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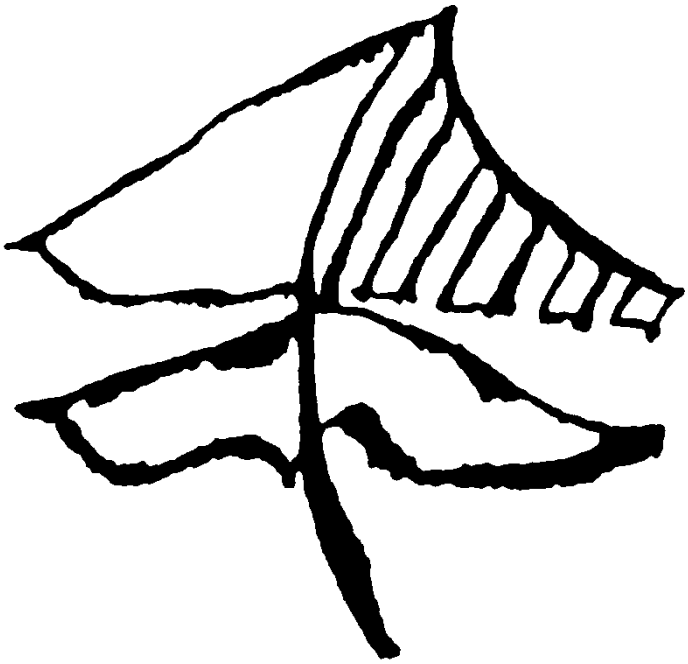

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Scientific Quarterly INTERCATHEDRA is the result of scientific, research and teaching cooperation of departments from Poznań, Zwoleń, Warsaw, Kraków, Tarnów, Trnava, Zlin, Žilina, Košice, Zagreb, Brno, Prešov and other Polish and foreign scientific centres dealing with issues of economics, organisation, programming, management and marketing, especially, but not only, in arboriculture.

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Wojciech Lis

Rafał Balina[1], Mirosława Marzena Nowak[2]

MODELLING TOOLS FOR ASSESSING AN INDIVIDUAL'S CREDIT RATING BY POLAND'S COOPERATIVE BANKS AS AN ELEMENT OF FINANCIAL SECURITY

Abstract: This study endeavors to indicate the best method for Poland's cooperative (co-op) banks operating in rural areas to assess credit risk as an element of financial security. Retail customers' data was used from rural co-op banks which had granted these clients credits in 2012 to 2014. The total of credit applications analyzed was 1,170. The data analysis confirms that the most effective method of rural client risk assessment for co-op banks considered in this study is the logistic regression model since this model shows a highly accurate efficiency in identifying 'bad' and well as 'good' clients.

Key words: financial security, cooperative bank, credit risk, variable, methods of estimating functions

INTRODUCTION

The security of financial institutions can be expressed as the possibility of performing its tasks i.e. smooth functioning, even in the case of intermittent shocks from external sources, in other words, conditions of unstable market conditions [Capiga 2011]. Concurrently, the contemporary banking system should be characterized as stable, secure and trustworthy. These three characteristics should be employed foremost to protect the interests of participants involved in this market. Unfortunately, as in all areas of life, risk is an inseparable part of banking [Balina, Żak 2014], and this is why effective risk management is currently a fundamental responsibility of all banks. As a result of high costs and other consequences of faulty credit decisions, banks endeavor to employ various instruments to reduce uncertainty in decisions of allocation [Żółtkowski 2009]. The natural stimuli for the development of these instruments are the intention to improve the quality of the credit portfolio, assuring a high level of financial security and simultaneous generation of higher financial reserves from commercial activities [Janc, Kraska 2001]. With the growing competition in the credit services marketplace, and in the face of unfavorable economic events, banks are faced with increasing requests for credit lines and growing numbers of high risk clientele and ventures [Wiatr 2011]; thus the need for banks to have a rational credit portfolio. As a result, banking systems frequently turn to the 'credit scoring' system which defines itself as a client classification system developed on experience and reasonable examples, statistics and supported by empirical population comparisons of reliable and unreliable borrowers who have applied for credit at one time or another [Zaleska 2012]. The system was developed for the purpose of assessing the creditworthiness of applicants while maintaining the interest of the creditor - based on recognized statistical principles and methodology, periodically verified by appropriate principles and methodologies and modified as current and future conditions dictate.

A material dilemma in utilizing scoring is the choice of method upon which entities will be classified [Pieczkowski 1999]. A number of classification methods prevail in the developed

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intermediary financial systems i.e. discriminant analysis and regression analysis (linear and logistic regression, classification tree) [Supera 1998].

RESEARCH METHODOLOGY

The primary objective was to identify the best method for estimating credit risk by co-op banks operating in rural areas.

The data of retail banking clients granted credits from 2012 to 2014 were used during the process of generating the scoring model. The total number of analyzed credit applications was 1,170 from which only 40 were deemed unsatisfactory i.e. a potential borrower did not fulfill the conditions of the credit contract.

The following variables were used for the study to classify potential borrowers:

- X_1 – age of the borrower (in years),
- X_2 – amount of money to be borrowed (PLN),
- X_3 – maximum interest rate as determined by 'debt to income' (DTI) indicator,
- X_4 – declared income on credit application (PLN),
- X_5 – declared debt of borrower (PLN),
- X_6 – number of people in household (number),
- X_7 – declared total expenses for household by borrower (PLN),
- X_8 – educational level of borrower - middle school (binary variable: yes, 1; no, 0),
- X_9 – educational level of borrower - high school (binary variable: yes, 1; no, 0),
- X_{10} – educational level of borrower - college education (binary variable: yes, 1; no, 0),
- X_{11} – educational level of borrower - university education (binary variable: yes, 1; no, 0),
- X_{12} – number of years with present employer (number),
- X_{13} – marital status: widower/widow (binary variable: yes, 1; no, 0),
- X_{14} – marital status: divorced (binary variable: yes, 1; no, 0),
- X_{15} – marital status: separated (binary variable: yes, 1; no, 0),
- X_{16} – marital status: married (binary variable: yes, 1; no, 0),
- X_{17} – did borrower have previous paid-off credit (binary variable: yes, 1; no, 0),
- X_{18} – does borrower have current credit (binary variable: yes, 1; no, 0),
- X_{19} – amount of unpaid current credit (PLN),
- X_{20} – has borrower maxed personal account debt limit (binary variable: yes, 1; no, 0),
- X_{21} – does borrower have debt limit in personal account (binary variable: yes, 1; no, 0),
- X_{22} – has borrower defaulted on debt in personal account (binary variable: yes, 1; no, 0),
- X_{23} – DTI indicator (%),
- X_{24} – is borrower behind in payments in other credits (binary variable: yes, 1; no, 0),
- X_{25} – maximum number of days borrower is behind in payment (number),
- X_{26} – is borrower behind in mortgage payments (binary variable: yes, 1; no, 0),
- X_{27} – borrower source of income ((binary variable: farmer, 1; other, 0),
- X_{28} – is borrower in informal relationship (binary variable: yes, 1; no, 0).

The explanatory variable is defined as the borrower defaulting on the conditions in the credit contract. In the case where the borrower pays off the credit, a value of 1 is assigned; if the credit is not paid, a value of 0 results. The above set of variables was used in the further part of the analysis.

During the construction of the scoring model, the need to identify which explanatory variables were strongly correlated and which were poorly correlated, was accomplished using the coefficient of correlation analysis [Borkowski B., Dudek H., Szczęsny W., 2003; Zeliaś A., 1991] which application produced the following list of variables used for further calculations: X1, X6, X10, X12, X21, X23, X24, X25, X26, X27, and X28.

Further analysis utilized three different estimation function methods facilitating risk assessment for borrower default on credit payment. The study evaluated the linear discriminant function model, the multi linear regression model, and the logistic regression model [Grabiński, Wydymus Zeliaś 1982; Pollak 1990; Bartkowiak 1997; Kufel 2007; Szpulak 2007].

RESEARCH RESULTS

The carried-out analysis of statistical data produced the following discrimination function:

$$Z_{AD} = 0{,}634829 * X_1 + 0{,}306118 * X_{21} - 267817 * X_{23} + 0{,}542125 * X_{25} + 0440658 * X_{26}$$

The evaluated model displayed a high degree of flexibility with regard to actual data. The determination coefficient in this case was 83%. It should be stresses that all variables had a statistical significance value of 0.05. Furthermore, the Fisher-Snedecor test indicated significance and non-randomness of the variables in explaining phenomena. This model also fulfilled all set assumptions pertaining to the estimation accuracy of a given model; therefore, this model can be judged as statistically proper.

Using the earlier derived results pertaining to variable choices for the model and the smallest squares method, the following multi regression model was produced:

$$Z_{RW} = 0{,}016862 * X_1 + 0{,}0000104473 * X_{26} + 0{,}177144 * X_{24} - 0{,}0017457 * X_{25}$$

The statistical analysis showed that all variables which were used in the multi regression model were significant and non-random in explaining phenomena tied to a borrower's default of a credit contract. This was confirmed by the F test and Student's t-test i.e. all the variables displayed 0.05 significance. Additionally, the evaluated model had a high determination coefficient which in this case came out as 92%. The variables did not show collinearity and had normal distribution of residuals which was confirmed by the Jarque-Bera and variance inflation factor (VIF) tests, and the White test confirmed the homoscedasticity.

Using the available variables and progression scheme in evaluating the logistic regression model, the following model emerged:

$$Z_{RW} = 0{,}06439 * X_1 - 0{,}0354 * X_{23} + 1{,}28373 * X_{26}$$

The evaluated model displayed a satisfactory level of coefficient determination which was 82%. Additionally, all variables were statistically significant in explaining considered issues which was evident from the testing of marginal effects with a significance level of 0.05.

After statistically verifying the models, the results were examined with regard to their usefulness in the constructed models for assessing credit applications. The quality evaluation of the models was based on effectiveness of classifying borrowers.

To evaluate the accuracy of business classification, the accuracy evaluation matrix of the discrimination model was applied [Altman 1996]. This tool presents summarization pertaining to indication correctness for an evaluated model. Determining the efficiency of a model and the level of erroneous forecast in the test group and the group used to construct the model allow the evaluation of a model in regard to its usefulness in practice. On the basis of data pertaining to the number of individual classifications, the efficiency of the models in identifying 'good' and 'bad' clients was evaluated, and the results are presented in Table 1.

As is evident from the analyses, the highest efficiency levels were performed by two models: the first is the logistic regression model; second, the multi regression model. The first of them displayed an effectiveness level of 97%, and the second displayed a similar result, recognizing only 96%. However, in evaluating the effectiveness of scoring models, the array of first and second degree errors is imperative, since these models' task is to accurately identify 'good' and/or 'bad' clients. This is the reason all efforts are made to reduce the asymmetry between these errors. Of the evaluated models, the best models were: the discrimination analysis model which identified 100%

of the 'bad' clients and 91% of the 'good' clients and the multi regression model which identified 100% 'bad' and 96% 'good' clients.

Table 1. Scoring Model Efficiency in Regard to the Used Sample for Model Construction

Model Efficiency	Evaluated Scoring Model		
	Logistic Regression	Discrimination Analysis	Multi Regression
SP_1	0%	100%	100%
SP_2	100%	91%	96%
SP_0	97%	91%	96%

Source: own materials

During the process of analyses of the evaluated models, additional examination was carried out on what were 320 observations not included in the original evaluation. Table 2 shows the results of the analysis.

Table 2. Scoring Model Effectiveness Based on Additional Samples

Model Efficiency	Evaluated Scoring Model		
	Logistic Regression	Discrimination Analysis	Multi Regression
SP_1	60%	30%	0%
SP_2	80%	90%	80%
SP_0	77,5%	82,5%	70%

Source: own material

As is evident from the analysis, all of the evaluated models showed general effectiveness above 70% in relation to the test sample; however, taking into account that a good scoring model should reflect symmetric indication between good and bad clients, it should be noted that the best of the evaluated is the logistic regression model. As regards the remaining models, their performance in identifying insolvent clientele was significantly below the expectations of the banking sector.

CONCLUSION

On the basis of an analysis of historical data, it was found that co-op banks incorporated into this study examining the most effective method of estimating credit risk as a part of a bank's financial security when servicing rural clientele, the best scoring model was logistic regression where this model shows high efficiency in identifying 'bad' as well as 'good' customers. It also remains to be stressed that the model which was the most effective, was the one with the least number of variables which included age, client's ability to service debt, and information regarding delinquency in current credits.

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Małgorzata Dolata[3]

THE INFRASTRUCTURE OF ENVIRONMENTAL PROTECTION AS A CONDITION OF ECOLOGICAL SAFETY

Abstract: The aim of the article is to present the problem of security, to compare ecological safety with security in its broad sense and to indicate the role of the infrastructure of environmental protection in the development of ecological safety. The considerations made in this study let us conclude that among different threats to the contemporary world, ecological threats are as significant as military, economic, social and political threats. Ensuring ecological safety is a fundamental task of the state. In order to achieve ecological safety it is necessary to meet particularly difficult requirements. The infrastructure of environmental protection plays one of the main roles in ensuring the right standard of ecological safety. The primary aim of the infrastructure is to guarantee the protective functions of ecosystems and to maintain their socioeconomic functions. Other functions include the maintenance and extension of animate natural resources as well as the maintenance of health in the resources and ecosystems.

Key words: infrastructure, infrastructure of environmental protection, safety, ecological safety

INTRODUCTION

For a long time safety used to be chiefly associated with military threats. In recent years the approach to this problem has changed. At present economic, social and ecological safety are considered to be key elements in general security and they seem to be as important as military safety. More and more attention is given to ecological safety, which until recently was often underestimated and pushed to the periphery of other problems of the modern world. It is necessary to stress the fact that ecological safety is not an absolutely new problem, especially in developed democratic countries, which are economically strong and which appreciate the importance of clean natural environment. The interest in the natural environment and its protection increased considerably in the 1970s and it became even more important in the consecutive years. Ecological safety was included into the state's policy as an important element affecting the safety of entities functioning in a particular country. It also became represented in legal regulations and other strategic documents of key importance to the state's policy in the following years.

