</td>
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</tr>
<tr>
<td></td>
<td>Lviv (13)</td>
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<tr>
<td></td>
<td>Mykolayiv (14)</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>Vinnytsya (2)</td>
<td>Low scientific and industrial potential</td>
</tr>
<tr>
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<td></td>
</tr>
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<td>Zhytomyr (6)</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>The city of Sevastopol (27)</td>
<td></td>
</tr>
</tbody>
</table>

Source: author’s estimation.
The ascription of all regions to the particular cluster depends on the overall estimation of all parameters in the period from 2001–2005. The division into three clusters highlights the significant factors estimation influencing the existence of disproportions between the regions. The regional policy for regions in cluster 3 have to be concentrated on promotion the growth of backward regions through subsidies, tax allowances, and foreign capital attraction.

The research results emphasize the existence of the dependence of regional cluster classification on the combination of industrial production index, fixed capital investment index, foreign direct investment per capita, and employment of working people in regions.

The continuation of the cluster analysis for 2003 and 2004 demonstrates the tendency of the basic two clusters to converge. Our analysis accounts for the effects of the several economic factors influencing regional economic development. The convergence is caused by indicators of innovations created by enterprises, expenditures on technological innovations, new products created by enterprises, resource saving technologies created by enterprises. As the result of the cluster estimation the first cluster includes Donetsk region. The second cluster combines Kharkiv, Kyivskay, Dnipropetrovsk, and Mykolayiv. The results demonstrate the insignificance of the other regions at the assessment. Generalization of the presented model, including additional indicators defining R&D, including R&D spending as additional factor, and extension of the assessment period can confirm the necessity to analyze other related questions concerning regional convergence (divergence).

3. **THE ECONOMIC CONSEQUENCES OF CONVERGENCE (DIVERGENCE) FOR UKRAINE’S 27 REGIONS**

The upswing of global industrialization, international division of labor, capital expansion, and foreign trade stimulate the Eastern European countries to integrate into the global economy. Coordination, cooperation, and networking problems are considered to be the essential questions for regional development. The development of R&D ensures the productivity improvement, and creation of the new technologies. The innovations application affects the speed of regional convergence (divergence). The different convergence (divergence) concepts examine different regions, and emphasize different criteria, including technology adoption potential, and innovation potential.
Firstly, regional convergence provides increasing return effects, and positive externalities. The standard neoclassical model approach demonstrates regional capital and labor ratios diminishing over time. Secondly, proponents of the opposite opinion give arguments of the existence of regional productivity differentials, and labor market imperfections. As a rule, output and income grow at the same rate in all regions, although the regions differ in technology, propensity to save, and natural growth of labor; these factors also determine the speed of convergence. At the same time, if the natural growth of labor is too fast (or too slow), then capital and labor tend to concentrate in a single region.

The ratings of investment attractiveness provided by Kyiv international institute of sociology shows those two regions, Kyiv and Kharkiv, have the most attractive innovation potential in 2013. Kyiv is considered to be a leader in the total amount of R&D organizations which makes up 26.1% of all forms. Kharkiv region takes the second place in the ratings, where it’s share reaches 15.1%. The number of technoparks is considered the biggest in Kyiv and Kharkiv.

There appears to be a lack of research works concerning ways of dealing with the estimation the role of innovations in diminishing interregional inequalities in the Ukraine. Some industrial regions with high urbanization regions succeed in establishing high-performing systems, where backward agrarian regions may stagnate.

From the scientific point of view this phenomenon for the role of innovations in stimulating convergence has not yet received a satisfactory explanation. From the practical point of view the solution of this problem can be considered as one of the major factors hindering the ability of long-term regional policy to eliminate interregional differences of per capita income. The pace of Ukrainian integration into the global economy is affected by the regional convergence (divergence).

**Conclusions**

The research strengthens the dependence of regional cluster classification on the combination of industrial production index, fixed capital investment index, foreign direct investment per capita, and employment of working people in Ukraine’s regions.
The application of hierarchical cluster analysis for Ukraine’s 27 regions for 2001 to 2005 confirms the low convergence between regions. The existing economic differences demonstrate less heterogeneity and more homogeneity between average developed, and backward regions. The sufficient industrial and scientific endowment inheritance creates opportunities to exploit potentials, and to improve position for regions in cluster 2.

The estimation of weak and strong regions explains the tendency for convergence (divergence). The regional policy identification is proposed to discover the measures for inequality reduction, regional attractiveness increase, and economic growth stimulation. Our results anticipate that the special regional policy may be the effective for regional inequalities smoothing, stimulating innovation development, and the economic growth.

The regional imbalances cause the need for redistribution mechanism foundation into financing the development of depressed regions with low income per capita. The policy of fiscal equalization could be provided until these regions could reach the level of fixed minimum income per capita.

References


The impact of innovations on convergence (divergence) in Ukraine

THE ROLE OF FINANCIAL INTERMEDIARIES FOR THE DEVELOPMENT OF THE JEREMIE INITIATIVE IN POLAND

Abstract

The financial intermediaries examined in this study play a significant role in the Jeremie Initiative which is being developed in our country – including the province of West Pomerania where it is being performed in a very intense way. JEREMIE (Joint European Resources for Micro-to-Medium Enterprises) is a support mechanism for micro, small and medium enterprises realized outside the EU grant scheme as an initiative of the European Commission, European Investment Bank (EIB) and European Investment Fund (EIF), based on revolving instruments. The Initiative was established in order to fill the financial gap relating to financial assistance instruments for small and medium enterprises as well as increase demand for capital including risk capital for enterprises, especially the smallest ones which perform their activity regionally.

One of the most important institutions of the Initiative is the Holding Fund which plays a key role since it manages the funds provided by the Managing Institutions (MIs). Additionally, it determines conditions on which the Financial Intermediaries are selected, monitors their results, makes reports on the development of operations for the MIs and performs informational and promotional activities. The financial intermediaries play a significant role. The primary group within them are loan funds, credit guarantee funds, cooperative and commercial (network) banks. There is also a possibility of participation for technology transfer funds, technology parks or mezzanine funds as well as other financial institutions which actively support development of micro, small and medium enterprises. The intermediaries’ task is active support for enterprises in the form of credits, loans and guarantees.

Keywords: financial market, financial intermediaries, financing, revolving instruments
Introduction

Business entities have either a deficit or surplus of financial resources. They can encounter a lot of trouble if they want to enter into direct transactions. One of the reasons for this is the shortcomings of the financial market. These shortcomings can be successfully reduced by financial intermediaries. It is because of them that capital can flow from surplus entities to deficit entities. The tasks of intermediaries also include balancing demand for capital with its supply in order to perform its effective allocation.

They also play a key role for the development of the Jeremie Initiative. Since they are one of the main participants of the Initiative they are responsible for effective and efficient capital allocation to micro, small and medium enterprises. The success of Jeremie Initiative is related to their activity in distribution of the revolving resources.

1. **FINANCIAL INTERMEDIARIES – WHO THEY ARE AND WHAT QUALITIES THEY SHARE**

Economy is built with business entities who make a lot of financial decisions. It is possible because of the presence of the financial market which acts as a bond between surplus and deficit entities. The first group includes entities who have a temporary surplus of financial resources and are able to postpone their current consumption in exchange for a certain remuneration (interest). The second group, however, includes entities who are forced to acquire their financial resources in order to fund their expenses. The flow of resources between the groups can be conducted either directly or indirectly (see Figure 1). In the event of direct funding the borrower borrows their financial resources on the financial market directly from the lender without third parties’ participation. Whereas in the event of indirect funding other entities, who provide support for the two groups at the time of transferring financial resources, “link” the borrower with the lender. These entities are referred to as financial intermediaries whose role is to borrow resources from the savers who represent supply and submit them to the spenders who make demand for them. Literature provides numerous definitions of financial intermediaries.

F.S. Mishkin (2004, p. 34) provides his definition of financial intermediaries as entities borrowing resources from lenders and at the same time giving
loans to borrowers. In his definition he also includes banks, insurance companies, investment funds and pension plans as financial intermediaries. In Mishkin’s opinion the intermediaries play a very important role on the financial market as they are able to level the shortcomings of the market represented by adverse selection and moral hazard and thus enable more or less correct functioning of the financial market. He is of the opinion that it is very difficult to reach the maximum level of economic potential without a team of efficient intermediaries.


But X. Freixas and J-Ch. Rochet (2008, p. 15) view a financial intermediary similarly to a middleman, who purchases and sells commodities and services, with the stipulation that banking operations are much more complex. They think that a financial intermediary is a business entity who specializes in simultaneous purchasing and selling of financial products and securities. They also think that the shortcomings of the markets make a requirement for financial
intermediaries whose key activity is transformation of the financial instruments. They convert deposits with a convenient maturity date for customers into non-market loans of a longer maturity period, totalling greater amounts and carrying a bigger risk. That is why they can be referred to as tools for diversification, structural changes and risk conversion.

In E. Bogacka-Kisiel’s (2000, p. 11) opinion financial intermediaries are institutions whose main objective is balancing demand for deposits (financial investments) of some entities with the requirements of some other entities for using resources. Their task is to balance supply and demand for financial resources if the circumstances are favourable for providing deposit services and financing services on condition that repayment requirements are met. In her opinion the group of intermediaries should include banks operating as loan institutions, but also factoring and leasing companies, trust and investment funds, building societies, institutions providing capital life policy and other insurance companies.