The aim of the article is:

- to present the problem of security and compare ecological safety with general security,
- indicate the role of the infrastructure of environmental protection in the development of ecological safety.

The article has descriptive and analytical character. It uses the method of deduction as well as the descriptive, critical and cognitive methods to analyse the theoretical accomplishments in reference publications and in selected legal acts and strategic documents.

ECOLOGICAL SAFETY

Security has always been perceived as one of the basic needs and most important values for individuals, social groups, nations, and countries. It is interpreted as a state of calmness and certainty, which is free from threats. The term 'security' corresponds to the Latin expression *sine cura* (securitas). According to the dictionary of the Polish Scientific Publishers, security is defined

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as a 'threat-free state'. In colloquial language it is also understood as an expression referring to 'the authorities in charge of public affairs' [Słownik Języka Polskiego 2015].

Considerations concerning security have evolutionary character, so the conceptual range of this category is constantly changing. Until the 19th century security referred to the protection of countries and their inhabitants from the threats of using the military power of one country against another or to the protection from natural disasters, such as fire or flood. Later the problem of security moved beyond that area [Marzec 2006, Turczyński 2011]. Contemporary trends in research on security base their scientific postulates on the accomplishments of numerous branches of science. The complexity of the security problem resulted not only in the multidisciplinary character of analyses in this area of science, where philosophers, lawyers, economists, military experts or ecologists conduct research on security, but it also contributed to the development of an independent scientific discipline, i.e. security science [Piocha 2001, Osiński 2014].

The range of problems related with security comprises both studies on the problems of internal security and international security, where considerations concerning the contemporary state's security policy is the intersection of these problems. The primary aim of the security policy is for state institutions to take deliberate, organised and competent actions to constantly provide favourable conditions to achieve national interests by counteracting external and internal threats, facing the existing and potential challenges, reducing risk and taking advantage of opportunities [Gierszewski 2013]. In order to achieve the goals and to implement the tasks of the security policy countries adopt security strategies. In contemporary times they are not only the means to achieve the security goals but also they are synonymous to effective actions. Security strategies plan the structure and functioning of the national security system and direct actions taken by the state according to the occurrence of situations in its surroundings and with due respect to the state's potential. Thus, the aim of the national security system should be appropriate preparation and effective use of the state's powers and measures to counteract the threats causing dangerous situations at all levels of the state's functioning [Wawrzusiszyn 2015].

When discussing the issue of security it is necessary to pay particular attention to its connection with threats. On the one hand, threats refer to a particular state induced by the perception of a particular phenomenon. On the other hand, they are objective factors causing the state of uncertainty and anxiety. As far national security is concerned, a threat is defined as an action or event which endangers the quality of life of inhabitants in a particular country, when the state cannot pursue its national interest or these possibilities are limited or disturbed [Fehler 2007].

The identification and assessment of threats is a necessary undertaking, but it is extremely difficult. The defence and protection from different potential threats organised by state institutions only give a possibility to achieve a particular condition, which is regarded as state security. This state cannot be violated by a wide range of threats concerning the strategic areas of state security. Reference publications provide different divisions of threats, depending on different criteria (e.g. the subject criterion, object criterion). Among a wide range of significant threats, including military, economic, social, cultural, ideological or political threats, ecological threats are also important [Wawrzusiszyn 2015].

Ecological threats may cause degradation of the environment on a global, regional or local scale. Both countries and individuals are affected by these threats [Frankowski 2008].

In contemporary times ecological threats are a common problem, which concerns both highly economically developed countries and developing ones, both countries with consolidated capitalism and those which used to function or still function in other political and socioeconomic systems. The current ecological situation of countries, or even regions, is relatively diversified. It is strictly related with the diversity of stages of their development and the resulting economic goals. Rich, developed countries claim that it is necessary to improve the quality of life, i.e. they advocate clean

air and water, healthy food, clean technologies and organic farming. These countries are also interested in ecological defence of their societies. They are ready to export 'dirty industries' and toxic waste and simultaneously, they introduce stricter ecological standards. On the other hand, poorer countries are ready to start production of any kind, because ecological threats cannot be their priority. The aims of these countries are formulated from the angle of backwardness, poverty, unemployment, lack of capital and technology [Krauze 2004].

As far as individuals are concerned, an ecological threat is a phenomenon or process which may disturb their life situation by limiting the possibilities to satisfy their needs, ranging from the most elementary ones, such as life and health, to higher-order needs. It is characteristic that a threat appears during an everyday interaction between humans and the environment rather than deliberate confrontation [Lisowski 1993]. Ecological threats are changes occurring in man's natural environment and these changes are usually unintentional side effects of human activity, which usually concern the economy [Delorme 1987].

Inappropriate use of natural resources, ecological disasters, inadequate safety standards in industrial production, too intensive agricultural production, contamination of soil with chemicals are examples of human activity and natural processes which cause ecological threats. The list of threats is long and it is still open, where scientific, technological, industrial, transport, military, health and natural threats are the most important [Wawrzusiszyn 2015].

One of the fundamental tasks of a state is to ensure ecological safety. In order to achieve this goal it is necessary to meet particularly difficult requirements - protect the quality of man's natural environment and use natural resources reasonably. Difficulties in ensuring ecological safety mostly result from the general tendency to overexploit the natural environment in the name of profit and efficiency and from high diversification of ecological conditions and economic aims in different regions and countries.

In contemporary times ecological safety occupies a stable position in the model of internal coexistence of countries and international community. It is not easy to define ecological safety, because the meaning of the term is blurred and ambiguous. It is interpreted as a permanent and continuous process of pursuit of an adequate ecological state (standard), which gives the sense of stability of the development of all elements of the ecosystem, where all possible means are applied according to the current legal regulations and rules, guaranteeing appropriate social coexistence within the country and in international relations [Przybytniowski 2014]. Reference publications define ecological safety as a state of counteracting the consequences of environmental transformations. As far as the ecosystem is concerned, ecological safety is defined as a state of the ecosystem where the risk of causing disturbance to its components is minimal (probably it is impossible to eliminate the risk completely). Broadly speaking, ecological safety is defined as actions taken to prevent and counteract negative consequences to health, politics and economy in all zones (layers) of the Earth, i.e. in the atmosphere, lithosphere, hydrosphere, pedosphere and biosphere [Poskrobko, Poskrobko 2014].

To sum up, we need to say that in recent years scientific research on the natural environment has proved that ecological safety cannot be treated only from the angle of human safety and existence. There is a close relationship between occurrences in nature and human functioning and activity. Therefore, the issues which are components of ecological safety and its position in the processes of coexistence of communities and especially, its influence on the development of ecological social awareness play an enormous role in multi-aspect researching of this complex problem.

THE INFRASTRUCTURE OF ENVIRONMENTAL PROTECTION VS ECOLOGICAL SAFETY

The fundamental criteria of the state's security include the ability to maintain sustainable development, i.e. taking care to maintain the welfare standard and increase the wealth of the present and future generations. As far as the multitude and diversity of factors affecting sustainable development are concerned, three main areas are distinguished. It is necessary to concentrate on the following areas when planning an effective sustainable development strategy:

- environmental protection and rational management of natural resources,
- economic growth and fair division of benefits resulting from the growth,
- social development.

As far as the concept of sustainable development related with environmental protection is concerned, favourable effects resulting from the development and modernisation of the infrastructure of environmental protection, which is usually called ecological infrastructure, play a particularly significant role.

The infrastructure of environmental protection is a relatively new infrastructural system, which is usually classified as the economic infrastructure. However, it is necessary to note the fact that the increasing popularity of the concept of ecodevelopment, which treats the ecological policy as at least equal or even superior to the economic and social policies, causes some people to advocate the idea that the infrastructure of environmental protection should be treated as a separate branch of infrastructure, independent of the social and economic infrastructure [Ratajczak 1999].

The basic premises for separation of the infrastructure of environmental protection result from its growing significance in ensuring the appropriate standard of ecological safety. More and more environmental elements and systems largely result from deliberate human activity. The enormous demand of humanity for environmental goods and services may cause imbalance in ecosystems. The primary aim in the development of the ecological infrastructure is to maintain the protective functions of ecosystems (clean water, soil and air), maintain and expand animate natural resources, maintain the health and vitality of the resources and maintain the socioeconomic functions of the ecosystems [Dobrzański 2001].

The significance of the infrastructure of environmental protection in the environmental policy, whose primary aim is to ensure ecological safety, also results from its role as a factor strengthening the following rules in the economy and society [Czaja 2001]:

- rational management of the environmental resources according to the effect maximisation variant – its aim is to maximise the effect of production or consumption from a particular resource by applying appropriate production technologies or consumption models,
- rational management of the natural environment resources according to the outlay minimisation variant – its aim is to minimise the consumption of the outlay of particular natural environment resources by applying appropriate economical production technologies and consumption models,
- rational management of the assimilative capacity of the environment – its aim is to optimise the use of the assimilative capacity of ecosystems by recognising the assimilative capacity and use of appropriate methods of deposition of pollutants,
- rational management of non-economic land in the environment – its aim is to preserve non-economic sites of the natural environment by applying different methods of protection and conservation, depending on the value of the environment,\
- preservation of untouched resources of the primary natural capital due to the need to preserve existence and biodiversity – its aim is to preserve untouched resources of the

primary natural capital by applying protective measures at all levels of management, ranging from micromanagement to mega management,

- maintenance of the conditions of stability of eco development – its aim is to preserve the resources conditioning stable development of the human civilisation by applying methods following the rule of minimisation of entropy sources.

The task of investments in the infrastructure of environmental protection is to make facilities and appliances for the protection and monitoring of the natural environment and to prevent the occurrence and spreading of negative consequences of human activity. The ecological infrastructure is composed of the systems and appliances, which mostly provide the services of water supply, sewage disposal and treatment, air protection and safe storage of waste.

In a broader sense, the infrastructure of environmental protection comprises both tangible and symbolic assets of the environment, i.e. its institutional components, which are necessary from the point of view of ensuring ecological safety by the state (the legal system, the system of institutions and organisations). Distinguishing the symbolic aspect of the infrastructure of environmental protection seems to be of key importance and it results from differences between its material and symbolic aspect. Symbolic elements of the infrastructure are developed in long, complex, sociocultural processes, whereas material elements require the implementation of appropriate investment processes. Apart from that, symbolic elements are usually much more durable than material elements and their degradation is longer. Material elements support sustainable development, but they are not the main factor consolidating and sustaining the development. Symbolic elements of the infrastructure are usually characterised by more durable and deeper influence on the effective achievement of the aims of development. Symbolic components of the infrastructure actually make the scale of financial support given to eco development and they also strengthen themselves. Both the symbolic and material ecological infrastructure should be adjusted to the changing strategy of eco development, which should be treated as a process which is being implemented rather than the state that needs to be achieved [Czaja 2001].

Environmental protection occupies a very important position in strategic documents, which are decisive to the implementation of the ecological safety policy in Poland. One of the main strategic goals of the National Security Strategy of the Republic of Poland, which is correlated with NATO's Strategic Concept and the European Security Strategy, is to protect natural resources and the natural environment from the consequences of natural disasters and the disasters caused by human activity [Leszczyński 2011]. The section of the Strategy discussing economic actions concerning security includes Paragraph 105. As results from the paragraph, actions increasing the ecological safety of Poland will concentrate on improving the state of the environment by continuing actions to improve cleanness of the air, water and soils and to ensure appropriate management of waste. The Strategy stresses the role of water management, which should be a priority in actions protecting the environment in the national economy [Strategy 2014].

Protection and improvement of the state of the environment is also one of the main goals of the Operational Programme Infrastructure and Environment 2007-2013 and 2014-2020. According to the National Strategic Reference Framework (NSRF), it is one of the programmes which is a basic tool to achieve the goals in the Framework by using the means of the Cohesion Fund and the European Regional Development Fund. The Regional Operational Programme is an element of the NSRF implementation system. It is a basic instrument of development used by regional government institutions. The priorities of the Programme include those that are strictly related to the development of the infrastructure of environmental protection. The aim of investments in the infrastructure of environmental protection is:

- to improve the quality of surface water and groundwater,
- to improve the quality of air,

- to minimise the amount of waste produced,
- to develop the system of waste recovery and disposal,
- to increase the use of unconventional sources of energy.

Between 2000 and 2013 the ecological infrastructure was systematically developing in Poland. The process was particularly noticeable in rural areas, which had been neglected in the previous decades. By 2013:

- the length of the water distribution network increased by 38%; the number of connections supplying water to residential buildings – by 41.4%, the number of residents with access to water distribution network services – by more than 14% (in 2013 76.6% of all Polish rural inhabitants used water from the water supply system),
- the length of the sewerage network and the number of its connections to residential buildings increased by nearly five times; the number of people with access to the network exceeded 16.7%; 30.9% of all rural inhabitants had access to services provided by the sewerage network,
- the number of collective communal sewage treatment plants increased from 1473 to 2491, whereas the percentage of the population with access to the plants increased from 14% to 35.3% of the total number rural inhabitants in Poland.

CONCLUSIONS

In contemporary economic sciences there is growing importance of the economic aspect of sustainable development, with due regard to its ecological aspect. We can hear about economics of sustainable development and global economics, where the need to modernise global economy ecologically is stressed. More and more often economy is placed in the environment, in nature and we try to achieve the state of equilibrium rather than an economic increase. Sustainability is stressed rather than financial values and there are suggestions to replace global issues with local problems [Zacher 2011].

In order to achieve the aforementioned assumptions ecological safety is placed in one of the key positions in the national security system. The state makes the management system and executive system for ecological safety and it defines which institutions at individual levels of the administrative division are in charge of ecological safety. In order to strengthen this system it is necessary to provide the ecological infrastructure to territorial units, according to their needs.

The article includes considerations on ecological safety and the significance of the infrastructure of environmental protection, which let us draw the following conclusions:

- among different threats to the contemporary world, ecological threats are as significant as military, economic, social, cultural, ideological and political threats,
- one of the fundamental tasks of a state is to ensure ecological safety. In order to achieve this goal it is necessary to meet particularly difficult requirements - protect the quality of man's natural environment and use natural resources reasonably,
- ecological safety can be approached from the point of view of elimination of threats to the natural environment and from the point of view of counteracting the emergence of such threats,
- the infrastructure of environmental protection plays one of the chief roles in ensuring the right standard of ecological safety. The primary aim in the development of the ecological infrastructure is to maintain the protective functions of ecosystems, maintain and expand animate natural resources, maintain the health and vitality of the resources and maintain the socioeconomic functions of the ecosystems,

- the development of the infrastructure of environmental protection is one of the priorities written in strategic documents influencing the implementation of the ecological safety policy in Poland and the EU.

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HOUSEHOLDS OF ELDERLY PEOPLE IN RURAL AREAS. LIFE SITUATION AND SOCIAL EXCLUSION

Abstract: The population in rural areas of Poland, just like in the majority of European countries, is aging. A reflection of this process is the fact that among the overall population, the category of single and double households of elderly people is growing. For many reasons, their socio-economic position may be more difficult than that of other groups. The purpose of the paper was to characterise a life situation and to define a scale of social exclusion associated with access to health services for this category of the population. Moreover, the individual and structural determinants of the described aspect of social exclusion of the respondents have been indicated. Empirical material used was the selected results of the studies conducted periodically by the IAFE-NRI in 76 villages across Poland. The study sample covered all families living in those villages. In the study, we used the method of statistical data analysis and qualitative content analysis. The survey carried out showed that almost one-fifth of all the families of elderly persons was socially excluded by the fact that their medical needs were unmet.

Keywords: elderly people, social exclusion, life situation, access to health services

INTRODUCTION

The rural population in Poland is aging. Due to the decreased number of births, average life extension and selectivity of migration processes, a large part of rural areas, particularly in the east and in the centre of the country is becoming depopulated [Szymańska, Biegańska 2014]. Among the overall rural population, the visible and large category is elderly people living alone and with another elderly person. For many reasons, their life situation may be more difficult than that of other groups of the rural community. The elderly population is usually characterised by the relatively worse state of health than the rest of the population. As the years go by, the incidence of various diseases and the risk of various injuries that often accumulate and restrict physical fitness are increasing [Pięcek 2005]. Intensified negative somatic symptoms are accompanied by deterioration of well-being, and, consequently, the increased demand for medical and rehabilitation services, often of specialist nature, as well as nursing care, medicines or other medical products. Therefore, what is important here, is appropriately frequent contact with healthcare institutions and other entities operating in this area. It is indicated that in a situation of reduced physical fitness, uneven distribution of healthcare institutions and the insufficient availability of transport means, a major barrier to the use of healthcare products and services for elderly rural residents is the physical distance [Shergold and Parkhurst 2012]. The specific position of elderly singles and couples living in rural areas is also determined by the lack of permanent support on the part of younger family members. The closest members of seniors' families usually left home or died [Frątczak 1993]. In connection with that, assistance to the elderly in need of access to medical services or performing daily activities, under favourable circumstances, is provided by their neighbours, employees of local public services or non-governmental organisation representatives. One of the reasons, but also a factor accompanying the poor health status of elderly people and low possibilities of its improvement is their difficult economic position. Elderly singles and couples living in rural areas are dependent on usually low pensions or other social benefits. In their case, what is more important for the quality of life than the level of income is often the fact that the basic material needs are

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unmet. The chances of improving the conditions of existence, particularly of people living mainly on social security, are lower than in case of the working population [Milburne, Doheny 2012]. These deficits with regard to health and living problems often also overlap with experiences of spending time mainly in one place with occasional interpersonal relationships, which may lead to deeper social isolation of single seniors and senior couples living in rural areas.

The issue of social exclusion in socio-economic studies is one of controversial subjects. What is particularly criticised is the ambiguity of this concept, its political connotations, as well as measurement methods [Mathieson et al. 2008]. This does not change the fact that this subject is undertaken frequently, particularly in the context of rural areas [Sibley 2006]. Seniors are often treated as a group particularly threatened by this phenomenon in these areas [Błędowski 2012]. Regardless of the fact that most of the studies regarding various dimensions and consequences of the aging process has applied so far to the biological (physical) and material aspect, little space has been dedicated so far to the socio-economic position of the category of single and double households of elderly people living in rural areas [Burholdt and Dobbs 2012]. The objective of the study was to characterise the life situations in this group, and, in particular, to determine the scale of social exclusion associated with access to health services, and to indicate the selected individual and structural reasons for this phenomenon.

DATA SOURCE AND METHODOLOGY

Empirical material used in this study was the selected results of panel studies conducted in 2011 by the IAFE-NRI in 76 villages across Poland. This study covered all families (farming and non-farming) living in those villages. The total number of the surveyed households amounted to 8,477. The sampling of villages was purposeful and reflected the socio-economic characteristics of rural areas in the country, particularly, the agrarian structure in regional and nationwide terms [Sikorska 2013]. The relevant information about rural families has been collected on a basis of a survey questionnaire. The subject of the analyses undertaken were households of elderly people, defined as **households with one or two members aged 60 years or more** (the term single and double households of elderly and elderly households were used interchangeably). For the purposes of describing the structural conditions of the life situation and social exclusion of the indicated category of respondents, also the data on the surveyed locations have been used. They have been collected by means of a special form (observation chart), so-called the *Village Characteristic*. It was a structured questionnaire containing open and closed questions addressed mainly to a village mayor or other leader of a local community (village). This information applied mainly to the condition of local social and technical infrastructure as well as the living conditions and socio-economic problems of rural dwellers.

In the paper, social exclusion is defined through the prism of the impossibility of human participation in the dimension of social life, which is considered significant. This approach is based on, *inter alia*, the following definition of social exclusion: *an individual is socially excluded if: (a) he or she is geographically resident in a society and (b) he or she does not participate in the normal activities of citizens in that society* [Burchardt et al. 1999, Szarfenberg 2010]. As one of such important aspects of collective life, healthcare is widely regarded. The right to medical services is considered a fundamental human right or social right constitutionally guaranteed to citizens [Piechota 2012]. Therefore, the impossibility of making use of health services was a manifestation of social exclusion addressed in the paper. Health-related social exclusion was defined according to the extent to which the respondents' health care needs were met, i.e. **when the degree of satisfaction was very unsatisfactory or unsatisfactory.** In the text, the methods of statistical analysis and qualitative content analysis have been applied.

HOUSEHOLDS OF ELDERLY PEOPLE IN RURAL AREAS: SOCIO-DEMOGRAPHIC CHARACTERISTIC, HEALTH STATUS AND STANDARD OF LIVING

From the data gathered by the IAFE-NRI it results that in 2011 households of elderly people accounted for less than one-fifth of all families living in the analysed villages. It is worth adding that in the previous years that rate was only slightly lower (in 2011, the percentage of households of elderly people amounted to 19.1% while in 2005 – 18.1% and in 2000 – 18.7%). More than half of that category was people living alone. In most cases, the situation of living alone referred to women. More than two-thirds of single households of elderly constituted women. Most often, their life situation was associated with the death of their spouse. In rural areas, women lived longer than men, on average. Therefore, the social composition and demographic factor were a reason for which single households of seniors were characterised relatively by the more advanced age. In their case, the median age was 76 years. Among them, a significant group was made of people aged 80 or more. Against that background, double households of elderly people were characterised relatively by the lower age. Half of the population, which formed those households, was not more than 72 years, and the structure of that category by age was relatively balanced. Among the families consisting of two elderly people, married couples dominated. The situations where two women or two men lived together were rare. These were the cases of families created by very old people (so-called long-lived people) and their children.

The life situation of the surveyed group of the elderly people was significantly determined by the health status. Statistical material documents the fact that in most cases it was fairly satisfactory (in all surveyed households, the health status was determined by one person only, most often, this person was the head of the family). As average (i.e. neither good nor bad), it was defined, in fact, by 39% of respondents from the households of elderly people. In turn, 34% of them declared that they felt good. Serious or very serious health problems applied to 22% of the respondents (from among all respondents aged 60 and more, 18% were characterised by poor health and 4% - by very poor health). It is worth stressing that in these terms, the elderly respondents did not differ significantly from the population of the remaining households. This latter category was represented in the largest numbers by the persons declaring the good and average health status. The results quoted should be interpreted as a reflection of the trend to a positive self-evaluation of health, visible in most age categories, also irrespective of the place of residence [Czapiński, Błędowski 2014].

On the basis of the information gathered, it may be concluded that the income situation of households of elderly people was similar to the level observed among the remaining families surveyed. Regardless of the fact that the value of income per household in the first of those groups was much lower and accounted for 39% of the average and 40% of the median recorded for the rest of the analysed families, the analogous *per capita* indicators were similar in both those communities. For some elderly singles and couples, of essential economic importance was the agricultural production. Most of those families produced food for their own purposes, thus limiting the consumption expenses. In case of non-farming elderly families (87% of all surveyed households of elderly people), the average share of food produced at home in the overall food consumption amounted to 19%. Running agricultural production intended for sale applied to few households of elderly people (8% of the respondents). In their case, agricultural income was not their main source of livelihood, although supplemented household budgets to a fairly great extent. The average share of agricultural income in total household income of elderly farming families amounted to 23%.

More visibly than the other surveyed families, the elderly households differed in terms of the standards of living. The level of equipping of houses belonging to elderly singles and couples in durable goods was relatively lower. This referred to, in particular, items allowing moving (e.g. means of transport) and having indirect contact with persons or institutions (mobile phone, Internet). For example, a car was available in less than every fifth household of elderly people, mobile phone

– in every third household and a computer with Internet access – in almost every seventeenth household. In case of the other surveyed families, the above-mentioned goods were generally available. It is worth pointing out that 52% of households of elderly and 58% of other surveyed families had landline phones.

HOUSEHOLDS OF ELDERLY PEOPLE AND SOCIAL EXCLUSION

From the IAFE-NRI studies it results that in 2011 social exclusion with regard to participation in the healthcare system applied to 17% of households of elderly people (Table 1). The members of that latter category rated the degree of meeting their health needs as very bad or bad (all the respondents defined the degree of meeting healthcare needs, both with respect to themselves and to their family members).

Table 1. Level of satisfaction with health care of rural households (in %)

Specification	no answer	very low	low	fair	high	very high
households of elderly	0.3	3.2	14.1	38.0	40.5	3.9
other	0.2	2.4	10.0	36.0	47.7	3.7

Source: IAFE-NRI surveys 2011.

An analysis of the information available indicates that in such cases negative ratings were associated mainly with the subjectively perceived health status. In other words, the worse was the health status of the respondents, the stronger they experienced deprivation of needs in that regard (among people with unmet healthcare needs. there was a large share of people with health issues). In addition, from the model analyses carried out it resulted that the poor health status had a positive and statistically significantly impact on the social exclusion as it increased the probability of deprivation of medical needs, *ceteris paribus*, by five times (Table 2).

Table 2. Determinants of health-related social exclusion amongst households of elderly

(logit model)

variable	coefficient	std. error.	t stat	sig.	odds ratio (in %)
constant	0.06	0.66	-4.24	***	-93.9
age	1.01	0.01	1.06		0.9
poor health status	5.92	0.14	12.53	***	492.4
sex (men)	1.04	0.15	0.25		3.8
car availability	0.88	0.21	-0.61		-12.0
single household	0.96	0.17	-0.22		-3.6
income	1.00	0.00	0.20		0.0

*Notes: ***p<0.001; No. of cases „correctly predicted"=1340(83%); f(beta'x) at mean of independent=0.378; McFadden R^2=0.108; Log likelihood ratio=-665.54; Likelihood ratio test: Chi-square (6)=160.49 (p=0.000)*
Source: own calculations based on IAFE-NRI surveys 2011.

Satisfaction with medical care did not associate significantly with other determinants analysed at the household level, i.e. with the socio-demographic characteristics of the respondents and the quality of their life. Both, the age gender household composition or living standard in this category

(e.g. level of income. car availability) did not play a significant role (Table 2). There has been no statistical significance of the impact of the above-mentioned factors on social exclusion related to access to healthcare.

When analysing health exclusion of elderly households, we must also take into account the considerations of general nature. From the observations carried out in the villages and interviews with the village mayors it results that less than two-thirds of the surveyed localities were situated at a distance of more than five kilometres from the nearest healthcare institution. The residents of nearly one-third of the surveyed villages had difficult access to medical care. The waiting time for providing basic medical advice and in particular, specialist service was significantly long. In many cases access to professional medical services in the field of oncology, cardiology, stomatology or geriatrics at the nearest healthcare institution was almost impossible. Also, the low level of services provided there was often considered a factor conducive to social exclusion of elderly patients, apart from the significant distance to the adjacent healthcare institution. In addition, almost every surveyed village was inhabited by at least several families living in poverty. The particularly difficult financial situation of households of elderly people which was also associated with reduced access to healthcare has been reported in more than one-third of the villages.

The studies conducted have documented that at the individual level for all surveyed rural families social exclusion of the households of elderly people was not widespread. Like other village residents the elderly most often rated the level of satisfaction of the needs with regard to medical care as high and slightly less – as average. To a large extent, that situation resulted from the overall satisfactory health status of the rural population. A significant proportion of the rural population due to well-being did not use medical services or used them occasionally which undoubtedly impacted the ratings of the activity of healthcare institutions and perception of inclusion or exclusion associated with that system. As an important determinant of the ambiguity of the opinions on satisfaction with medical care we should also consider the common especially among elderly rural residents' culture of independence self-reliance adaptation to difficult living conditions but also a lack of disposition to use support of public institutions including healthcare [Zanjani. Rolwes 2012]. Consequently, there were relatively few respondents who declared the poor health status among the elderly age categories. These were people with serious health problems and relatively most often dissatisfied with the healthcare system as well as declared their own needs in that area as unmet.