Most of the definitions state that financial intermediaries are both a link and a guarantor between surplus and deficit entities on the financial market who balance demand with supply. They also point out an important role of the financial intermediaries as entities who reduce the shortcomings of the market.

2. **REASON WHY FINANCIAL INTERMEDIARIES OPERATE**

The operations performed by financial intermediaries bring benefits not only to customers but also to financial institutions. The increasing role and importance of intermediaries in economy can be examined from several vantage points. One of them is why financial intermediaries operate in economy (Waliszewski, 2010). One of the reasons include the shortcomings of the financial market relating to the necessity of reducing transaction costs or information asymmetry which can be manifested in the form of adverse selection, moral hazard or auditing costs (Freixas and Rochet, 2008).

Transaction costs relating to transaction operations are one of the most serious problems that the lenders face, which results in their limited activity in this respect. These shortcomings have brought about specialization and a phenomenon of economies of scale through which it is possible to reduce unit costs of such a transaction by producing and selling a greater number of financial products. Following Benston and Smith, who stated that banking sector opera-
tions result from transaction costs, one can state that other forms of intermediary activity result from significant operational costs – numerous transactions of little value (Freixas and Rochet, 2008). One of the means by which it is possible to reduce their transaction costs is specialization in their activity in which it is assumed that deposit and loan operations are separated. However, this process does not apply to the universal banks. If there is a problem with providing more premises, the process of specialization is also difficult to complete, especially if the intermediaries are geographically widespread and when, for instance, transportation costs arise. If this is the case, it is more effective for an intermediary to provide both deposit and loan services in one place. The second means by which it is possible to reduce transaction costs is to reach economies of scale which is accomplished by way of reducing the costs of one single transaction as there is a growing number of such transactions. As a result the overhead costs can cover the increasing number of transactions and thus change the unit cost of each operation and at the same time reduce the running costs and have a direct impact on the profit.

Transaction costs are not the only reason for the existence of financial intermediaries. It is very often when a transaction is performed that either party has no sufficient information about each other in order to make an optimum decision. The reason for this is a phenomenon of information asymmetry represented by adverse selection or moral hazard. The reason for information asymmetry is the fact that one of the parties has insufficient information and knowledge about the other party performing a transaction, for example in a lender-borrower relation. The resulting disproportions cause problems with conducting a transaction as the product price increases because of a higher risk or a transaction is literally doomed to failure.

Disproportionate access to all the information on the financial market or its lack results in perturbations before a transaction is concluded and after it is concluded. The problems resulting from information asymmetry before a transaction is concluded is adverse selection and moral hazard after a transaction is concluded. Adverse selection occurs when the adverse borrowers search for financial resources with a redoubled effort. The lenders or these whose activity brings about undesired results have little information about them. A very active search for a loan results in their selection. After they are given funds the lender carries a higher risk of loss. This will most likely lead to a situation in which the
lender stops providing loans as they do not want to run the risk of making a loss.

B. Armendariz de Aghion and J. Morduch (2005, pp. 35–36) view adverse selection a bit differently. As they examine this problem against the background of microfinance they associate it with information disruption and rate it as a problem encountered by agencies which are so common in economic life. In their opinion the problem results from the fact that the lender is unable to know the borrower, does not see their involvement in work and knows nothing about their profits, which leads to inefficiency.

Adverse selection which is also called information asymmetry *ex ante* increases the risk of giving bad loans, which limits loan activity, although the capital providers could give good, profitable loans. In literature the problem of adverse selection and ways of its reduction is examined in detail. The strategies devised by Stiglitz and Weiss (1980) are good examples. They pointed out that if there is some missing information about the borrowers it is difficult to tell the risky ones from the ones we know more about, which results in a higher cost of providing support as the interest rate increases. The higher cost of obtaining capital discourages quality customers who are then eliminated from the market.

Imperfect access to information is also present after a credit agreement has been concluded. The reason for this is information asymmetry *ex post* referred to as *moral hazard*. B. Armendariz de Aghion. J. Morduch (2009, pp. 45–46) named this problem as moral hazard *ex post* or exercise problem. In this case the term *ex post* relates to the resulting complications after the agreement has been concluded, the credit given and invested by the borrower even though all the stages were reached in an appropriate way. The essence of this term is involvement of the borrower in an activity which is undesired from the lender’s point of view, which at the same time makes it unlikely for the loan to be repaid. This results in the lenders’ ability to reduce loans significantly or totally if it is impossible to exercise the loan repayment from the borrower. In this case the lender takes a risk that the borrower will spend the funds on undesired (from the lender’s point of view) activity which reduces the likelihood of loan repayment in a considerable way. Bearing in mind the fact that the borrower has the funds which belong to someone else, he or she is able to take a greater risk related to yielding bigger profits, but also to higher likelihood of inability to repay the loan. Moral hazard which reduces loan repayment ability is the reason why a great deal of lenders decide not to provide loans at all (Mishkin, 2004). The
problem of moral hazard is presented by G. Akerlof (1970, pp. 488–500) in his article entitled *The Market for Lemons* in which he describes this phenomenon by giving an example of totally used up cars, which he calls “the problem of wrecks”. A potential buyer who is interested in purchasing a used car is very often unable to estimate its condition and quality. Therefore the price he or she will pay is an average price which is dependent on the prices of “good” and “bad” cars. The owner of a car which is in worse condition will gladly sell it at an average price, but these owners who have cars in better condition will be unwilling to do so. This will very likely result in disappearance of used cars which are in good condition and then there will be only wrecks on the market. Therefore as a result of adverse selection the market of used cars will be unable to function properly any longer.

In F.S. Mishkin’s (2004, p. 176) opinion if everyone had access to the same information at the same time, i.e. if there were no information asymmetry, the “problem of wrecks” would vanish. This problem is resolved through its elimination by way of providing the surplus entities with all the information about these entities who announce their demand for capital (households, enterprises). It is possible because there are companies (intermediaries) which specialize in collecting and processing all data which is used for successful separation of good entities from bad ones. However, it does not resolve the problem of adverse selection fully since there is the so called gatecrasher problem, i.e. the interested party uses information without paying for it (someone else has paid for it).

Similarly to car sellers who have to deal with the problem of adversary selection financial intermediaries on the financial market become experts in obtaining information about potential borrowers. It allows them to reduce the risk of conducting loan activity since they are able to tell the borrowers carrying a greater risk from these borrowers who carry a smaller risk.

The problem of the existence of financial intermediaries with their work is also taken up by Ashta (2007). In his view, the market existence of the intermediaries between supply and demand for funds can reduce the problem of information asymmetry that results from lack of adequate human capital and transaction costs of loans. He believes that this problem can be successfully resolved by financial intermediaries.
3. DESCRIPTION AND ORIGIN OF THE JEREMIE INITIATIVE

The financial intermediaries examined in this study play a significant role in the Jeremie Initiative which is being developed in our country – including the province of West Pomerania where it is being performed in a very intense way. JEREMIE (Joint European Resources for Micro-to-Medium Enterprises) is a support mechanism for micro, small and medium enterprises realized outside the EU grant scheme as an initiative of the European Commission, European Investment Bank (EIB) and European Investment Fund (EIF) (Council Regulation (EC), 2006, Brussels, (c. 36)), based on revolving instruments. The Initiative was established in order to fill the financial gap relating to financial assistance instruments for small and medium enterprises as well as increase demand for capital including risk capital for enterprises, especially the smallest ones which perform their activity regionally (Hübner, 2005).

The concept behind the Jeremie Initiative was presented for the first time in October 2005 in the context of the EU funds for 2007 to 2013. The originators had an idea of establishing a tool for developing enterprises by means of expanding their access to the outside sources of finance. In May 2006 the memorandum on cooperation relating to the development of the Initiative between the European Commission and the European Investment Fund was signed. The first financial contract with the governing institution, however, was initialled in 2007. The next stage of implementation (from 2007 onwards) was a competition arranged by all the regions (countries) for appointing Holding Fund Manager who was to be responsible for the initiation, functioning and squaring accounts of the project as well as signing agreements with the financial intermediaries. The third stage (from 2008 onwards) was the actual implementation stage of the project which included initiation of the financial engineering instruments and a cooperation platform for exchanging information, experience and opinions on the implementation and operation of the Initiative which, by the way, can be implemented in two possible ways. The first way is on the national level, the second is regional. Before the Jeremie Initiative was implemented in the countries (regions) evaluation studies were made. They identified and quantified the gap between supply and demand for the financial products (venture capital, including seed capital, credits, loans, guarantees). The evaluation included suggestions for operational plans in order to reduce the estimated gap and contained proposed solutions as well as instruments which should have
been used in the Initiative while performing transactions with the financial intermediaries. Both in the province of Western Pomerania and other provinces which decided to implement the Jeremie Initiative the negotiations ended in failure, which forced the regions to launch competitions for appointing Holding Fund Manager within the national financial institutions. At the moment the two strategies are being implemented in Poland.

One of the most important institutions of the Initiative is the Holding Fund which plays a key role since it manages the funds provided by the Managing Institutions (MIs). Additionally, it determines conditions on which the Financial Intermediaries are selected, monitors their results, makes reports on the development of operations for the MIs and performs informational and promotional activities. The financial intermediaries play a significant role. The primary group within them are loan funds, credit guarantee funds, cooperative and commercial (network) banks. There is also a possibility of participation for technology transfer funds, technology parks or mezzanine funds as well as other financial institutions which actively support development of micro, small and medium enterprises. The intermediaries’ task is active support for enterprises in the form of credits, loans and guarantees.