In case of the determinants which may have affected the ratings of access to health care in case of the elderly rural residents, such as age volume of income or car availability. There were no statistically significant relationships. The lack of clear relationships between the level of deprivation of medical needs and the individual characteristics selected for the analysis should be assigned to the relative homogeneity of the group of elderly people forming single and double households both in terms of the socio-demographic characteristics and living conditions. However, the analysis of the qualitative data collected in the analysed villages allowed to separate and describe the structural conditions at the local and national level likely to foster a sense of social exclusion in the elderly rural residents. First, they were associated with the spatial distance. In the vast majority of the villages there were no healthcare institutions and pharmacies. It should be added that in case of the analysed villages the possibility of using public or private transport was significantly limited (few runs. often in inconvenient hours). In general, the households of elderly people were not equipped with a car (more than 80% of the families in this category). In turn, elderly owners of vehicles due to their advanced age or health status usually were not able to drive on their own.

Secondly, social exclusion of the elderly people from health services should also be partially associated with the form of the local and national health and social policies. Particularly, the point here is the insufficient number of healthcare institutions lack of support in accessing them insufficient number of physicians with relevant specialisations as well as the low level of basic

medical advice. With regard to the situation of the elderly requiring long-term medical care attention is drawn to the inappropriate division of tasks among the public entities, the lack of system and comprehensive support for this category of persons and their families as well as the deficit in professional care institutions for dependent people [Golinowska 2010].

CONCLUSIONS

Elderly singles and couples constituted less than fifth family living in the analysed villages. The life situation health problems or disability of many of them could have fostered social exclusion. The studies carried out confirmed that with regard to almost every fifth household of elderly people in the villages, deprivation of medical needs were visible. Usually, this applied to seriously ill people who were in a difficult life and material situation. On the other hand, the information g at the level of the surveyed villages showed that in some cases the observed characteristics related to local social and technical infrastructure including in particular to the provision of health and transport services in conjunction with the unfavourable suburban location could translate into the adverse position of seniors with limited fitness or poor health.

The improvement in the situation of this category of the population should involve the introduction of changes in the health and social policy at the central and self-government level. In particular, they should apply to organising the health care and social welfare system and to greater cooperation in meeting the basic needs of the elderly population among the institutions responsible for the above-mentioned areas of the sectoral policy [Hoff 2008]. It is also necessary to improve access of elderly rural residents to medical specialists, nurses, specialised social workers as well as to increase public expenditure on nursing and long-term care. In addition, the quality of life of elderly people (especially those who are ill and single) would be improved by the appropriate activities of the local level authorities. In this context, the improvements are required in the system for diagnosing and monitoring social needs on the scale of rural areas as well as in the range of public services offered there in relation to transport. What is also indicated as desirable is to broaden support for seniors, especially those in advanced age (e.g. in the form of dissemination of providing at their homes some medical and care services and assistance in daily life activities).

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THE EXECUTION OF ECOLOGICAL SAFETY IN VIEW OF STATE DOCUMENTATION

Abstract: Ecological safety, which concerns access to natural resources and clean natural environment, the maintenance of biodiversity and adjustment to climatic changes is one of the elements of the National Security System in the Republic of Poland. The aim of the study is to present the legal regulations and strategic documents which make the framework for the functioning of the system and to analyse them for references to the ecological safety system. The article has a descriptive and analytical character. It analyses the documents which are national legal acts and strategic documents. As results from the analysis, state documents make a large number of references to the issues of environmental protection, which is a condition for the country to achieve the required state of ecological safety.

Key words: ecological threats, ecological safety, environmental protection, National Security Strategy.

INTRODUCTION

Safety can be defined as the ability to avoid or oppose threats or as the creation of this ability by a particular entity. The dangers against which the state needs to be secured may include different areas of its functioning. Thus, we can talk about political, economic, psychological and sociological dangers as well as threats to public law and order, military threats and ecological threats.

Ecological safety is generally defined as a desirable state of the natural environment, free from dangers causing imbalance in ecosystems and the biosphere. Ecological safety is approached in two basic aspects. The negative aspect consists in the elimination of threats to the natural environment. The positive aspect of ecological safety is identified with a wide range of ideas and concepts which should counteract the emergence of such threats. The latter aspect postulates reorientation of the current socioeconomic relations rather than elimination of threats, so as not to cause the development of an ecological crisis [Ciszek 2012].

Due to the fact that people are threatened by the consequences of imbalance in the natural environment, it seems particularly significant that we should counteract these threats or at least minimise them. In order to do it as effectively as possible it is necessary to construct an appropriate system in the state. Adequate legal regulations or formal guidelines in the form of documents issued by the state are the starting point for the construction of this system. These documents could be used as the basis for the implementation of particular actions by specific entities.

The aim of the study is to present the assumptions of the national security system so as to counteract ecological threats effectively. The study presents current legal regulations and strategic documents, which make the framework of the system. The author analyses these documents in terms of references to the natural environment protection.

The study has a descriptive and analytical character and it is based on the method of observation and intuition and partly on critical analysis. The study analyses the following documents, which are either national legal acts or strategic documents: the Constitution of the Republic of Poland, the Environmental Protection Act of 27 April 2001, the State Inspectorate for

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Environmental Protection Act of 20 July 1991, the Spatial Development Act of 7 July 1994, the Construction Law of 7 July 1994, the National Security Strategy of the Republic of Poland of 2014, the development strategy of the national security system of the Republic of Poland 2022 of 2013, the White Book of the National Security System of the Republic of Poland of 2013, the European Security Strategy, Safe Europe in a Better World of 2009.

TYPES OF ECOLOGICAL THREATS

Ecological threats are the most serious of numerous threats in the 21st century. The progressing global process of degradation of the natural environment is one of them. The ecological threat is a natural phenomenon or process which may deteriorate people's life situation due to disturbance in satisfying their needs, ranging from the most elementary ones, such as those related with life and health, to higher-order needs, such as those involving experiencing beauty. The disturbance occurs regardless of the will of an afflicted person or social group. Ecological threats are related with increasing pollution of the natural environment, which affects not only individual countries but also regions or even the entire global system [Wawrzusiszyn 2015].

Ecological threats include all factors which reduce citizens' safety in their use of environmental components, i.e. air, water, soil, mineral resources, flora, fauna, landscape, terrain and climate [Gajdzik, Wyciślik 2008]. An appropriate natural environment protection policy is a superior issue in ensuring ecological safety. The following elements are subject to protection under the policy: air, water, land, minerals, plants and animals. We can also distinguish the factors from which the environment is protected: noise, electromagnetic field, chemical substances, waste and other pollutants, extraordinary threats [The Environmental Protection Act of 27 April 2001].

At present the following ecological threats are the most alarming:

- air pollution, which considerably affects people's quality of life and often causes diseases [Raczkowski 2012];
- global change of climate, which mostly results from excessive emission of greenhouse gases due to the constant growth of industrial production [Serzysko 2014];
- loss of biodiversity, which affects the functioning of entire ecosystems [Raczkowski 2012];
- ecological disasters with considerable, long-lasting consequences, especially for the local community [Wawrzusiszyn 2015];
- water pollution, including the lack of access to clean water, which cannot be substituted, but it is necessary for life and development of production processes [Księżopolski 2011];
- increasing amounts of production and consumption waste, which remains a threat despite the waste management policy;
- threats resulting from excessive exploitation and depletion of natural resources [Dobrzańska, Dobrzański, Kiełczewski 2008].

The greatest threats to the environment resulting from human activities are related with excessive exploitation and pollution of its basic components, i.e. air, water and soil. The most serious consequences of air pollution include: climate warming, reduced ozone layer in the stratosphere, production of ozone in the troposphere, contamination of food chains on land and in oceans with toxic substances, increased acidity of surface waters (especially lakes) and forest dieback due to the impact of acid rain and sulphur dioxide.

The use of fossil fuels as energy carriers is considered to be the most important reason for the accumulation of greenhouse gases. The combustion of coal, oil and natural gas results in the production of large amounts of carbon dioxide. In the last century the content of carbon dioxide in the atmosphere has risen by 25%. The ecological balance is also violated due to deforestation, as trees absorb carbon dioxide in the photosynthetic process. Increasing population, industrialisation and agricultural production are the causes of rapid energy consumption.

Due to the fact that the greenhouse effect is regarded as the most serious problem related with the atmospheric air pollution there is a wide range of actions taken to reduce the hazards it involves. It is necessary to take the following strategic actions to limit the greenhouse effect [Dobrzańska, Dobrzański, Kiełczewski 2008]:

- reduce the rate of deforestation,
- increase the rationality and efficiency of use of primary and secondary energy,
- limit the emission of greenhouse gases from the industry and transport,
- propagate the new style of consumption, according to which the ecological character of goods will be an important factor affecting the demand,
- stimulate the actions which increase the binding of atmospheric carbon (the forestation of available areas).

The experience of many countries shows that there should be two directions of actions taken to counteract climatic changes. On the one hand, they should as much as possible concentrate on limiting the influence of human activities on the climate. On the other hand, they should concern the development of the methods by means of which individual species and entire ecosystems can adapt to climatic changes more easily [Lenzen, Murray 2010, Verschuuren 2010].

The threats of water management concern the situations involving the shortage and pollution of water. In both cases it is necessary to limit the use of water resources, but it is not always possible (e.g. in areas with long-lasting droughts, where people suffer and die due to the absolute lack of water). Water shortage is caused by many anthropogenic factors, such as climatic changes, overexploitation of groundwater, agricultural practices (e.g. irrigation and drainage), regulation of rivers and streams, changes in vegetation and deforestation of the Earth's surface, drainage of open pit mines and underground mines, pollution of water with sewage [Dobrzańska, Dobrzański, Kiełczewski 2008].

In view of the available water resources and the global rate of their consumption we can say that the threat of a water barrier in many regions of the Earth is increasingly likely to occur. The threat is particularly likely in the regions surrounding deserts in the Sahel in Africa, the Arabian Peninsula and Central Asia.

The anthropogenic effect on the Earth is mostly related with the contamination of soils with substances deposited by precipitation (washing the dust and gases emitted by industrial and communal sources from the air). It is also related with improper application of fertilisers and crop protection products, storage of waste, mechanical destruction of the soil cover and vegetation and defragmentation of ecosystems. The reduction of crop areas should also be treated as a loss of agricultural soils, because farmland is being developed into buildings, roads, industry and landfills, whereas farmland with poor soil is being forested.

The anthropogenic effect on the Earth is also related with the storage of waste, which is chiefly produced by the industry and households. The vast majority of waste comes from the industry. Industrial waste chiefly comes from coalmining, power engineering, metallurgy, extraction of mineral resources and, to a lesser extent, from the agri-food industry. The waste is largely unsuitable for commercial use and therefore it is stored. On the other hand, communal waste is chiefly produced by households, public facilities and places providing services for the community. The amount of this waste is closely related with the level of individual consumption.

To sum up, ecological threats are related with ecological disasters, improper use of natural resources, inappropriate safety standards in industrial production, contamination with industrial and hazardous waste and soil erosion caused by too intensive agricultural production [Wawrzusiszyn 2015].

LEGAL REGULATIONS BEING THE BASIS OF THE STATE ECOLOGICAL SAFETY SYSTEM

The following documents set standards for the functioning of the State Security System and the ecological safety subsystem, which is part of it: the Constitution of the Republic of Poland, the Environmental Protection Act of 27 April 2001, the State Inspectorate for Environmental Protection Act of 20 July 1991, the Spatial Development Act of 7 July 1994, the Construction Law of 7 July 1994, the National Security Strategy [Gierszewski 2013].

Poland has appropriate rules and regulations, which guarantee following the state ecological safety policy. The superior task of the Polish ecological safety system is to create appropriate conditions for organised activity to prevent or counteract the consequences of events causing ecological threats, to manage rescue actions and to restore the original state of degraded natural environment [Wawrzusiszyn 2015].

The ecological safety system is a component of the state security system, which should be understood as all forces (entities), means and resources used by the state to carry out security tasks, which are adequately organised into subsystems and links, prepared and maintained [Poskrobko, Poskrobko 2014]. The state security system consists of the management subsystem and executive subsystems. The management subsystem comprises the management of the state defence, general management of defence and crisis management, which is the most important element of the subsystem from the ecological point of view. One of the fundamental goals of the crisis management system is to ensure an appropriate ecological safety standard by effective prevention of all types of ecological threats. If these threats appear, it is necessary to restore the original state as soon as possible. In the executive subsystem ecological safety is executed within the protective part of the operating subsystem. We can distinguish two areas in this subsystem. The first area is responsible for monitoring ecological threats, whereas the other area is responsible for reacting if an ecological threat occurs [Poskrobko, Poskrobko 2014].

According to Article 5 of the Polish Constitution, the Republic of Poland guarantees safety to its citizens and provides environmental protection based on sustainable development.

According to Article 74, it is the public authorities' duty to protect the natural environment, so the authorities lead a policy that guarantees ecological safety to the present and future generations. Apart from that, it is written in the Article that everybody has the right to be informed about the state of the natural environment and its protection and the public authorities support citizens' actions to protect and improve the state of the environment [The Constitution of the Republic of Poland].

The Constitution makes an important reference to environmental protection based on sustainable development, which ensures the integration of economic, environmental and social goals. The pursuit of ensuring ecological safety of the state through the implementation of this rule guarantees that the natural environment protection is not an issue that is left behind the problems of socioeconomic development. It is a perfect starting point to make the ecological safety system a significant element of the state security system.

The Environmental Protection Act of 27 April 2001 is also based on sustainable development. It is used for constructing the rules of environmental protection and conditions of using its resources (Article 1). All policies and strategies in the industry should allow for the rules of the natural environment protection and sustainable development (Article 8). Chapter 2 of the Act concerns the monitoring of the natural environment by the state and spreading information, which is a very important element of the state security system. The whole Part II of the Act concerns the protection of environmental resources. Article 82 is about setting quality standards for the environment and limiting pollution, which is a matter of key importance from the point of view of ecological safety.