4. IMPLEMENTATION OF THE JEREMIE INITIATIVE IN WESTERN POMERANIA

In the province of Western Pomerania 280 million zlotys were provided for the implementation of the Jeremie Initiative. By the end of May 2012 five competitions were launched for such financial products as global loans, counter-guarantees and portfolio guarantees\(^1\) in which credit guarantee funds, loan funds as well as commercial and cooperative banks took part.

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\(^1\) As of 31 May 2012 there were two competitions held for global loans, one for a counter-guarantee. On 8 May 2012 the call for proposal was finished. As for the portfolio guarantee one competition was finished. By 31 August 2012 the call for proposals will have been finished for the second competition.
Table 1
Jeremie Initiative – results in Western Pomerania at the end of May 2012

<table>
<thead>
<tr>
<th>COUNTER-GUARANTEE</th>
<th>Number of supported enterprises</th>
<th>Share of HFM funds in the guarantee (in zlotys)</th>
<th>Value of granted credits/loans (in zlotys)</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Pomeranian Regional Fund of Credit Guarantee</td>
<td>489</td>
<td>32,437,249.52</td>
<td>80,145,652.80</td>
</tr>
<tr>
<td>Fundusz Wspierania Rozwoju Gospodarczego Miasta Szczecina</td>
<td>38</td>
<td>2,068,052.45</td>
<td>10,638,887.00</td>
</tr>
<tr>
<td>Fund of Credit Guarantee in Stargard Szczeciński</td>
<td>42</td>
<td>3,205,818.40</td>
<td>6,023,950.80</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>569</strong></td>
<td><strong>37,711,120.37</strong></td>
<td><strong>96,808,490.60</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GLOBAL LOAN</th>
<th>Number of supported enterprises</th>
<th>Share of HFM funds in the loan value (in zlotys)</th>
<th>Value of granted credits/loans (in zlotys)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Szczeciński Fundusz Pożyczkowy</td>
<td>54</td>
<td>7,183,675.00</td>
<td>9,676,500.00</td>
</tr>
<tr>
<td>Foundation for the Development of Polish Agriculture</td>
<td>102</td>
<td>9,969,500.00</td>
<td>12,802,000.00</td>
</tr>
<tr>
<td>Polish Entrepreneurs Foundation</td>
<td>199</td>
<td>23,701,992.00</td>
<td>30,823,060.00</td>
</tr>
<tr>
<td>Fundacja Centrum Innowacji i Przedsiębiorczości</td>
<td>25</td>
<td>3,027,800.00</td>
<td>3,945,000.00</td>
</tr>
<tr>
<td>Regional Development Agency of Koszalin</td>
<td>9</td>
<td>606,277.65</td>
<td>670,627.00</td>
</tr>
<tr>
<td>Stowarzyszenie Inicjatyw Społeczno-Gospodarczych</td>
<td>19</td>
<td>2,367,200.00</td>
<td>3,151,000.00</td>
</tr>
<tr>
<td>Gospodarczy Bank Spółdzielczy in Choszczno</td>
<td>2</td>
<td>256,170.00</td>
<td>348,600.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>410</strong></td>
<td><strong>47,112,614.65</strong></td>
<td><strong>61,416,787.00</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PORTFOLIO GUARANTEE</th>
<th>Number of supported enterprises</th>
<th>Share of HFM funds in the loan value (in zlotys)</th>
<th>Value of granted loans (in zlotys)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FM Bank</td>
<td>2</td>
<td>39,680.00</td>
<td>62,000.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2</strong></td>
<td><strong>39,680.00</strong></td>
<td><strong>62,000.00</strong></td>
</tr>
<tr>
<td><strong>Sum total of all products</strong></td>
<td><strong>981</strong></td>
<td><strong>84,863,415.02</strong></td>
<td><strong>158,287,277.60</strong></td>
</tr>
</tbody>
</table>

Source: Bank Gospodarstwa Krajowego.
There have been already 70 agreements signed with the financial intermediaries nationwide, including 14 agreements signed in the province of Western Pomerania. Their value in the region exceeded 170 million zlotys which compared with the total amount of 280 million zlotys allotted for the Jeremie Initiative amounts to 62.5%. Hopefully, the intermediaries will be provided with the next part of financial resources which will work out and then it will be given to the enterprises as soon as possible. The first results of the Jeremie Initiative are already tangible (see Table 1). The three financial products gave support in the form of credit or loan to over 980 enterprises from the province of Western Pomerania totalling over 150 million zlotys.

By performing analysis of the beneficiaries of the Initiative one can arrive at very interesting conclusions (Table 2). The micro enterprises (Figure 2) received the most support from counter-guarantees, global loans and portfolio guarantees.

Table 2

<table>
<thead>
<tr>
<th>Kind of enterprise</th>
<th>COUNTER-GUARANTEE</th>
<th>GLOBAL LOAN</th>
<th>PORTFOLIO GUARANTEE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value of granted</td>
<td>Value of</td>
<td>Value of granted</td>
</tr>
<tr>
<td></td>
<td>and guaranteed</td>
<td>granted</td>
<td>and guaranteed</td>
</tr>
<tr>
<td></td>
<td>loans (in zlotys)</td>
<td>loans (in</td>
<td>loans (in zlotys)</td>
</tr>
<tr>
<td>Micro enterprise</td>
<td>61,501,24</td>
<td>457</td>
<td>342</td>
</tr>
<tr>
<td>Small enterprise</td>
<td>32,439,25</td>
<td>106</td>
<td>65</td>
</tr>
<tr>
<td>Medium enterprise</td>
<td>2,868,000</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>96,808,49</td>
<td>569</td>
<td>410</td>
</tr>
</tbody>
</table>

Source: own work based on data provided by Bank Gospodarstwa Krajowego.
By performing analysis of the beneficiaries based on the kind of enterprise one can see that majority of them are micro enterprises which go through the most of difficulties in the process of obtaining external finance. Both in terms of quantity and value most of the credits or loans granted through guarantee were given to the smallest enterprises. From all the beneficiaries nearly every one in five was a start-up, i.e. a company whose activity period is shorter than 24 months.

**Conclusions**

By examining the functioning of the Jeremie Initiative from the financial intermediaries’ point of view and on the basis of what role they play on the financial market one might venture an opinion that by levelling disproportions of the market they are able to distribute financial resources efficiently.

Currently, the Jeremie Initiative is at its initial stage of implementation. There are first tangible results of the competitions. The Holding Fund Manager
will soon reach a one-time turnover which means that revolving will be fulfilled. But it is definitely too early to evaluate the performance of the Manager, financial intermediaries and the whole idea of finance engineering instruments. It will be possible to achieve it after 2015 when the HFM will square accounts of the operation with the Managing Institution.

To date the interest of financial intermediaries in the competitions has shown that it should be in the domain of cooperative banks which operate on the regional scale and know the specifics of that market as well as of the branch banks which are interested in supporting the SMEs sector only. As the settled competition show the network commercial banks are not interested in it, since they operate globally and do not tend to carry a risk and finance young, innovative and regional enterprises. The Jeremie Initiative in our country is being implemented in five provinces on the regional level, which of course applies to their products and their regional character – something the network banks are currently not interested in. Not all the commercial network banks have resigned from taking part in the Initiative. The biggest commercial banks are not taking direct part in it, since they are in close cooperation with the credit guarantee funds. This kind of approach seems to be understandable because in order not to compete with the funds for guarantees the banks prefer to cooperate with them and use their guarantees in the process of issuing credit.

Not only will the implementation of the Initiative in the province of Western Pomerania bring real benefits for the enterprises, but it will also have a positive impact on the shape and structure of the financial support system for the enterprises. The Jeremie Initiative will enhance the capital position of the local financial intermediaries which will result in reactivation of these institutions which have temporarily suspended financial support for enterprises. Although the shape and size of the local and regional banking and para-banking institutions are being crystallized some of them will soon need new and fixed capital funding in order to develop the Initiative efficiently. Although some challenges might crop up on the way, one can state that financial intermediaries play a significant role in the development of the Jeremie Initiative. It is mainly them who will decide whether or not it succeeds and to what extent the enterprise sector is supported.
References


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SELECTED DETERMINANTS AND THEIR INFLUENCE OVER BUSINESS INNOVATIVENESS

Abstract

This paper looks at the relation between business innovation activities and the location of particular enterprises (at voivodship level). In the first part, general assumptions on innovation activities of Polish businesses have been made. Following this, a question has been asked whether a relationship can be found between the number of innovative companies in particular voivodships and the investment attractiveness of these voivodships. The analysis has been based on the ranking of most innovative Polish companies prepared by Institute of Economics – Polish Academy of Sciences (INEPAN) and the report on investment attractiveness of Polish voivodships by the Gdansk Institute for Market Economics (IBNGR). The results of the first step of the research indicate that the voivodships which were evaluated (Nowicki, 2010) as most attractive to investors, were also those where the most innovative companies were located. The aforementioned can lead to a conclusion that increasing the investment attractiveness of voivodships and regions can be a win–win strategy followed by an increase in the number of innovative businesses as well as stimulating their growth by innovation.

Keywords: business innovativeness, investment attractiveness of voivodships, R&D intensity

Introduction

Nowadays innovation activity of companies is regarded as one of the key factors influencing its stable, long-term growth. At the same time, the type and
number of innovations implemented, as well and their implementation frequency determine innovativeness level of businesses.

The aforementioned factors cause that top management have to look for the management tools that enable successful increase within innovativeness. On the other hand, what has to be emphasized is the fact the business innovativeness may also be influenced by other elements, which may be, to some extent, independent of managerial decisions. One of these can be for example the location of an enterprise – at the level of particular cities and voivodships.