The issues of using resources, providing access to them and saving them for future generations are key elements guaranteeing ecological safety in the state.

The State Inspectorate for Environmental Protection is a state institution that controls the entities using the environment [The State Inspectorate for Environmental Protection Act of 20 July 1991 (Official Journal No. 77, Pos. 335)]. The activity of the Inspectorate chiefly consists in monitoring the environment. The institution develops state programmes for monitoring the environment, coordinates the tasks of monitoring the environment by the state, gathers and processes information about the environment, assesses the state of the environment, makes reports about the state of the environment and participates in international exchange of information about the state of the environment [The State Inspectorate for Environmental Protection Act, Article 2, Paragraph 2]. In Article 2, Paragraph 4 of the Act we can read about the duty to prevent major failures and supervise removal of the consequences of these failures. It is also a task of the crisis management system. According to Article 25b, the Chief Inspector for Environmental Protection is obliged to make a report about the state of the environment in Poland at least once in 4 years. Information about the state of the environment is an indispensable element of the ecological safety system.

The Spatial Development Act of 7 July 1994 [Official Journal No. 89, Pos. 415] defines the range and procedures in planning the use of areas for particular purposes and it sets the rules of management of these areas, which are based on sustainable development. Apart from that, the Act indicates that spatial development must be particularly concerned about the requirements of natural environment protection, health, the safety of humans and property, the state defence and security. Thus, we can say that the Act provides fundamental legal basis for the state security policy.

The Construction Law of 7 July 1994 [Official Journal No. 89, Pos. 414] also makes references to environmental protection. Article 5 imposes the duty to design and construct a building or structure according to the requirements of environmental protection. It should guarantee protection from noise and vibrations, have adequate energetic characteristics and rational energy consumption.

The examples of legal acts presented above make the basis and provide the opportunity to implement the ecological safety system effectively so that it can be a significant basis for the state security system.

STRATEGIC DOCUMENTS BEING THE BASIS OF THE STATE ECOLOGICAL SAFETY SYSTEM

The legal acts guaranteeing ecological safety of the state are supplemented by strategic documents. One of the essential documents is the National Security Strategy, which defines Poland's fundamental interests and strategic goals concerning national security in agreement with the Constitution of the Republic of Poland. The document was approved by the President of Poland on 5 November 2014 and it replaced the National Security Strategy of the Republic of Poland issued in 2007 [Wawrzusiszyn 2015].

The National Security Strategy is correlated with allied strategies, i.e. the NATO Strategic Concept and the European Security Strategy. One of the main strategic goals is to protect natural resources and the natural environment from the consequences of natural disasters and disasters caused by the human activity [Leszczyński 2011]. According to the document, actions increasing ecological safety will be concentrated on improvement of the state of the natural environment, maintenance of biodiversity and adaptation to climatic changes especially by providing for the need to ensure appropriate investments in low-emission sources. The environmental protection will consist in the continuation of actions for the improvement of cleanness of the air, waters and soils and in adequate waste management (Paragraph 105). According to the strategy, it is equally important that water management should be a priority for the entire national economy. The

document includes all the most important elements concerning the natural environment protection, which are also included in the state ecological policy [The National Security Strategy 2014].

On 9 April 2013 the Council of Ministers made a resolution approving the National Security System Development Strategy for the Republic of Poland 2022, which resulted from the National Security Strategic Review carried out at the President's order between 2010 and 2012 and it resulted from the President's proposals included in the White Book of the National Security of 2013 [Wawrzusiszyn 2015]. The strategy defines the role of the entities in charge of external security of the state. The entities are treated both as direct users of the environment and as a real power which could actively create pro-ecological actions at a local level. This is also done by increasing professional staff's awareness of environmental protection.

According to the strategy, the support given to environmental protection and actions taken by the security sector for the water management result from the need to mitigate the impact of the sector infrastructure, especially the impact of military facilities on the environment. It is necessary to continue actions aimed at the maximal use of technology and pro-ecological solutions and to meet the EU's basic standards of air protection, protection from noise and vibrations, waste management, provision of high quality drinkable water, rehabilitation of degraded areas, increasing forest resources and flood prevention.

The White Book of the National Security of the Republic of Poland of 2013 was written as an open presentation popularising the results of the National Security Strategic Review. According to it, the EU programme Natura 2000 is an important element of environmental protection in Poland as it forms the common European natural environment protection system. In Poland the programme encompasses about a dozen per cent of the country's area, which improves the state of the natural environment. On the other hand, it limits the possibility to exploit natural resources or develop infrastructure (including power supplying infrastructure). Apart from that, the Book makes references to the problem of climatic changes, which may cause usually disastrous consequences, which are difficult to specify now and which people are not fully aware of at the moment. They have increasing influence on the security of countries, including Poland. Global warming is a noticeable tendency of the long-term change. According to the data provided by the most representative body of the Intergovernmental Panel on Climate Change, climate warming is unquestionable and it is noticeable in the increase in the global mean temperature of the air, the temperature of water in oceans and seas, the melting of glaciers and the rising average water level in oceans and seas. The emission of greenhouse gases mostly results from a business activity. The gases, especially carbon dioxide, concentrate in the air and are responsible for the global warming (scientific research centres do not fully agree about it, though) [The White Book of the National Security, 2013]

All assumptions of the National Security Strategy of the Republic of Poland result from the European Security Strategy, which the Council of Europe accepted in December 2003. For the first time it set the rules and clear goals concerning the execution of the EU's security interests based on our fundamental values. Some of the main goals are to implement actions preventing climatic changes, to mitigate the conflicts resulting from the degradation of the environment and to compete for natural resources [The European Security Strategy, Safe Europe in a Better World, 2009].

CONCLUSIONS

Ecological safety is chiefly related with access to natural resources and clean natural environment, the maintenance of biodiversity and adjustment to climatic changes. Ecological safety can be understood as the elimination of threats to the natural environment and as prevention of these threats. This interpretation of ecological safety fits the idea of sustainable development very well. It is necessary to stress the fact that it is a constitutional standard of the Republic of Poland. It assumes

that the socioeconomic development of a country must be harmonised with the natural environment [Ciszek 2012].

The Constitution of the Republic of Poland and a wide range of laws which are related to the natural environment protection due to the subject matter are some of the legal instruments which are decisive to the implementation of the ecological safety system. The legal acts are supplemented by strategic documents, which in Poland are in agreement with the European Security Strategy. They are necessary elements for the functioning of the national security system and its subsystem, i.e. ecological safety, because they give a possibility to specify the chief assumptions included in legal acts. However, the tasks enabling the solution of basic ecological problems are not specific enough and the tools which are supposed to encourage individuals to take pro-ecological actions are unsatisfactory and not very effective. The legal acts and state documents related with the ecological policy executed in Poland are surely the starting point for the construction of the proper ecological safety system. It is only necessary to introduce legal measures so that entities are encouraged to fulfil the postulates included in the documents.

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SOCIAL EXCLUSION AND ACCESS TO HEALTHCARE SERVICES IN POLAND

Abstract: On the background of European Union member states Poland belongs to the group of countries with higher than average level of exposure to social exclusion. According to the EUROSTAT estimates, in 2013 Poland's population at risk of poverty and social exclusion represented 25.8% of all citizens.

The aim of the paper was to analyze the organizational and legal solutions in the Polish health care system, which are intended to provide access to health services for people at risk of social exclusion.

Overview of legal solutions shows that a relatively high level of protection was provided to all social groups. Both the constitutional provisions and laws form the basis for medical coverage for all citizens. Another problem is the practical implementation of legal solutions, which implies restrictions on the access to services for the homeless.

Analysis of secondary data available from the Social Diagnosis indicates the strong impact of the financial factor as defining the ability to fully benefit from the protection of health. In the case of of pharmacological treatment and dental percentage of people declaring difficult access to treatment fluctuates within 15-16%.

Key words: Social exclusion, poverty, healthcare.

INTRODUCTION

Social exclusion is an area of interest both in terms of pure science, as well as in the context of the activities carried out under a wide range of national policies. Considering the multi-level nature of this phenomenon becomes a necessity of to consider it as a the specific system of links, existing between different areas of living and social activity of groups affected by the problem mentioned above. It is a kind of obligation to include in this wide range of issues also those related to the health of individuals and communities, and activities aimed at preservation and improvement of health status. As evidenced by the numerous of research persons traditionally classified as marginalized groups usually enjoy poorer health than the rest of the population [Morgan et. Al. 2007 Santana 2002]. In this context, it is of particular importance to guarantee access to health care services for those groups. This study aims to assess to what extent the problem of access to services for excluded people was reflected in the legislation, policy documents and in the practice of healthcare institutions.

Putting social exclusion in a historical perspective it should be noted that this concept is formed parallel to the modern way of understanding poverty, but not in isolation from it. Very strong influence on contemporary understanding of exclusion has had the formation of a dichotomous division between absolute and relative poverty. Perceiving the fact that poverty is not limited to a situation of deprivation of the resources needed to meet basic needs was a clear breakthrough. Supporters of the recognition of poverty in relative perspective - in relation to socially acceptable standards, limited the use of criteria refering to financial capacity to satisfy basic needs, which was often regarded as crucial in the process of adjudicate whether a person is poor or not. According to the proponents of this trend describing the living conditions must take into account not only the ability to survive, but also the quality of life related to socially acceptable norms. Referring to the views of one of the 'fathers' of the new concept - Peter Townsend [1979[

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should be emphasized that the persons ability to be active and regular participation in social life became an equally important criterion. In practice, this new perspective resulted in the creation of new (higher than absolute) indicators of income of households. However it is more important, that it led to a change in thinking about poverty, which turned out to have a direct impact on the development of the concept of social exclusion, by drawing attention to the ability to participate in social life.

Considering the social exclusion it should be noted that most researchers are compliant about the fact that we are dealing with a complex and multidimensional phenomenon. This complexity led to adopting distinct perspectives on how to define the very concept of exclusion. It will be very helpful at this point to refer to the review of specific definitions made by H. Silver. In her opinion, based on a literature review it is possible to indicate several different paradigms within which are made efforts to explain the phenomenon of exclusion [Nowak 2012]. These are:

- The paradigm of solidarity, based on republican view, which describes social exclusion as a situation of breaking the social bonds between the individual and society (social solidarity). The process of exclusion is depicted as a form of self-defence used by the group, which perceives persons not following group norms as a threat to the existing cultural order. The mechanism of action implemented by the group leads to reducing any contact with these individuals and creates certain barriers in order to weaken the ties between a group and the outsiders.
- The paradigm of specialization, referring to liberal views. The reason for the exclusion is the ongoing processes of specialization taking place in the society. In this case, the exclusion of individuals is determined by the fact that they do not participate in the social process of profitable exchanges. The source of this state of affairs are usually various forms of discrimination, which can affect individuals as well as entire social groups.
- Monopoly paradigm, referring to the social-democratic ideas - it suggests links between social exclusion and the existence of monopolising groups. Groups that are in a privileged position in this case seek to maintain exclusivity for certain resources and benefits. Social exclusion is a consequence of the emergence and monopolistic groups that seek to maintain current inequality for their own benefits.

Regardless of the approach to explaining emergence of social exclusion, for the purposes of this study is adopted the definition contained in the National Strategy for Social Inclusion, where it was recognised that social exclusion is "(...) the absence or limitation of opportunities to participate, influence and use the basic public institutions and markets, which should be accessible to all, especially the poor. " [Narodowa Strategia Integracji Społecznej 2004]

Considering the scale of the threat of social exclusion it should be noted that referring to other EU Member States, Poland is characterized by a higher than EU average percentage of people at risk. However in the light of the latest available data from Eurostat it appears that the difference is small. In 2013, the percentage of the population at risk of social exclusion in the EU was 24.5% while for Poland it was estimated at 25.8%. Since 2005 Eurostat survey indicate a permanent decline in the level of risk exclusion in Poland (from 45.3%). The opposite trend can be observed in recent years at the level of the whole European Union, which can be attributed to the period of economic slowdown and problems in countries such as Spain, Portugal, Italy or Ireland [Eurostat 2015].

A closer look at the issue of social exclusion in Poland leads to identification of the presence of several factors that predispose people to greater exposure to exclusion. In particular this are factors such as household income and individuals education. Considering the two groups, which in terms of economic situation are in opposition to each other it should be noted that the degree of their exposure to social exclusion is far disproportionate. In the households with lowest income (I-st

quintile) almost 92% of people are considered to be at risk of social exclusion. As a comparison, in the group of attaining the highest income (IV-th quintile) the problem of the threat of exclusion concerned only 7.1%.

Individuals situation is determined significantly by his/her level of education. Among the graduates of lowest levels of education (primary and secondary school (gimnazjum)) at risk of exclusion was over 42% of population. For a group of people with vocational, high school or post-high school education proportion of population at risk of exclusion amounted to 27.2%. Along with the Higher Education exposure to the exclusion is considerably diminished and only 8.5% of people who graduated universities are considered to be at risk of exclusion. The analysis provided by Eurostat raises the issue of the impact of the level of education of parents on their children's living conditions. The results indicate that less educated parents significantly increase the exposure of the child to social exclusion. The group threatened with social exclusion included nearly 77% of children raised by parents with lower secondary education or less. For comparison among children of parents with higher education, only 8.9% were considered at risk of social exclusion.