This paper looks at the relation between business innovation activities and the location of companies (at voivodship level). In the first part general assumptions on innovation activities of Polish businesses have been made. Following this, a question has been asked whether a relation can be found between the number of innovative companies in particular voivodships and the investment attractiveness of these voivodships. The analysis has been based on the ranking of most innovative Polish enterprises prepared by Institute of Economics – Polish Academy of Sciences (INE PAN) and the report on investment attractiveness of Polish voivodships by the Gdansk Institute for Market Economics (IBNGR).

1. BUSINESS INNOVATION ACTIVITIES AND THEIR DETERMINING FACTORS

Understanding innovation activities of enterprises and their sources is definitely easier while being conscious of the specificity of particular innovations as well as their development. According to Tidd, both technological and commercial innovation is central to the policy debate of the future of Europe (Tidd, 2006). The above conclusion can be widened onto the micro level where understanding of why some enterprises are more innovative than the others and what are the crucial factors responsible for this process. The cited author emphasizes also that most innovations are ‘messy’ (Tidd, 2006) – this can to some extent explain the fact why it is so difficult to manage innovations in a successful way and, why this process is very much variable – depending, among others, on the type of innovations implemented and the external conditions for this process. In the table below an attempt has been made to group particular sources for innovation activities of companies.
### Selected elements influencing business innovativeness

<table>
<thead>
<tr>
<th>Group of factors</th>
<th>Factors</th>
<th>Potential influence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterprise related</td>
<td>Business specificity</td>
<td>This group of factors seems to be relatively easily influence by the company</td>
</tr>
<tr>
<td></td>
<td>Development strategy of an enterprise</td>
<td>Its impact is to an extent dependent on the managerial approach towards development by innovations</td>
</tr>
<tr>
<td></td>
<td>Managers approach towards innovation management</td>
<td></td>
</tr>
<tr>
<td>Technological</td>
<td>Depending on the type of innovations implemented</td>
<td>Of strong influence in case of technological innovations (product and process) requiring constant R&amp;D works</td>
</tr>
<tr>
<td>development</td>
<td>Opportunities for financing R&amp;D works within the enterprise</td>
<td>Strong need for financing R&amp;D activities</td>
</tr>
<tr>
<td>Sector/market related</td>
<td>Competition in the market</td>
<td>Apart from the impact of factors such as: new entrants, suppliers and competitive companies offering new products or substitutes, the influence of a location over innovative activities is worth considering</td>
</tr>
<tr>
<td></td>
<td>Influence of business environment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bargaining power of customer/suppliers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Threat of new entrants/substitute products</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Location and its influence over the enterprise</td>
<td></td>
</tr>
<tr>
<td>Economy related</td>
<td>Legal/social/cultural constraints</td>
<td>Business having no influence over them</td>
</tr>
<tr>
<td></td>
<td>State policy towards innovation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>R&amp;D financing by the government and business sector</td>
<td></td>
</tr>
</tbody>
</table>

Source: own study based on: (Tidd, 2006).

Study of the factors listed in the table above may lead to asking the question about the relation between activity within innovation and: 1. the size of a company; 2. the specificity of a region where the enterprise is located. At this point, the thesis initially set by J. Quinn is worth citing. The author initially claimed that small companies have often been observed as more innovative than the big ones (Quinn, 1986, p. 2). However, based on the study conducted (Quinn, 1986), the main barriers for innovation implementation have been identified (Table 2).
Table 2.

Selected barriers to innovation – case of big and small companies

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Existence and impact in case of</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>big companies</td>
</tr>
<tr>
<td>Top management isolation</td>
<td>Rather than in small companies where there are direct ‘links’ between top management and the operational level</td>
</tr>
<tr>
<td>Intolerance of fanatics</td>
<td>Rather to appear in big companies</td>
</tr>
<tr>
<td>Short time horizons</td>
<td>Seem to appear and be dependent rather on the top management strategy than the type of company- more ‘person’ than ‘company’ typical factor</td>
</tr>
<tr>
<td>Accounting practices</td>
<td>May be more formalised in case of these enterprises</td>
</tr>
<tr>
<td>Excessive bureaucracy</td>
<td>The stepladder system may be a serious barrier in the implementation of innovations</td>
</tr>
<tr>
<td>Inappropriate incentives</td>
<td>As innovation is regarded as a chaos bringing, this factors seems to be dependent on the business strategy, especially approach towards risk and its management</td>
</tr>
<tr>
<td>Financial constraints</td>
<td>Definitely can block innovation implementation in small firms- due to lack of sufficient financial resources and also opportunities to get proper financing.</td>
</tr>
<tr>
<td>Consciousness regarding innovation</td>
<td>Depending on the knowledge and consciousness of top managers and their approach towards management by innovations, rather than on the size of a company</td>
</tr>
<tr>
<td>Development strategy</td>
<td>Also, like the factor above, is to a high extent correlated with the development strategy – however due to financial resources that can be dedicated to implementing innovative projects, most probably easier to introduce in big firms.</td>
</tr>
<tr>
<td>Lack of external resources</td>
<td>Lack of sufficient resources, including financial one, is, in most cases, typical of small businesses – and for this reason being one of the most serious barrier to innovations.</td>
</tr>
</tbody>
</table>

Source: own study based on: (Quinn, 1986, pp. 7–8).
Studying information from table 2, one of the potential barriers – financial constraints – is worth paying attention to. The influence of this factor is remarkable especially in case of small and medium companies, which, very often, cannot implement valuable new solutions, due to limitations within financing. On the other hand, this particular element, causes that small enterprises more and more often concentrate on the implementation of non-technological innovations, which are, either, closer to their activities profile, or, require less expenditures – on the contrary to technological product and process innovations which are most capital – intensive.

2. **POLISH INNOVATIVE ENTERPRISES – A BROAD LOOK AT THEIR INNOVATION ACTIVITIES**

Poland as the European Union member, together with other member states, is obliged to fulfill the targets that have been set. This refers also to innovation activities, both, at the level of companies as well as the whole economies. The results of the EU research on innovation (Innovation Union Scoreboard, 2011, 2012) show that the structure of countries in light of their innovativeness level has remained unchanged. Particular states are grouped into four categories of: innovation leaders, innovation followers, moderate innovators and modest innovators. Poland still belongs to the category of moderate innovators with the results comparable to countries such as Slovakia, Romania but lower than the results of for example Hungary or Czech Republic innovation (Innovation Union Scoreboard, 2011, p. 7). The above clearly indicate that results of Polish enterprises are well below the results of the average European economies to compare with Czech Republic, Portugal or Italy (European Commission, 2012, pp. 18–19). The effects mentioned above are definitely the outcome of many factors, R&D intensity being one of them. The table below presents the dynamics of R&D as % of GDP for selected EU economies in the period 2000–2010.
In the analysis of the data presented in the above table what brings attention is the increase in the R&D dynamics (measured as GDP %) in most of the countries studied. What is especially interesting is the fact that almost all states grouped in the Union Innovation Scoreboard as moderate or modest innovators increased their expenditures on R&D in the period between 2000 and 2010. This may indicate that more attention and understanding is brought by the national governments to the problem of innovation management and also attempts are made to introduce homogenous innovation policy in particular
states. Similarly, the only state where the R&D expenses decreased was Sweden. However in case of this country, it has to be emphasized that, for many years, Sweden has been and still is the only economy with governmental R&D expenditures exceeding 3% of GDP. To give an example, the aforementioned values were: 4.13% of GDP in 2001, 3.56% in 2005 and 3.42% in 2010 (Eurostat, 2012).

Table 4
Polish most innovative enterprises and their R&D expenditures by sectors, 2010

<table>
<thead>
<tr>
<th>Companies by sectors</th>
<th>R&amp;D expenses, zł</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial sectors</td>
<td></td>
</tr>
<tr>
<td>chemical</td>
<td>19 576 000</td>
</tr>
<tr>
<td>wood</td>
<td>12 985 000</td>
</tr>
<tr>
<td>electromechanical</td>
<td>187 590 000</td>
</tr>
<tr>
<td>energy</td>
<td>30 115 000</td>
</tr>
<tr>
<td>pharmaceutical</td>
<td>76 355 000</td>
</tr>
<tr>
<td>other</td>
<td>55 843 000</td>
</tr>
<tr>
<td>light</td>
<td>22 225 000</td>
</tr>
<tr>
<td>building materials</td>
<td>7 369 000</td>
</tr>
<tr>
<td>metal</td>
<td>54 160 000</td>
</tr>
<tr>
<td>automotive</td>
<td>753 517 000</td>
</tr>
<tr>
<td>fuel</td>
<td>3 907 000</td>
</tr>
<tr>
<td>grocery</td>
<td>1 013 000</td>
</tr>
<tr>
<td>raw materials</td>
<td>8 198 000</td>
</tr>
<tr>
<td>plastics</td>
<td>21 653 000</td>
</tr>
<tr>
<td>Service sectors</td>
<td></td>
</tr>
<tr>
<td>architecture</td>
<td>38 001 000</td>
</tr>
<tr>
<td>retail</td>
<td>468 000</td>
</tr>
<tr>
<td>wholesale</td>
<td>414 439 000</td>
</tr>
<tr>
<td>hotels and restaurants</td>
<td>29 000</td>
</tr>
<tr>
<td>IT</td>
<td>177 970 700</td>
</tr>
<tr>
<td>other</td>
<td>76 533 000</td>
</tr>
<tr>
<td>media</td>
<td>11 236 000</td>
</tr>
<tr>
<td>telecommunication</td>
<td>91 571 000</td>
</tr>
<tr>
<td>Financial sectors</td>
<td></td>
</tr>
<tr>
<td>banking</td>
<td>139 355 000</td>
</tr>
<tr>
<td>other</td>
<td>2 612 000</td>
</tr>
<tr>
<td>capital market</td>
<td>31 042 000</td>
</tr>
</tbody>
</table>

Source: own study based on: (Baczko, 2011).
The above discussion may also bring the thesis that R&D expenditures are much dependent on the type of innovations implemented (technological and non-technological ones). Undoubtedly, independently of the innovation type, R&D activities of businesses will remain one of the crucial determinants of innovative growth.