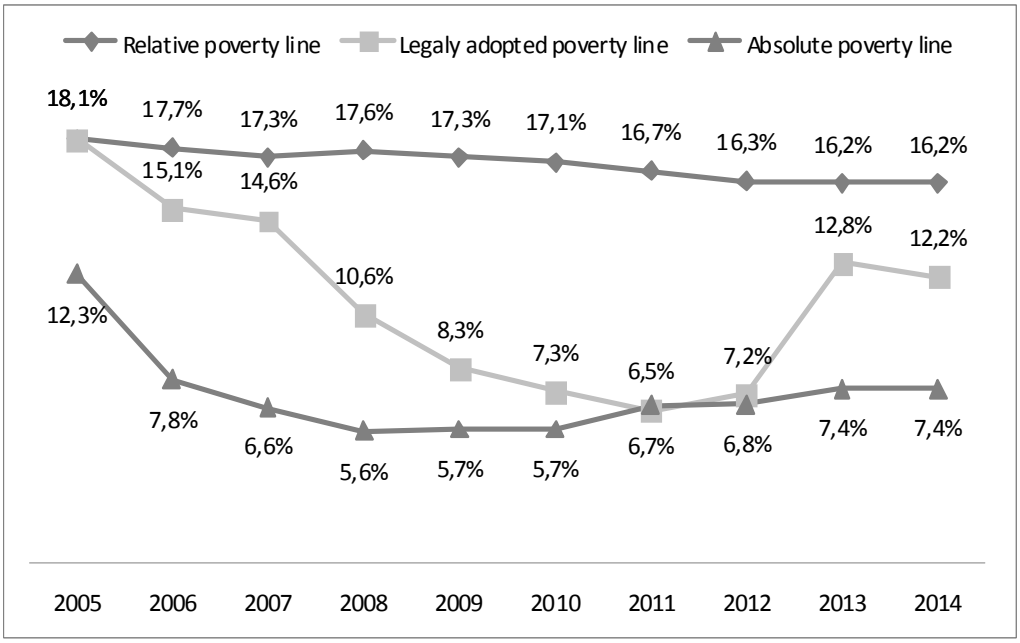

Figure 1. Population at risk of poverty

Source: GUS [2015]

As noted in the introduction, even though social exclusion is not synonymous with poverty it remains strongly associated with this phenomenon. It is reasonable to believe that the two phenomena may pose to each other a kind of catalyst. On the one hand, social exclusion translates itself very often into fewer capabilities or lesser ability to gather financial resources. On the other hand less material resources at the disposal of the individual may hinder their full participation in society, thus leading to the marginalization of social life . For this reason, it is impossible to make a reflection on social exclusion without the problems of poverty and, above all, without specifying the

scale of this phenomenon. By analyzing available statistics on absolute poverty, one can notice that in the last decade can be distinguished period of significant fall in the number of people living below the living wage (2005-2008), followed by stabilization and a gradual increase in the number exposed. These changes are illustrated in a graph [Figure 1].

METHOD

For the purposes of this study author conducted a systematic review of existing legal acts regulating issues of social security and organization of healthcare services. Additionally, a review of national strategic documents was performed in order to find references to the topic of this study. The analysis was expanded to include a review of available literature.

RESULTS

In the context of functioning health systems, issues of poverty and exclusion are now quite often raised due to its link to the problem of inequalities in health. Noticing the correlation of these phenomena with a worse state of health of people affected should naturaly lead to taking measures that will limit this undesirable state. As noted in the European Commission's Communication "Solidarity in health: reducing health inequalities in the EU" in 2009 people with lower education, a lower occupational class or lower income tend to die at a younger age and more often. Also, groups that are socially disadvantaged and at risk of social exclusion are characterized by a particularly poor average levels of health and suffer from the most common diseases. The group whose state of health is considered to be significantly worse than the rest of the population includes residents of disadvantaged areas and people at risk of poverty, the unemployed and employed illegally, homeless, disabled, mentally ill or chronically ill, the elderly receiving low pension and single parents (European Commission 2009). Basically, if you take applied quite commonly division of social exclusion for physical, structural, normative and material one can notice that the health consequences are relevant to each of these categories of exclusion. It is therefore particularly important to ensure that designated groups have proper access to health services.

Such an assumption probably motivated authors of the National Social Integration Strategy 2004, which document can be seen as the first strategic document taking the issue of access to services for people who are excluded. The strategy identifies three categories of recipients of health services:

1. bearing the cost of healthcare system operation and benefiting from all acquired in this manner possibilities;
2. not bearing the cost of system's operation for various reasons, most often socially accepted, but using all its capabilities within the principle of solidarity and at the costs for the other insured;
3. persons with limited capabilities of using the system, but not bearing the costs of its action.

Usually the last category is considered as the one in which case we can talk about the potential threat of exclusion from access to health care services. Records of the strategy were, however, quite general in nature, which drew the attention of, among others, C. Wlodarczyk (2011) referring to the provisions of the strategy as follows: "(...) The barriers to accessing were treated as a disabling factor, but issue of participation of various dimensions of social position on health have not been developed (...)".

Issues related to living conditions and its impact on health could not be skiped in the National Health Programme (2007) 2007-2015, which among the strategic objectives also mentions reduction of social and territorial disparities in health status of the population. One of the adopted directives for action in this area is: "(...) to reduce inequalities in health in groups with worse health status in areas neglected materially, with large scale of unemployment, in the regions and local centers with

worse indicators of environmental quality, in the regions and community centers with poor infrastructure, hindering access to health (...) ". What is interesting though, that the National Health Programme is often mistakenly regarded as a sectoral document (ie. Applying solely to the health care system), such definition of its general aim clearly indicates that its implementation based only on the capabilities and resources of the healthcare sector would have no raison d'être. As noted, desired improvements can be achieved by changing the existing allocation of funds for health and social benefits in a way allowing for aligning existing differences. On the other hand, it is quite a distinctive that an important role in achieving the objective described above was attributed by authors to the activities in the primary health care (PHC), indicating the need to introduce changes to ensure full patient access to primary health care (admitimg on the day of application) as well as the need to develop within the PHC sector mechanism aimed at groups at risk of poverty and social exclusion. Unfortunately, as with the Social Inclusion Strategy topic has not been developed.

Overview of NHP operational goals also allows you to find references to specific factors that contribute to social exclusion, such as disability, age or addiction. For the first of these groups was assumed the need to promote the creation of conditions for the active life of people with disabilities by:

- Increase participation in social life (mainly by improving access to educational, cultural and health services)
- limiting functional barriers hindering the life of people with disabilities (eg. By changing construction regulations)
- an increase in professional and social activity.

Quite similar is also operational objective of the program addressed to senior citizens. What draw attention in this case is the selection of effects that are suppose to prove achievement of the objectives. While two of them (ie. Reducing the incidence of disability, chronic diseases and premature deaths in people over 60 years of age and a reduction in the prevalence of risk factors for non-communicable diseases in the elderly population) can be taken without reservation, considering as another effect the issue of promoting the idea "active aging", seems to be a misguided idea, with regards to difficulties in proving that it translates to the improvement of health. Similar objections brings treating in such terms effect of obtaining "(...) by older people feeling of full health, security and active participation in economic, cultural, social and political life." It is not clear what would be the measure for effects defined in such way, thus it will be difficult to assess the effectiveness or ineffectiveness of the actions of the bodies responsible in this issue.

Moving from a strategic dimension to legislative solutions should be noted that seemingly any doubts with regard to access to healthcare services resolves the constitutional guarantee of protection of the health of all citizens [Constitution 1997]. However, closer look at the practical solutions applied in Polish health care system enables you to notice that despite the relatively wide access to health services for people at risk of social exclusion there have emerged several issues which demonstrate the lack of planned strategy to solve the problem of access to health care.

One of the main interpretation determining entitlement to health care in Poland is the Act on healthcare services financed from public funds [2004]. In its records it distinguishes three categories of persons entitled to use healthcare services. These are respectively:

- individuals covered by the common - mandatory and voluntary health insurance
- other than the insured persons with Polish citizenship and having their residence on Polish territory that meet the income criterion for entitlement to social care
- other than those referred previously, people with Polish citizenship and having their residence on Polish territory under the age of 18 years or over the period of pregnancy, childbirth and the postpartum period.

Due to the above-mentioned assumptions but also the living conditions to authorized to use healthcare services are also:

- unemployed;
- scholarship recipients; during the period of training, apprenticeship or vocational training of adults;
- persons receiving pre-retirement allowance;
- persons receiving permanent social assistance;
- people receiving care or an addition to the family allowance for single parents who had lost the right to unemployment benefits due to the expiry of the statutory period of its collection;
- homeless people coming out of homelessness;
- persons under the individual program of social work or performing social contract.

Taking into account all this the provisions and considering them as giving de facto entitlement to benefits to society as a whole, attention should be drawn to the particularly difficult situation of one group of patients - individuals who are homeless. Under the current Polish regulations for services provided to a homeless person account should be covered by the Social Welfare Centre (OPS). OPS is not obliged to issue a certificate which declaring its will of payment for the services and a homeless person does not need to have such a certificate, therefore, all cases in which admittance of homeless patient depends on having such a declaration is unlawful [Stychlerz 2009 Porowska, Wygańska 2012]. Experience shows, however, that healthcare providers, fearing problems with receiving funds from OPS, will refuse to accept a homeless person, unless he or she has been authorized to charge the Social Welfare Centre for medical costs [Wlodarczyk 2011].

The problem was undertaken by, among others, The Ombudsman, who concluded that both the Social Welfare Act, and health insurance regulations do not give the homeless a real access to health services, due to the complexity of the procedures (Market Health 2011). Sort of solution of the problem from the perspective of healthcare providers was recruitment of social workers who mediate in completing the procedures for obtaining charges for treatment of patients covered by social welfare benefits.

In the context of access to treatment it would be difficult to ignore the aspect fees paid directly by patients, especially those related to pharmaceutical treatment. For the majority of patients affected by social exclusion, such costs are a significant barrier to access. Portrayal of the problem may be results of the Social Diagnosis study [Czapiński, Panek 2015], where, among other questions respondents were asked about issues related to the cost of health care.

According to a report of a survey conducted in 2013, the average quarterly spending on medicines in 2013 amounted to 423 PLN and was about of 50 PLN higher compared to 2011. At the same time, expenditures in this area were declared by 91% of households. For comparison outpatient treatment services were used by 39% of households, and their expenditure on this account amounted to an average of 596 PLN per quarter of a year. In the context of the analyzed subjects one of the most important information is the scale of resignation of services. The Social Diagnosis indicate that the largest scale of resignation occurs in the case of purchase of medicines and dental treatment. Cancellations of purchase of these benefits was declared respectively by 16.9% and 16.2% of households surveyed. Most often cancellations occurred in households of people living of unearned sources of income. In this group cancellations of purchase of medicines reached 45%, and nearly 12% of the respondents declared they had to give up hospital treatment.

Negative impact on the availability of health care services may be the effect of ownership transformation of healthcare providers, to some extent forced upon the local government units by the Law on medical activity. As pointed out by previously quoted C. Wlodarczyk [2011]. "For the poor and marginalized situation - apparently - has not changed and hospitals operate as before. But

keep in mind about mental changes, especially among management of facilities. The emphasis on economic efficiency, highlighting the issue of financial balance and avoiding debts makes it difficult to care about the mission of a hospital. This - as the name suggests - has traditionally been treated and seen as an asylum for people who are in a difficult situation. In Poland there exist the term " welfare patient", often elderly, helpless, sick. Against the pressure on efficiency, such patients, deriving from the poor and excluded, they will be treated as a burden, leading to trouble."

CONCLUSION

Considering the current legal system, it should be noted that it forms a broad guarantees of access to health care services for the general public, including marginalized groups. However, the practice used by some providers and the overall design of the system, causing shifting part of the cost of treatment on the patient, raises serious concerns about its ability secure properly the health needs of disadvantaged groups.

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Baha Kalinowska-Sufinowicz[7]

DEMOGRAPHIC AND ECONOMIC SECURITY AS CRUCIAL DETERMINANTS OF ACHIEVING SOCIAL SECURITY IN POLAND

Abstract: The aim of the article is to present and discuss selected determinants of achieving the conditions of social security in the state on the case of Poland in the years 1990-2015. Taking into account the trends taking place in the society and the economy in Poland in the years 1990-2015, the research hypothesis assumes that crucial elements of the Polish social security is to achieve demographic security, which, in turn, is determined by attainment of economic security.

In the article selected priority conditions for the attainment of social security in the state are discussed with attention paid to the system determinants. On the basis of the classification of social security, the demographic and economic security are indicated as its fundamental elements. It is important that there are mutual dependencies between these two categories. At the end the conclusion and proposals for changes in family policy and to the labour market are demonstrated.

Key words: social security, demographic security, economic security, labour market, women.

INTRODUCTION

The main goal of the article is to demonstrate and discuss selected conditions of attainment of social security in the state. The spatial scope comprises the territory of Poland, and as a time frame the years 1990-2015 were chosen. The evaluation of the trends taking place in the Polish society and economy in the years 1990-2015 allowed to formulate the research hypothesis that crucial elements of social security of Poland are the attainment of demographic security, which, in turn, is determined by achieving economic security.

The structure of the article is as follows. At the beginning the concept and the elements of social security are demonstrated. Then the system conditions of social security are indicated, as well as analyses of demographic and economic security in Poland are studied. At the end the interactions between demographic security (and situation) and economic security (and situation) are indicated.

CONCEPT AND ELEMENTS OF SOCIAL SECURITY

Consideration on the economic and demographic security should start from the general definition of social security, and then demonstrating its important elements. J. Świniarski [2008, p. 18, after: Korczyński 2015] as social security understands such a condition of the society, which provides not only its survival, but also its development.

This definition can be considered from the point of view of a large number of criteria. One of them is the entity responsible for the achievement of already mentioned condition of the society. It is worth noting that it can be both the state and its bodies, and other entities of the national economy, such as enterprises, non-profit organisations or households. Another criterion is time. This definition is presented from the static view, however, social security can be considered in the dynamic terms as a process to ensure the survival and development of society.

From another perspective, social security is defined by A. Skrabacz [2012, p. 9]. She states that social security is a protection of the existential rudiments of human life, providing the possibility of satisfying individual needs (physical and spiritual ones), the realisation of life aspirations by creating conditions for work and learning, health and pension guarantees. This way of conceiving strongly refers to activities undertaken within the framework of social policy of the state. It should

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be underscored that social security is often indicated as an objective, achieving of which is in the responsibility of this kind of state policy.