As far as innovation activities of Polish enterprises are concerned, valuable data can be found in the studies carried out by Institute Nauk Ekonomicznych Polskiej Akademii Nauk (INE PAN) in its research on innovativeness of Polish economy. Based on the data from the aforementioned study, where 500 most innovative Polish companies were selected, their R&D expenses are worth showing (Table 4). In the studies of R&D expenses of companies representing particular sectors, the structure of expenses between industrial and service sectors is worth paying attention to. The expenditures of businesses from service sectors amounted for almost 55% of those from industrial sectors. This should be evaluated in a positive way especially due to the fact that technological innovations are attributed mostly to industrial companies while those enterprises providing services concentrate to a high extent on non-technological innovations.

3. BUSINESS INNOVATIVENESS VERSUS INVESTMENT ATTRACTIVENESS OF VOIVODSHIPS

The analysis of R&D activities of most innovative Polish companies brings the conclusion that the industrial firms remain most active within R&R, followed however dynamically by service companies. At the same time, there can be observed a huge ‘R&D expenses gap’ between service and financing sector which seems to be a natural element related to the type of business activities of the last ones. In the light of the above, an interesting question is, whether there is any relation between the location of particular companies and the: 1. number of most innovative enterprises in these voivodships and 2. their R&D activities. In the next part of this paper an attempt has been made, as the first step of further research, to analyze the aforementioned elements. The study has been based on the data received from the study of most innovative Polish enterprises carried out by Polish research institution INE PAN as well as the results of the study of investment of Polish voivodships – this one by Instytut
Badań nad Gospodarką Rynkową (IBnGR). The structure of companies compared in this paper has been shown in the table below.

### Table 5

**Most innovative Polish enterprises by the voivodship, 2010**

<table>
<thead>
<tr>
<th>Voivodship</th>
<th>Number of innovative companies(^1)</th>
<th>Total R&amp;D expenses, zł</th>
</tr>
</thead>
<tbody>
<tr>
<td>śląskie</td>
<td>83</td>
<td>385 596 000</td>
</tr>
<tr>
<td>dolnośląskie</td>
<td>43</td>
<td>73 176 000</td>
</tr>
<tr>
<td>mazowieckie</td>
<td>99</td>
<td>434 185 700</td>
</tr>
<tr>
<td>małopolskie</td>
<td>47</td>
<td>134 696 000</td>
</tr>
<tr>
<td>wielkopolskie</td>
<td>42</td>
<td>44 950 000</td>
</tr>
<tr>
<td>zachodniopomorskie</td>
<td>10</td>
<td>7 606 000</td>
</tr>
<tr>
<td>łódzkie</td>
<td>31</td>
<td>20 010 000</td>
</tr>
<tr>
<td>pomorskie</td>
<td>26</td>
<td>84 789 000</td>
</tr>
<tr>
<td>opolskie</td>
<td>13</td>
<td>8 461 000</td>
</tr>
<tr>
<td>lubuskie</td>
<td>10</td>
<td>7 489 000</td>
</tr>
<tr>
<td>kujawsko-pomorskie</td>
<td>27</td>
<td>27 814 000</td>
</tr>
<tr>
<td>podkarpackie</td>
<td>34</td>
<td>82 646 000</td>
</tr>
<tr>
<td>warmińsko-mazurskie</td>
<td>4</td>
<td>3 685 000</td>
</tr>
<tr>
<td>świętokrzyskie</td>
<td>5</td>
<td>4 070 000</td>
</tr>
<tr>
<td>lubelskie</td>
<td>11</td>
<td>9 135 000</td>
</tr>
<tr>
<td>podlaskie</td>
<td>14</td>
<td>5 839 000</td>
</tr>
</tbody>
</table>

Source: own study based on: (Baczko, 2011).

Analysis of the R&D expenditures structure in particular Polish voivodships clearly indicates the following conclusions. In reference to the above, the voivodships can be classified into the main categories presented in the table 5.

One of the first remarks that can be made after studying the structure of R&D expenditures from the table above is the noticeable gap between expenses of three leading voivodships in comparison to those with the expenditures not exceeding 20 mln zł. Also, in this group, all of the voivodships amounted for no more than 10 mln zł. The aforementioned can indicate either that most innovative companies choose these particular voivodships for their location, which

\(^1\) From the ranking of 500 most innovative Polish companies prepared by INE PAN.
might also be for other reasons e.g such as infrastructure or intellectual capital, or, that these are the conditions that particular voivodships create for enterprises to implement innovations.

Table 6

Polish voivodships by the R&D intensity of innovative companies

<table>
<thead>
<tr>
<th>Level of R&amp;D expenses, zł</th>
<th>Companies located in the voivodships</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;100 000 000</td>
<td>mazowieckie – 434 186 mln zł</td>
</tr>
<tr>
<td></td>
<td>śląskie – 385 596 mln zł</td>
</tr>
<tr>
<td></td>
<td>małopolskie – 134 696 mln zł</td>
</tr>
<tr>
<td>20 000 000–100 000 000</td>
<td>pomorskie – 84 789 mln zł</td>
</tr>
<tr>
<td></td>
<td>podkarpackie – 82 646 mln zł</td>
</tr>
<tr>
<td></td>
<td>dolnośląskie – 73 176 mln zł</td>
</tr>
<tr>
<td></td>
<td>wielkopolskie – 44 950 mln zł</td>
</tr>
<tr>
<td></td>
<td>kujawsko-pomorskie – 27 814 mln zł</td>
</tr>
<tr>
<td></td>
<td>łódzkie – 20 010 mln zł</td>
</tr>
<tr>
<td>&lt; 20 000 000</td>
<td>lubelskie – 9 135 mln zł</td>
</tr>
<tr>
<td></td>
<td>opolskie – 8 461 mln zł</td>
</tr>
<tr>
<td></td>
<td>lubuskie – 7 489 mln zł</td>
</tr>
<tr>
<td></td>
<td>zachodniopomorskie – 7 606 mln zł</td>
</tr>
<tr>
<td></td>
<td>świętokrzyskie – 4 070 mln zł</td>
</tr>
<tr>
<td></td>
<td>warmińsko-mazurskie – 3 685 mln zł</td>
</tr>
</tbody>
</table>

Source: own study.

Looking at the R&D intensity of businesses in particular voivodships, also the relation between the numbers of innovative companies their R&D expenditures and the investment attractiveness of voivodships is worth closer look (table 7).

The data from the table above shows that there can be noticed a relation between the investment attractiveness of particular voivodships and innovativeness level of companies located in these regions. The aforementioned innovativeness is understood as: 1. the number of the most innovative companies (from the list of 500 by INE PAN) and 2. the intensity of innovations where companies ranked higher received higher number of points that businesses located lower in the ranking. The voivodships which were classified as most attractive have also grouped either the biggest number of innovative enterprises or those from the top of the mentioned ranking of innovativeness. The 5 leading voivodships have also collected the highest number of points – in every case
exceeding the level of 9 000. Out of 3 most attractive voivodships, 2 of them gathered more than 20 000 points which creates a noticeable gap between them and other studied voivodships. Similarly, looking at the other voivodships grouped as 6–15, only 4 of them exceeded the level of 6 000 points, while most of the voivodships was classified between 2 000–4 000 points. In the presented structure the results of 2 voivodships are also worth underlining. 2 voivodships: warmińsko-mazurskie and świętokrzyskie, which were ranked lowest from the point of view of investment attractiveness, also received the lowest number of points (846 and 1 059) which confirms the thesis that the level of business innovativeness is to an extent related to the conditions particular voivodships can offer to an investor.

Table 7

<table>
<thead>
<tr>
<th>Ranking of voivodship</th>
<th>Voivodship</th>
<th>R&amp;D expenses, zł</th>
<th>‘Value’ of the most innovative companies located</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>śląskie</td>
<td>385 596 000</td>
<td>21 841</td>
</tr>
<tr>
<td>2</td>
<td>dolnośląskie</td>
<td>73 176 000</td>
<td>9 257</td>
</tr>
<tr>
<td>3</td>
<td>mazowieckie</td>
<td>434 185 700</td>
<td>25 207</td>
</tr>
<tr>
<td>4</td>
<td>małopolskie</td>
<td>134 696 000</td>
<td>11 973</td>
</tr>
<tr>
<td>5</td>
<td>wielkopolskie</td>
<td>44 950 000</td>
<td>9 656</td>
</tr>
<tr>
<td>6</td>
<td>zachodniopomorskie</td>
<td>7 606 000</td>
<td>3 020</td>
</tr>
<tr>
<td>7</td>
<td>łódzkie</td>
<td>20 010 000</td>
<td>7 745</td>
</tr>
<tr>
<td>8</td>
<td>pomorskie</td>
<td>84 789 000</td>
<td>6 856</td>
</tr>
<tr>
<td>9</td>
<td>opolskie</td>
<td>8 461 000</td>
<td>3 098</td>
</tr>
<tr>
<td>10</td>
<td>lubuskie</td>
<td>7 489 000</td>
<td>2 173</td>
</tr>
<tr>
<td>11</td>
<td>kujawsko-pomorskie</td>
<td>27 814 000</td>
<td>6 495</td>
</tr>
<tr>
<td>12</td>
<td>podkarpackie</td>
<td>82 646 000</td>
<td>8 630</td>
</tr>
<tr>
<td>13</td>
<td>warmińsko-mazurskie</td>
<td>3 685 000</td>
<td>846</td>
</tr>
<tr>
<td>14</td>
<td>świętokrzyskie</td>
<td>4 070 000</td>
<td>1 059</td>
</tr>
<tr>
<td>15</td>
<td>lubelskie</td>
<td>9 135 000</td>
<td>3 792</td>
</tr>
<tr>
<td>16</td>
<td>podlaskie</td>
<td>5 839 000</td>
<td>3 281</td>
</tr>
</tbody>
</table>

From the list of 500 most innovative companies by INE PAN. The value has been calculated in the following way. Particular enterprises from the list were given points in a descending order (The company ranked number 1–500 points; company ranked number 2–499 points, company ranked number 500–1 point).

Conclusions

This paper is the first step in the process of seeking answer to the question whether there can be identified a relationship between innovation activities of enterprises and their location (in particular at the voivodship level). In spite of a broad research presented in literature regarding potential elements and their influence on increasing innovativeness, there seems to be much space for the discussion on the relationship between innovative growth and conditions particular voivodships offer. Further on, an attempt has been made to analyze whether Polish voivodships, which have been assessed as most attractive to investors, are also those with the highest number of innovative businesses, or, where the enterprises are more innovation-active in comparison to other locations. The results of the first step of the research indicate that the voivodships which were evaluated (Nowicki, 2010) as most attractive to investors, were, in most cases, also those where the most innovative companies were located. The aforementioned can lead to a conclusion that increasing the investment attractiveness of voivodships and regions can be a win–win strategy followed by an increase in the number of innovative businesses as well as stimulating their growth by innovation. Similarly, regional governments can treat this a kind of help indicating not only strengths of particular voivodships that can be used to attract potential companies to invest there but also weaknesses to be improved.

Also another argument has to be taken into consideration and this is, according to Tidd (2006), that innovation needs more balanced support. The aforementioned more balanced support can also be understood as the influence of the conditions voivodships create for innovative companies. To conclude there is a need for deepened research towards the relationship between the innovation activities of enterprises and their location at the level of voivodships. In the next step, particular factors from this environment need indentifying – as well as ways of their improvement.

References


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STRUCTURAL, PROCESS AND ATTRIBUTES APPROACH TO E-LEARNING SYSTEM

Abstract

E-learning system in educational organization can be analyzed and defined from various points of view. The structural definition identifies key system elements and defines its boundaries with the environment, points to relations between elements and the relationship of elements in relation to the system as a whole. Structural approach determines the components of a system and clarifies how it should be seen in relation to the environment. The functional definition (process) indicates the actions that occur within the system and that simultaneously convert (transform) input streams (needs, goals, resources) in the final results (quality, efficiency). The process approach clearly emphasizes the dynamics of the system and processes occurring in it and presents a specific sequence of parallel or consecutive events. Kind of a bind connecting structural and functional perspective is the definition which shows the characteristics of e-learning systems. The attributes approach gives an answer to questions about the specific characteristics of the system, which are essential for electronics teaching.

Keywords: e-learning, systems theory, educational organization
Introduction

One of the characteristics of science development is the search of such tools and methods for testing the phenomena occurring in nature, which describe as faithfully as possible the essence of things. The systems theory, proposed and developed in the twentieth century, is one of the most versatile methods used in scientific research and is used in various areas of socioeconomic life. A statement that science with the aim to analyze and study the general laws of complex, separated in a physical or theoretical sense systems which are functional entireties, can be assumed to be a definition of general systems theory (Sadowski, 1978, pp. 23–30, 61–73; Bertalanffy, 1984, pp. 31–46, 60–69).

1. AN E-LEARNING SYSTEM AND THE GENERAL SYSTEMS THEORY

In the literature there are three areas of interest in a systematic approach in research. The first is the study of systems, which is characteristic of scientific exploration and system theory in relation to various scientific fields and identifying the doctrine which is a set of rules that describe all system elements. The second area is systems technology, namely the problems of modern techniques and technologies in the implementation of theoretical discoveries and innovations. The third element is so-called systems philosophy, so the reorientation of thinking and beliefs, derived from scientific paradigm which is entailed in a general systems theory (Bertalanffy, 1984, p. 23–26).

The key phrase in a system approach to proposed specific research and issues is the system. Due to approaches used in various disciplines, different definitions of this term can be met. L. Bertalanffy – the author of systems theory, defines the system as a “complex of mutually interacting parts.” (Bertalanffy, 1950, p. 134–165). A. Hall and D. Fagen propose a broader approach and define the system as “a collection of objects together with relations between objects and between their attributes.” (Hall, Fagen, 1956, p. 18–28).

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1 The work of Austrian biologist and philosopher L. von Bertalanffy (1901–1971) Kritische Theorie der Formbildung (1928) determined the beginning of general systems theory.
Fig. 1. The overall system model

Source: own elaboration.

Another definition, proposed by R. Kershner introduces the concept of function’s input and output and defines the system as “a collection of beings or things animate or inanimate, which take some input and act in accordance with them to produce some output, aiming at maximizing the specific functions of input and output” (Flage, Huggins and Roy, 1960, p. 164).

Beyond this difference and many variants of theoretical descriptions and definitions, following general characteristics of the system may be adopted (Sadowski, 1978, pp. 95–100, 149–154):

- a collection of interacting elements, among which there are certain relationships and feedback,
- characterized by a specific rearrangement, organization and structure, often a hierarchical structure,
- functioning according to certain rights and turns a certain states, which set presents behavior of the system,
- a set of defined borders, remaining in the relationship with the environment of the system,
- subject to the impacts of external stimuli (resources, information), called inputs, which are converted into specific results (outputs) after transformation.²

² There are two main types of transformations: probabilistic, which uniquely identifies the output value based on the input and deterministic that specifies the probability of the different output values based on the input value.
The system is a universal concept, which manifests itself in a variety of areas of life and science (biology, physics, chemistry, but also computer science, economics, management) and in a range of details and complexity (simple and complex systems, open and closed systems).

E-learning system in educational organization is a subjective term, because its range may be different, depending on the viewpoint adopted by the observer. The adoption of specific benchmarks for system decomposition and atomization of its individual elements and the demarcation of borders between the system and environment, is also individual in nature and is burdened with a significant degree of subjectivity. According to Sadowski (1978, p. 100), the general definitions of systems can be divided into three groups:

- definitions characterizing the internal structure of the system, which can be called structural definitions,
- definitions of the system behavior, otherwise known as the functional definitions (process),
- definitions defining specific properties of the system, which can be defined as attribute definitions.

2. **STRUCTURAL, PROCESS AND ATTRIBUTES APPROACH**

The first group of definitions allows to describe the elements and relations between them and the couplings occurring in the e-learning system. The list of elements of e-learning system of educational organization should be established based on the level of the electronic teaching: information technology, methodological-substantive, organizational and economic. The most important elements of an e-learning system are:

1. at the level of information technology:
   - e-learning information system (platform), modules and tools of the system in particular,
   - electronic repository of electronic objects (courses), form and the standard of courses or their parts in particular,
   - knowledge and competence of those responsible for the proper functioning of the e-learning platform (information scientist).

2. at the level of methodological-substantive:
- knowledge and competence of those responsible for analyzing electronic courses, and in particular the knowledge of behavioral aspects of teaching (methodology expert),
- knowledge and competence of those responsible for the design of electronic courses, and in particular the knowledge of IT tools for modules building in functional and graphical aspect (designer, graphic designer),
- knowledge and competence of those responsible for the design of electronic courses, particularly the ability to use above presented methodologies and tools (teacher).

Fig. 2. Elements and relations of e-learning system

Source: own elaboration.
3. at the organizational and economic level:

- a leadership in the e-learning project, particularly to e-learning strategic policy (leader),
- organization and realization of electronic educational process (student, teacher), planning and monitoring of the courses realization in time (the administrator) and evaluation of courses (student, teacher, methodology expert),
- rational funding mechanisms and salaries, in particular, the tools of analysis and evaluation of costs and benefits (administration, leader).

In structural terms, e-learning system must be understood as a set of interacting components, grouped around a learning process planned by the administration of educational organizations, realized by students and teachers based on specific e-learning platform, managed by information scientist and based on electronic courses designed by methodology expert and designer. Inherent part of the e-learning system is the e-learning policy of the organization implemented by the leader, based on a reasonable financial plan and a schedule of activities. Because of the equivalence of the functions performed (though not yet named) by the individual system elements, the majority of relations in the e-learning system is predominantly feedbacks, although the role of a leader is superior to the other elements. In other words, the e-learning system can be defined as aggregate of technical, human, organizational and financial resources and interrelationships between them.