In order to effectuate the classification of social security, the elements of security should be demonstrated, which are drawn to attention by P. Sienkiewicz [2010, p. 32-34]. The author within the framework of widely understood security distinguishes:

- national (political) security,
- economic security,
- technical security,
- medical security,
- ecological security,
- social (societal) security.

Undoubtedly, from the point of view of the currently observed changes of the structure of the society, this list should be complemented by demographic security, which can be considered as a part of social security, however, due to its importance, it is worth abstracting and considering separately. According to P. Sienkiewicz, the state is the object of security policy, the object of this policy is the society, but the subject of it – is social security [Gierszewski 2013, p. 71]. It can therefore be concluded that social security is a permanent trait of broadlyunderstood security and is an important goal of security policy.

SYSTEM DETERMINANTS OF SOCIAL SECURITY

The scope of the activity of the state in the sphere of creation of social security in the country can be determined by system factors which are specific to the state, resulting from certain views of axiological nature. Depending on the state's dominant socio-economic policy, it may be implemented in different scopes and according to different models [Kalinowska-Sufinowicz 2013, p. 49-50].

In the neoliberal system of market economy (which is also called a Anglo-Saxon system) the state policy for the creation of social security is mainly characterised by forming of modern legal and institutional infrastructure and by legislation that clarifies the standards and the rules of the game. The neoliberal framework of functioning of market economy are thus to trigger a broadly understood entrepreneurship in the society for the creation of social security on its own in accordance with the motto that *every man is the architect of his own fortune*.

The most extensive role of the state in making socio-economic policy can be observed in the social-democratic system of market economy (also called Nordic system). The main premise in this system is the thesis about social benefits flowing from a certain limitation of economic freedom in favour of the state regulation activity. With such a style of making of socio-economic politics, there is a tendency to replace the functioning of the market by the state activities and creating their own solutions aiming to achieve social security.

DEMOGRAPHIC SECURITY OF POLAND

The fundament of social security is to strive for the survival of society, which implies its link with achievement of demographic security. The observation of changes in both numbers and the structure of population in Poland, leads to the conclusion about the gradual deterioration of the situation of the population in our country [Rosłon-Żmuda 2013, p. 178]. These changes are the result of the presence of many processes. The primary reason is reduction in women's total fertility rate (TFR). In Poland, the value of this indicator declined from 1.991 in 1990 to 1.390 in 2014 [CSO 2015a, s. 295], what allows for stating a very deep depression in the number of births [Kalinowska-Sufinowicz 2013, p. 69].

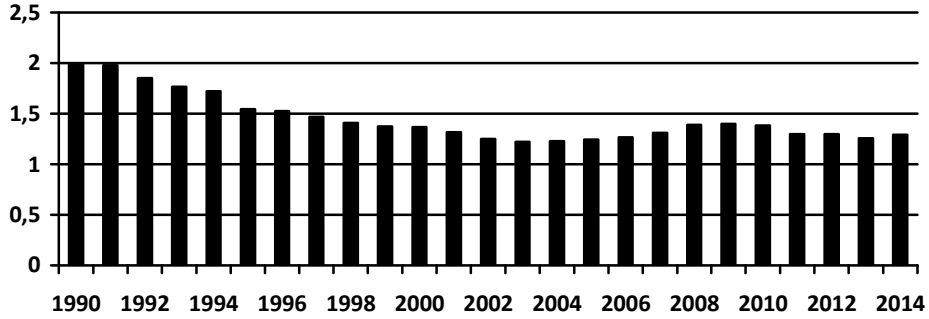

Figure 1. The total fertility rate in Poland in the years 1990-2014

Source: [CSO 2015a, p. 295; CSO 2015b].

The process of ageing is also intensified by extending average life expectancy in Poland. In the years 1990-2014 this indicator increased for women from 75.24 to 81.61, for men – from 66.23 to 73.75 [CSO 2015a, p. 410].

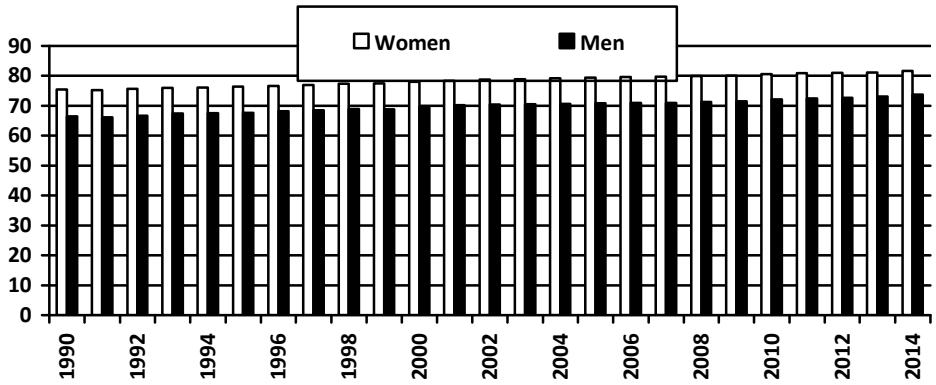

Figure 2. Average life expectancy by sex in Poland in the years 1990-2014

Source: [CSO 2015a, p. 448; CSO 2015b].

Longer life expectancy within the population in Poland is also evident in the increase of the median age of population during the analysed period – from 32.3 to 39.4 years [CSO 2015a, p. 162]. The medical development in recent years along with increasing of the availability and effectiveness of treatment were not without influence on these phenomena. The situation of population has not been improved either by the phenomenon of labour emigration which was reinforced during about accession period.

Taking into account the dynamics of changes in the demographic situation in Poland, it is worth posing the implementation of the solutions that have worked properly in other developed economically countries and led to a significant improvement in terms of women's fertility. It should be underscored that it is the one of elements of the demographic situation, which, using the socio-

economic policy instruments, including among others family policy, may be affected and may lead to its improvement.

ECONOMIC SECURITY OF POLAND

The evolution of social security is determined by the level of economic security. The latter concept can be understood and interpreted in different ways. K. Raczkowski [2012, p. 81] defines economic security as a relatively balanced status of functioning of a national economy, in which appearing risk of equality disorder is in the designated and acceptable standards of organisational and legal principles of social symbiosis. As regards this definition to the concept of social security to ensuring the development of society, it is useful to demonstrate the important from the point of view of earlier mentioned considerations embracing the elements of economic security. Analysing the demographic situation and its determinants, it is relevant to present the conditions, that foster the effective functioning of the national economy. These determinants are in the spheres of:

- production,
- money,
- employment and unemployment,
- international economic relations.

In the sphere of production the essential purpose should be stable and sustainable economic growth while maintaining the care about the state of the environment, what conditions the appropriate quality of life. Notwithstanding the occurrence of periods of slow economic growth, Poland was characterised by the economic growth, which should be highly positively evaluated.

In the sphere of money it is relevant to care for the preservation of a stable price level, conditioning the rational planning of economic activities. The crucial problem is further preserving the independence of the Polish National Bank from the government. It is necessary in the implementation of the long-term objectives, which cannot be dictated by current needs without drawing attention to the consequences in the form of accelerated rate of inflation.

With regard to the labour market, it is worth to indicate the desire to ensure a high level of employment while at the same time the lowest level of unemployment, especially of this long-term one. Gauges, which allow to assess the situation on the labour market, in favour of economic security, are among others: the number and structure of the employed, the number and structure of unemployed, as well as the direction of the changes in these indicators in the long-time perspective, and according to the gender inequalities.

In the sphere of international economic relations it is relevant – from the point of view of the labour market equilibrium – to maintain the equipoising of balance of payments, in particular in the balance of trade. Negative balance favours the formation of many negative phenomena such as the increase of the unemployment level. M. Kabaj [2005, p. 220-240] expresses an opinion that the deficit in the balance of trade had led Poland to the import of unemployment.

DEMOGRAPHIC AND ECONOMIC SECURITY INTERACTIONS

Contemplating the problem of social security, the demographic and economic security were intimated as the essential conditions for ensuring the survival and development of society. The interactions between these two categories of social security should be indicated and considered.

In the first place, it should be noted that maintaining some gauges of economic security at the appropriate level is quite essential in terms of demographic security. One of the crucial determinants is a boost of security on the labour market, which can be achieved with different methods – having regard to the system conditions of the economies. The goal also can be accomplished through both increased stability of employment (especially among women), activities to raise the employment rate and reducing the unemployment rate, as well as the implementation of the elements of flexicurity model such as increasing flexibility of employment with simultaneous attention to

appropriate active labour market policies and social security, to ensure the possibility of survival of a family during the search for a new place of employment. Analysing the situation on the Polish labour market starting from 1990, such factors as: a decrease in the stability of employment, an increasing threat of dismissal or of remaining unemployed, were much more strongly felt by women than by men [PORC 2013, p. 1]. These changes did not remain without affecting the decisions about fertility. Reversing the trend of these changes is not as easy assignment, but the observation of other states allows for a certain amount of optimism.

On the other hand, the lack of demographic security, of which effect can be noticed in the presented by the European Commission forecasts for the size and structure of the population in Poland to 2060 [EC 2014, p. 19], will influence the privations in terms of economic security, especially on the macroeconomic level. The consequences of the deteriorating demographic situation in Poland will be noticable both on the labour market in the form of shrinking resources, as well as in the sphere of public finance. Increased demographic dependency ratios [EC 2014, p. 57] will affect increasing the state financial burden, among others expenditure on the payments of pensions, as well as social assistance in the long term. Some factors are not without impact on this situation such as radically reducing the participation in the cost of educating children by the state. These changes decreased the availability of institutions for children and other dependents care.

CONCLUSION

In this article selected – and according to the author – crucial determinants for achieving conditions of social security in the country were demonstrated, with special attention paid to the system determinants of the state. On the basis of the subject classification of the social security, the demographic and economic security were indicated as its fundamental elements. It is relevant that between these two categories mutual dependencies are observed.

State activities in favour of increasing demographic and economic security and, consequently, social security, should be comprehensive and embrace a wide range of socio-economic policy instruments, primarily of family policy and labour market policy as well.

In the area of family policy, it is worth to imply that increasing fertility actions, which should subsume supporting the development of motherhood, participation in the cost of educating children, among others with use of the tax system, but above all by supporting the development of system of institutions for children and dependent person care. It should be underscored that the effectiveness of the activities of family policies can be ensured only if the principles of this policy are stable, what bears on the general sense of security among the families in the state.

In the sphere of labour market policy, instruments in the field of employment, unemployment and earnings for the work can be distinguished. In the area of employment and unemployment, it is worth to highlight the need to take actions toward economic activisation of young women, as well as reactivisation of mothers returning to work after a break for maternity. The promotion and implementation of solutions with range of positive labour market flexibility are essential activities towards women. It should be underscored that mentioned positive flexibility is defined as increased use of flexible forms of employment and organisation of working time, which are family-friendly and do not exacerbate the state of budget of the households with children.

In turn, in the realm of earnings, the attention should be paid to limiting the vertical and horizontal occupational segregation (also using educational policy instruments), as well as to the reduction of all forms of economic discrimination against women on the labour market. Parents, especially women, in Poland should have appropriate conditions conductive to making decisions about having their offspring It should be also connected with achieving a concordant work-life balance. If family policy does not fulfill these conditions, the demographic bomb that is ticking louder and louder in Poland will not be halted.

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Lidia Karbownik[8]

PREDICTING FINANCIAL SECURITY OF ENTERPRISES FROM TSL SECTOR IN POLAND WITH THE LOGIT MODEL

Abstract: The major objective of the paper is an attempt to estimate logit models, which create methodical terms of forecasting the level of financial security of enterprises from TSL sector in Poland. The accomplishment of this objective is justified by a need to deepen empirical research on these models. They allow to identify emerging abnormalities in functioning of business entities while ensuring early warning for various stakeholder groups about reducing the level of financial security of these enterprises. The data, which was collected, processed and used by the author, comes from the Economic Information Centre Ltd. in Warsaw, Info Veriti Poland Ltd. database, websites (e.g. www.infocredit-online.pl and www.krs-online.com.pl) and the Central Statistical Office in Warsaw. The results of conducted empirical research show a high predictive ability of the proposed logit models in the learning and test sample. These models should therefore fulfil an important function as an instrument for strengthening the monitoring processes and increase in efficiency of supervision of functioning of TSL sector enterprises in Poland.

Key words: financial security of enterprise, enterprises of transport, forwarding and logistic sector, logit model

INTRODUCTION

Financial security of a business entity is a complex and multi-dimensional economic category that refers to the state and process of shaping financial conditions providing an enterprise with effective and efficient continuation of business activities and a chance to develop.

The analysis of criteria and measures of enterprise financial security indicates a relatively dominant focus of attention in the literature on financial liquidity, profitability and cash performance, capital structure and solvency of an economic entity together with investments.

The major objective of the paper is an attempt to estimate logit models, which create methodical terms of forecasting the level of financial security of TSL sector enterprises in Poland. The accomplishment of this objective is justified by a need to deepen empirical research on these models. They allow to identify emerging abnormalities in functioning of business entities while ensuring early warning for various stakeholder groups about reducing the level of the phenomenon analysed in this paper.

METHODICAL BASICS

The learning sample was reduced only to those from 180 enterprises from TSL sector in Poland, for which bankruptcy petitions has been filed in the period between 2009 -2014 (data from the Economic Information Centre Ltd. in Warsaw):

- that were "inactive" on May 31, 2015 (data from Info Veriti Polska Ltd.)[9],
- whose key business activities belonged to the "Transport and warehouse management" section, according to the Info Veriti Poland Ltd. as of May 25, 2015 (in case of lack of such information – the author used databases available on www.infocredit-online.pl and www.krs-online.com.pl websites)[10],

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[9] This criterion was met for 74 analysed enterprises.

[10] This criterion was met for 64 analysed enterprises.

- whose financial data for at least one full calendar year or two and three full calendar years prior to the date of filing bankruptcy petitions to the court was available on 31 May 2015 in the base of Info Veriti Poland Ltd., and as the balance sheet date 31 December was accepted in each year of the whole analysed period[11].