Figure 2 shows the dependencies occurring between the elements of e-learning system represented by people (or rather their knowledge, skills and personality traits) and two factual elements, namely e-learning platform and repository for electronic courses. Presenting a new, systemic approach to e-learning, both the key roles of all elements and the central role of the e-learning system and a repository of e-learning courses must be remembered, as a specific “meeting place” of all cells of the system. At the end of the presentation of structural definition, it should be noted that the presented scheme of the system components and e-learning system relationship serves as a subjective and conventional model.

The second group of definition recognizes the system through the prism of its functions in educational organization, in occurring system processes. The essence of the definition here are streams of input into the system, transformed into the output streams and issues related to the control system. A functional
definition of an e-learning system of an educational organization will consist of
the following elements:

- Input streams – the need (objectives) of an educational organization, un-
derstood as raising (or maintaining) the quality of students and teachers
education and ensuring economic efficiency of organizations (as a
competitive advantage). An important component of the input streams
are the resources of the organization (information technology, organiza-
tional, financial, human)

- transformation – a collection of processes occurring parallel or in suc-
cession in a specific order, designed to transform the input streams into
output streams,

- output streams – to achieve the objectives (to meet the needs of the or-
organization) by gaining real competitive advantage and quality education
(raising the level of education and skills, broaden the base of
knowledge, increasing recruitment, student satisfaction, collaboration
with employers, etc.) and increase the resource base (increase teachers’
competence, broaden the base of electronic teaching materials, etc.).

Because of the diverse complexity of educational organizations, a detailed
list of processes should be established individually for each one. A general
functional definition of an e-learning system can be based on groups of process-
es occurring in the didactic activities of most organizations. The main functional
activities of an e-learning system should therefore include:

1. On the organizational and economic level:
   - defining the principles for e-learning strategies in the organization,
   - determining the budget and timetable for actions,
   - establishing a project team and organizing the trainings,
   - planning of electronic didactic process.

2. On the information technology and methodological – substantive levels:
   - selection and installation of an e-learning platform,
   - choice of methodology, analysis and design of electronic courses chosen for dedicated e-learning platform,
   - implementation and test of developed electronic courses,
   - realization and monitoring of the teaching process based on the plat-
form and courses,
   - evaluation of e-learning tools and electronic courses,
quality and effectiveness assessment of the conducted electronic courses.

Fig. 3. E-learning system in the process approach
Source: own elaboration.

Functional definition describes an e-learning system as a set of consecutive or parallel processes aimed at the rational implementation of e-learning services based on assumptions and availability of resources within the organization. The individual components of an e-learning system, remain in certain relations with each other and carry out assigned functions. In functional definition the equivalence of different processes occurring in the e-learning system can be observed – there are no more or less important processes. An important factor is the precise definition of the functions, as changes from the initial into desired state and the sequence of their occurrence. In addition, an important element of the process approach to the electronic education is the assessment of its quality and efficiency, both in terms of quantity and quality. In other words, the e-learning system is, in process approach, the correct identification of input variables (educational needs, resources of organization) and their conversion (transformation)
in the final result (output variables) which is the realization of its objectives at a predetermined level (Downar, 2006, p. 57).

A third group of definitions, which is applied in a systemic approach to analyze the studied phenomena, is a definition that describes the special characteristics specific for each system. The most important features of an e-learning system in educational organization should include, already mentioned subjectivity and arbitrariness of the system, its dynamics, and the subordinate role in the hierarchy of the general education system in Poland.

The e-learning system of educational organization subjects to constant changes and modifications at all levels, which causes its evolution into a more or less controlled direction. On the information technology level it refers mainly to the database issues (repositories of courses, files sizes, security) and network issues (transfer speed, e-learning server performance, reliability). From the information technology point of view the implementation of individual e-learning projects is not a difficult, whereas the supervision and planned comprehensive development of multi-layered electronic learning in educational organization is a complex task. A major problem may be, however, the lack of an universal, global e-learning standard (dynamics of system environment), which would ensure the compatibility of systems and electronic teaching materials. Awareness of this fact should lead to the selection of the most common tools (and free teaching resources dedicated to specific solutions) or commercial e-learning platforms, continuously developed and supported by major IT companies.

The essence of e-learning training is based on the prepared electronic teaching materials. The dynamics of the system is therefore also visible at the methodological and substantive level and manifests in a constant controlled and planned evaluation and modification of both content and form of electronic courses. Analysis of needs and objectives allows and requires periodical changes in the way of e-learning and blended learning teaching methods, depending on internal factors (growth rate of the system, such as increase of teachers competence level, new methods of applying the paradigm of constructivism and cognitivism) and external (dynamics of the system environment, such as increase in market demand for certain professionals).

Another attribute of an e-learning system in the educational organization on the methodological and substantive level is the difficulty in developing such tools for analysis and evaluation, which would allow for a qualitative and quantitative assessment (educational and economic) of conducted tasks. In addition,
there is a need for conversion of teaching quality issues and economic efficiency to a common denominator, so that the expenditures on the quality would not undermine the balance of the economic efficiency. Lack of complex mechanisms for assessing the e-learning systems causes selective analysis of e-learning investments and often inadequate level of its assessment.

An important feature of e-learning system is its dependence on the other systems. Considering this issue at the organizational and economic level, conducting a separate, independent educational policy introducing innovative and often revolutionary changes in the teaching process is not always possible, which significantly limits the rational use of e-learning tools. Educational organizations are subsystems of larger whole, and thus their e-learning policies are limited on organizational level (e.g., financial dependence of department authorities) and legal level (statutory limits of legal restrictions on e-learning training, imposed by the Ministry of Science and Higher Education). The consequence of this are organizational, legal, economic and social barriers actually occurring among decision-makers (leaders implementing e-learning systems, whose role has been highlighted in the structural definition), that prevent the use of new educational paradigms and promote the traditional model of education.

Conclusions

Summing up the above considerations it should be noted that the e-learning system in educational organization can be analyzed and defined from various points of view. The structural definition identifies key system elements and defines its boundaries with the environment, points to relations between elements and the relationship of elements in relation to the system as a whole. Structural approach determines the components of a system and clarifies how it should be seen in relation to the environment.

The functional definition (process) indicates the actions that occur within the system and that simultaneously convert (transform) input streams (needs, goals, resources) in the final results (quality, efficiency).
Definitions of e-learning system

<table>
<thead>
<tr>
<th>Definition type</th>
<th>Key elements of a definition</th>
<th>Application of a definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural</td>
<td>The elements and relations in the system, system and environment boundaries</td>
<td>System description</td>
</tr>
<tr>
<td>Functional</td>
<td>The processes of input resources transformation (targets) into results</td>
<td>Characteristic of system performance</td>
</tr>
<tr>
<td>Attributes</td>
<td>Features of the system at different levels</td>
<td>Characteristic of system features</td>
</tr>
</tbody>
</table>

Source: own elaboration.

The process approach clearly emphasizes the dynamics of the system and processes occurring in it and presents a specific sequence of parallel or consecutive events. Kind of a bind connecting structural and functional perspective is the definition which shows the characteristics of e-learning systems. The attributes approach gives an answer to questions about the specific characteristics of the system, which are essential for electronics teaching.

References

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PSYCHOGRAPHICS USEFULNESS IN MARKETING RESEARCH – TARGETING CONSUMERS AND CREATING ADVERTISING COPY

Abstract

In article author describes issues pertaining to utility and perception of consumers’ psychographics inside companies such as: costs of psychographic marketing research, their relative effectiveness or lack of it when placed head to head with other variables such as demographics, and the perceived utility of psychographics to the research people who generate or buy them within advertising agencies. Admittedly market plays a critical role in the development and maintenance of a market orientation in companies. And for them, data containing consumers’ psychographics is one of the most important factor in market intelligence among others (e.g., demographics, attitude measures, behavioral use measures).

The knowledge-based use of psychographics may be framed in such terms as what is used (content), who uses it, and the type of use. And the type of knowledge-based use of psychographics may be framed in terms of three possibilities: action-oriented use, knowledge-enhancing use, and affective use. Here in article, three aspects of use (content, users, and type of use), are examined: 1). the perceived credibility of psychographics information, 2). the perceived usefulness of psychographics and 3). the perceived cost relative to benefit.

Keywords: consumers, marketing research, psychographics

Introduction

Psychographic data is being collected from the research studies based on the following information such as personality, values, attitudes, interests, and
lifestyles. Because this area of research focuses mainly on interests, activities, and opinions, psychographic factors are also called IAO variables. Psychographic studies of individuals or communities can be valuable in the fields of marketing, demographics, opinion research, and social research in general. They can be contrasted with demographic variables (such as age and gender), behavioral variables (such as usage rate or loyalty), and organizational demographics variables (sometimes called company derived variables), such as industry, number of employees, and functional area.

Psychographics have remained a controversial subject in terms of their validity and utility. But most marketing research on them has concerned issues of validity and some factors remain still unexplained, e.g. 1). the costs of psychographic research, 2). their relative effectiveness or lack of it when placed head to head with other variables such as demographics, 3). the perceived utility of psychographics to the research people who generate and/or buy them within advertising agencies. In hereby article author examines the last (third) issue by reporting on a survey of advertising research directors in large and medium size agencies.

A key framing theoretical concept for investigating psychographic utility is knowledge use which has been widely studied in the marketing area (Deshpande and Zaltman, 1982, 1987; Kohli and Jaworski, 1990; Menon and Varadarajan, 1992). For advertisers, psychographics are but one form of market intelligence among others (e.g., demographics, attitude measures, behavioral use measures) and thus may be seen as competitors for scarce research. Similarly, various forms of psychographic research are also competitive with each other (e.g., syndicated versus customized psychographics; various forms of measures vs. others, such as the List of Values versus Values and Lifestyles.

The knowledge-based use of psychographics may be framed in such terms as what is used (content), who uses it, and the type of use. What is used may be seen in terms of various forms of measures that are designed to gain psychological insight into the consumer. Who uses them in the advertising setting consists of researchers who obtain the information from consumers and feed it to creatives to help them create advertising. It should be added that psychographic information thus translated into actual advertisements in turn influences consumers. As consumers are researched again, a continuing cycle of lifestyle evolution is evidenced. The type of knowledge-based use of psychographics may be framed in terms of three possibilities (Menon and Varadarajan, 1992):
action-oriented use (changes in activities, practices, and policies directly linked to research studies),
knowledge-enhancing use (acquiring of new knowledge),
affective use (using information to feel satisfied, confident and good about decisions).

Based on these three aspects of use (e.g., content, users, and type of use), one has examined:

- the perceived credibility and validity of psychographics information,
- the perceived usefulness of psychographics,
- the perceived cost relative to benefit.

1. METHOD OF EMPIRICAL ANALYSIS

A survey was conducted among research directors in the largest Polish advertising agencies in January 2012. Respondents were guaranteed anonymity. In this regard, not even the size of the agency nor the individual titles of the respondents will be given when they are quoted to protect their confidentiality. It can be said that the respondents were individually listed by held positions at the vice-presidential or executive vice-presidential level. They were given a preaddressed, postage-paid envelope, plus the opportunity to receive copies of the results if they requested it. Seventeen surveys were returned out of 73, for a return rate of 23.2%.

The focus of the survey was on an open-ended question that asked the research directors to describe in your own words your experience with using psychographics. Some additional guide questions were included within the text of this question to provide some direction to the answers while still allowing plenty of room for the respondents to go where they wanted with the question (e.g., what do you find are their strengths and weaknesses?).

Other questions asked involved scale-type items and were drawn up to reflect some of the dimensions of knowledge. These included:

- the perceived usefulness of psychographics in creating advertising copy,
- the perceived usefulness of psychographics in targeting consumers,
- the perceived cost/benefit relationship of psychographics,
- the perceived validity/credibility of psychographics,
- the exact job title of the respondent; and the billings of the agency.
2. RESULTS

The results of both the quantitative and qualitative questions are below reported. The means for a number of the quantitative questions (based on a 5-point scale with “1” representing a low score and “5” a high score: 2, 3, and 4 are intermediate scores) are reported in Table 1.

2.1. Attitudes toward psychographics

Perceived usefulness of psychographics in creating advertising copy. More respondents in this survey found psychographics to be not very useful or somewhat useful (10 of them) while only 4 thought them to be quite or very useful. Similar results were found for the usefulness of psychographics in targeting consumers as were found for their usefulness in creating advertising copy.

Table 1

<table>
<thead>
<tr>
<th>Means for questions on perceived usefulness</th>
<th>Mean</th>
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<tbody>
<tr>
<td>Usefulness in targeting consumers</td>
<td>2.43</td>
</tr>
<tr>
<td>Usefulness in creating advertising</td>
<td>2.50</td>
</tr>
<tr>
<td>Cost/Benefit of psychographics</td>
<td>2.38</td>
</tr>
<tr>
<td>Validity/Credibility of psychographics</td>
<td>3.13</td>
</tr>
</tbody>
</table>

Source: own elaboration.

In perceived benefits of psychographics relative to their cost eleven of our respondents found that psychographics were either extremely costly or somewhat costly relative to their benefit while only 3 thought they were extremely beneficial. And as far as perceived validity/credibility of psychographic research is concerned our sample split fairly evenly on the issue of the validity of psychographic research. On the negative side, 7 thought they were either extremely invalid or somewhat invalid while on the positive side, 7 thought they were somewhat valid or extremely valid. The mean was a little higher for this item than for the others indicating a slightly better (though by no means approving) attitude toward the validity of psychographics as opposed to their usefulness.
2.2. Reported use of syndicated psychographics

More respondents reported that they used syndicated psychographics and related services than reported they did not (10 to 7). Of the 10, one indicated that his or her agency did not use any on a regular basis but would look at available research. Another reported that his or her agency had its own “VALS-type” proprietary approach. Of the 8 remaining, 4 reported using VALS\(^1\). One respondent who reported using a syndicated service nonetheless found syndicated psychographics to be of limited value relative to customized psychographics of specific segments (e.g., coffee drinkers) although the latter are expensive to gather.

2.3. Open-ended responses

As open-ended responses (from conducted research) indicated, most of the directors found there to be major problems with psychographics. Only a few reported them to be quite or very useful. However, even one of these respondents reported that the account people in his or her agency were skeptical about psychographics. The more general attitude seemed to be reflected in the following quote from another respondent who in response to the open-ended questions had found psychographics to be not very useful either in targeting consumers or in creating advertising: *I’ve used both syndicated and custom psychographics in the past, but try to avoid using them today because of extremely disappointing results.*

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\(^{1}\) VALS (“Values, Attitudes And Lifestyles”) is a proprietary research methodology used for psychographic market segmentation. VALS was developed in 1978 by social scientist and consumer futurist Arnold Mitchell and his colleagues at SRI International. It was immediately embraced by advertising agencies, and is currently offered as a product of SRI’s consulting services division. VALS draws heavily on the work of Harvard sociologist David Riesman and psychologist Abraham Maslow. Mitchell used statistics to identify attitudinal and demographic questions that helped categorize adult American consumers into one of nine lifestyle types: survivors (4%), sustainers (7%), belongers (35%), emulators (9%), achievers (22%), I-am-me (5%), experiential (7%), societally conscious (9%), and integrated (2%). The questions were weighted using data developed from a sample of 1,635 Americans and their partners, who responded to an SRI International survey in 1980.
3. DISCUSSION AND IMPLICATIONS

The results of this study serve to mirror to advertising agency research directors a sample of views across their profession. They indicated, at least in the eyes of many of them, that psychographics have for the most part a limited utility, although there are individual differences in that assessment. Framing our results in terms of knowledge use while acknowledging the limitations of this study in terms of its provisional character and limited sample and response rate (those who did not respond to the survey might differ from those who did, although we were unable to detect any systematic difference), we nonetheless can reach two conclusions of note.

First, some people such as “creatives” may be more positive about psychographic use, but even they have some problems with them and perhaps as often as not tend to rely on their own intuitive insights. Second, psychographics seem to be more knowledge-enhancing than action-oriented, thus resulting in low affectivity in terms of overall satisfaction for those advertising agency people who use them.

Secondly, based on the respondents’ statements, we can also determine whether psychographics can provide greater utility or not in terms of advertising effectiveness:

- One respondent cited simple attitudinal measures related to a product’s purchase as being helpful and another cited selective perception. Future research might examine what sorts of attitude measures are seen as most useful to advertising and research companies people.
- The idea of situational psychographics (i.e., people engage in different lifestyle roles as suggested by one respondent) suggests some directions in situational and role-playing that might be further pursued.

In relation to the first two points, we might investigate the relative effectiveness of other measures of describing a market target, its response to advertising, and its product purchase and use behavior. Examining these might lead to psychographics that are more product category specific and therefore potentially useful to advertisers.

Psychographic research might also be improved by the use of interpretive methodologies in two possible ways: (a) applying various quantitative psychographic and value measures and then doing in-depth interviewing and observation (e.g., ethnographic, phenomenological, open-ended questions) to see how
the measures play out in ways meaningful to researchers, if at all and (b) developing ways to assess values and psychographics on a totally interpretive basis.

Also we might explore why some research directors are more satisfied with psychographics than others. For instance, might it be organizational culture (Menon and Varadarajan, 1992), or better research methodology that causes these individual differences? Do researchers attitudes toward psychographics change and evolve over time based on their career position and/or experience with psychographics and other forms of advertising and consumer research?

We need also to account for the different views of various participants in the psychographic use/research process. In this regard, future studies should be made of the attitudes toward psychographics of others concerned (e.g., creatives, account people, the advertiser), because their different aims and career experiences and trajectories might produce somewhat different views and perspectives. Thus, we might also look at the relationship between researchers and users of research to see how trust and other factors enter into the various parties’ attitudes toward psychographic data (Moorman, Deshpande and Zaltman, 1993).

We need also in the future investigate the research and research use processes themselves to see how research is created, used, marketed internally by research agency people and externally by market research vendors to agencies. Qualitative methodologies, such as case studies and in-depth interviewing would be of particular interest here, since we are interested in developing detailed models and insights into the nature of the process.

Finally we might consider some exercises (Gould, 1993, 1995) that can sharpen our understanding of those relationships. By analogy to the counter transference in psychoanalysis where analysts investigate their own feelings toward their clients in order to better understand them, researchers can include their own feelings toward the consumers they are profile.

**Conclusions**

Author’s results although very tentative and exploratory, nonetheless raise some very grave concerns about the perceived usefulness of psychographics. The idea of focusing on “Psychographics” implies that we need to know more about them. In many respects, psychographic research could use some of the suggestions, especially the idea of investigating a small area and trying to stay
within the bounds of the real. Replication and longitudinal investigations might prove to be particularly useful in this regard but only if the measures are valid to begin with. Thus, future research should not so much attempt to resurrect current psychographics or their use patterns if they offer so little as our survey respondents indicated, but instead, should focus on new avenues of use and new more "market-valid" measures of psychographics that can be useful, effective, and valuable.

References