The research was conducted for the balanced sample[12], i.e. for 31 enterprises[13] that met initial conditions for the selection of the research sample as well as 31 enterprises not in danger of bankruptcy. Therefore, the analysed enterprises which filed bankruptcy petitions, were assigned business entities that met specific criteria, namely:

- they conducted business activity in the same sector (i.e. TSL sector);
- were located in the same voivodeship as the bankrupt company;
- they owned a comparable total size of assets in the year in which data was used to estimate model parameters[14];
- they showed not higher than a moderate level of risk (data of Info Veriti Poland Ltd. for 2013 year[15]).

Therefore, the learning sample comprised 62 business entities.

The test sample was reduced to those chosen from 180 enterprises from the TSL sector in Poland, which filed bankruptcy petitions in the period between 2009-2014 (data from the Economic Information Centre Ltd. in Warsaw):

- that were "active" on May 31, 2015 (data from Info Veriti Polska Ltd.)[16];
- whose key business activities belonged to the "Transport and warehouse management" section, according to the Info Veriti Poland Ltd. as of May 25, 2015 (in case of lack of such information - databases available on www.infocredit-online.pl and www.krs-online.com.pl websites have been used)[17];
- for which the court did not announce the discontinuance of the legal proceedings[18];
- whose financial data for at least one full calendar year or two and three full calendar years prior to the date of filing bankruptcy petitions to the court was available on 31 May 2015 in the base of Info Veriti Poland Ltd., and as the balance sheet date 31 December was accepted in each year of the whole analysed period[19].

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[11] This criterion was met for 32 analysed enterprises.
The sample was reduced to 31 enterprises from the TSL sector in Poland, due to the fact that one year prior to the date of application of bankruptcy petitions to the court total assets of the EDRO-TRANS Ltd. in liquidation bankruptcy amounted to just over 16 thousand zloty and the author did not find an enterprise with a comparable value of the analysed variable. This company was omitted in further studies.

[12] The selection of enterprises results from the applied research method (more among others: Korol 2010).

[13] Lack of financial data prevented from conducting an analysis for a bigger research sample in this period.

[14] Financial measures for enterprises not in danger of bankruptcy were calculated respectively for years from which data was collected for bankrupt entities assigned to them.

[15] This criterion was not met in the case of one of the analysed enterprises. Due to the low value of the total assets of one of the analysed enterprises, which has filed bankruptcy petition (GTS TRANS Ltd. in liquidation bankruptcy) - business entity with a high level of risk was matched to it (i.e. TRANS KAR Ltd.), because it was difficult to assign enterprise not in danger of bankruptcy with a similar value of total assets and not higher than a moderate level of risk.

[16] This criterion was met for 106 analysed enterprises.

[17] This criterion was met for 100 analysed enterprises.

[18] This criterion was met for 98 analysed enterprises because in the case of two enterprises the court announced the discontinuance of the legal proceedings.

[19] This criterion was met for 50 analysed enterprises. Enterprises not in danger of bankruptcy from the test sample were matched in the same way as in case of the learning sample. Due to a very high value of the total

Therefore, the test sample comprised 100 enterprises from TSL sector.

The basic data collected, processed and used by the author comes from the Economic Information Centre Ltd. in Warsaw, the Central Statistical Office in Warsaw, Info Veriti Poland Ltd. database as well as such websites as www.infocredit-online.pl and www.krs-online.com.pl.

Due to the lack of detailed financial data of enterprises from TSL sector in Poland the analysis was at the initial stage limited to 18 diagnostic variables (see table 1)[20].

As a result of the research (including substantive and statistical criterion) a final list of measures was determined. The criterion of sufficient distinction, with the critical value of coefficient of variation at the level of v = 0,2, fulfilled all the analysed variables during the analysed research period and none of them were eliminated at this stage of empirical research.

Table 1. Selected financial measures of the evaluation of financial security of enterprise*

Lp.	Criteria of the evaluation of financial security of enterprise	Measures of financial security of enterprise
m_1	Financial liquidity	*CA/CL*
m_2		*(CA - In - SDE)/CL*
m_3		*(CA - In)/CL*
m_4		*C/CL*
m_5	Efficiency of action	***S/SAR***
m_6	The dynamics and structure of assets	*CA/TA*
m_7		*C/CA*
m_8	Capital structure and solvency	*E/TA*
m_9		*TL/TA*
m_{10}		*D/TA*
m_{11}		*(SRrb+OtSR+CLb+SAL)/TA*
m_{12}		*CLb/TA*
m_{13}		*D/E*
m_{14}	Capital and asset structure	*(CLb + SRrb + OtSR + SAL)/CA*
m_{15}	Profitability	*EAT/**TA***
m_{16}	Financial reserves	R_c/TA
m_{17}		R_l/TA
m_{18}		*AL/TA*

* The average values of the variable are marked in bold.

assets of one of the analysed enterprises, which filed bankruptcy petition (EQUUS JSC in liquidation bankruptcy) – a business entity with a high level of risk was matched to it (i.e. M-Logistic Ltd.), because it was difficult to find an enterprise not in danger of bankruptcy with a similar value of total assets and not higher than a moderate level of risk.

[20] The nominal values from the financial statements for the years 2007-2013 were deflated by the price index of service for „Transport and warehouse management", specified in: Ceny w gospodarce narodowej w 2006 r., Ceny w gospodarce narodowej w 2012 r. and Ceny w gospodarce narodowej w 2013 r.

where:
TA – total assets,
CA – current assets,
In – inventory,
SAR – current receivables,
C – cash and other monetary assets,
SDE – short-term deferred charges and accruals,
E – equity,
R_c – capital reserves,
R_l – reserve for liabilities,
SRrb – short-term reserves for pension benefits and alike,
OtSR – other short-term reserves,
TL – total liabilities,
D – long-term liabilities,
CL – current liabilities,
CLb – short-term liabilities,
AL. – accruals and deferred income,
SAL – short-term accruals and deferred income,
S – net revenues from sales (products (services), goods and materials),
EAT – net profit (loss).

Source: own study on the basis of: Pawłowicz (ed.) 2005, Franc-Dąbrowska 2006, Duraj 2010, Запорожцева 2011, Zuba 2011, Karbownik 2012.

As a result of a subsequent selection the further discussion took into consideration only those measures of the evaluation of enterprise financial security for which the predictive ability was at least 50%[21], and the Spearman's rank correlation coefficient calculated for each pair of independent variables was in the range (-0,7, 0,7)[22].

Based on the review of the literature two variants were included (Karbownik 2014):

I. where a current ratio was accepted as key measure of the evaluation of financial security. Finally, the author eliminated these variables that were strongly or very strongly correlated with m_1. Therefore, for the subsequent phase of the research only the following measures: m_1, m_6, m_7, m_{10}, m_{15}, m_{17} and m_{18} were included.

II. where a cash ratio was considered most significant in the evaluation of analysed problem. For that reason, during the subsequent selection the variables that were removed were

[21] In order to estimate the predictive ability of each measures in the first stage threshold points were determined and then only these diagnostic variables were selected, which properly classified analysed enterprises at 50%. The threshold points were calculated as the average of the average obtained in both, analysed groups of business entities (i.e. bankrupt enterprises and enterprises not in danger of bankruptcy) (compare: Maślanka 2008). This criterion was not met in the case of measures: m_5, m_{13} and m_{16} (the average efficiency of forecast of these measures in the whole analysed period amounted respectively to 48,39%, 48,39% and 44,62%).

[22] The correlation between analysed variables was not higher than moderate. The following assumptions were accepted for the objective of the paper (Ostasiewicz, Rusnak, Siedlecka 2003):
a) less than 0,2 – no correlation,
b) 0,2–0,4 – weak correlation,
c) 0,4–0,7 – moderate correlation,
d) 0,7–0,9 – strong correlation,
e) above 0,9 – very strong correlation

strongly or very strongly correlated with each other (including, among others, with m_4) and least correlated with the dependent variable. Therefore, in the subsequent phase of research only the following measures: m_4, m_6, m_8, m_{10}, m_{15}, m_{17} and m_{18} were taken into consideration.

In order to estimate logit models[23] one year before bankruptcy[24] the GRETL program was applied.

THE RESULTS OF EMPIRICAL RESEARCH

The estimated logit model in variant I (LOG I)[25] includes only two of the analysed diagnostic variables (see table 2), i.e. current ratio (m_1) and return on assets ratio (m_{15})[26].

The estimated model took the following form:

$$y_1 = -1{,}97187 + 1{,}40725\, m_1 + 11{,}7954\, m_{15}$$

Table **2.** The results of the logit model estimation – variant I.

	Coefficient	Standard error	*p*
const	-1,97187	0,796347	0,01328
m_1	1,40725	0,523051	0,00714
m_{15}	11,7954	5,61318	0,03561

Source: own calculations based on data from Info Veriti Polska Ltd. and the Economic Information Centre Ltd. (by means of GRETL software).

For variant II (LOG II) the estimated model (see table 3) includes also two variables, i.e. cash ratio (m_4) and return on assets ratio (m_{15})[27]:

$$y_2 = -1{,}34237 + 6{,}66974\, m_4 + 13{,}5272\, m_{15}$$

Comparing the form of two presented logit models it can be noticed that they differ only by independent variables which constitute the basis for the selection of diagnostic variables from the area of financial liquidity.

The signs of estimated parameters of statistical models indicate that the higher the level of the current ratio (m_1) or the cash ratio (m_4) and return on assets ratio (m_{15}), the higher level of financial security of the analysed business entities.

[23] The assumptions of the logit model are presented, among others, in: (Gruszczyński (ed.) 2012, Kufel 2011 and www.statsoft.pl/textbook/stathome.html (05.05.2015)).

[24] P. Antonowicz (2013) claims that evaluation of the threat of enterprise bankruptcy is usually made in a one-year forecasting period.

[25] Abbreviation: LOG – logit model.

[26] In the GRETL program the measure of R^2 type, i.e. McFadden R-square, is given by default. Its value falls into the range 0-1. If the model perfectly predicts the dependent variable, then R2 = 1. However, in practice, McFadden R2 values are small and closer to 0 than 1 (Gruszczyński (ed.) 2012). The coefficient of R2 type, i.e. McFadden R-squared amounted to 0.47 – what suggest a relatively good matching of data to the model.

[27] The coefficient of McFadden R-squared amounted to 0,50.

Table 3. The results of the logit model estimation – variant II.

	Coefficient	Standard error	*p*
const	-1,34237	0,585063	0,02177
m_4	6,66974	2,44183	0,00631
m_{15}	13,5272	5,45246	0,0131

Source: own calculations based on data from Info Veriti Polska Ltd. and the Economic Information Centre Ltd. (by means of GRETL software).

The efficiency of the estimated logit models was also checked on 100 TSL sector enterprises included in the test sample and the results of conducted analyses for the learning and test sample are presented in table 4.

Table 4. The efficiency of the estimated logit models in the learning and test sample*

Type of sample	Type of enterprises	Models	
		LOG I	LOG II
Learning sample 31:31	Bankrupt enterprises	87,10% (4)	93,55% (2)
	Enterprises not in danger of bankruptcy	83,87% (5)	80,65% (6)
	Total	85,48% (9)	87,10% (8)
Test sample 50:50	Bankrupt enterprises	78,00% (11)	80,00% (10)
	Enterprises not in danger of bankruptcy	78,00% (11)	80,00% (10)
	Total	78,00% (22)	80,00% (20)

* The number in brackets is the number of misclassified enterprises.

Source: own calculations based on data from Info Veriti Polska Ltd. and the Economic Information Centre Ltd. (by means of GRETL software).

The results which are presented in table 4 confirm the high predictive ability of logit models in the learning sample (characterized by their efficiency at the level above 85%) and a slight decrease of their efficiency in the test sample in relation to the learning sample (the efficiency at a level equal to or higher than 78%). The efficiency of forecasts of the presented models in the learning sample was higher in case of the bankrupt enterprises. It should be noted that a slightly better model of forecasting the analysed problem in the group of discussed logit models was the one that is based on the cash ratio and return on assets ratio.

CONCLUSIONS

The empirical research initiated by the author allowed to estimate simple to interpret logit models which enable evaluation of the capability of TSL sector enterprises in Poland to obtain and maintain the financial conditions of continuation and development of their business activity. The value of the coefficient of R2 type, i.e. McFadden R-squared suggests a relatively good matching of data to the models.

The results of conducted empirical research show a high predictive ability of the proposed logit models in the learning and test sample. Thus, these models should therefore fulfil an important function as an instrument for strengthening the monitoring processes and increase of efficiency in supervision of the functioning of enterprises from TSL sector in Poland. Therefore, the models can be integrated into existing analytical and forecasting solutions due to the fact that they not only take into account the specific conditions of the activity of analysed enterprises, but also due to the fact that they form an integrated set of tools capable of obtaining a high degree of efficiency of accurate predictions.

The results presented in this paper also confirmed the conclusions from the study on the literature as well as the empirical research conducted by the author for many years, which concerned financial security and/or threat of business entities. The conclusions confirmed that return on assets ratios are the most common – beside financial liquidity ratios – measures of evaluation of the financial conditions which ensure an effective and efficient continuation of activities and a chance to develop.

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THE PROBLEM OF BANKING SYSTEM STABILITY IN LITERATURE

Abstract: The article is an overview of the literature output in the field of banking sector stability. In the literature a plethora of definitions of the term may be encountered. There is no universal definition of the term. Therefore, the article proposes a unique division of the existing explanations into the following groups: stability determined by the quality of the banking sector, stability in terms of its influence on the macroeconomic situation and stability understood as the absence of a crisis.

Keywords: stability, banking sector

INTRODUCTION

In literature many definitions of banking sector stability may be encountered. They all define the basic characteristics which must be met by the banking market to be stable. It is also emphasized that stability of banking system can be identified with the stability of the entire financial system. There is no universal definition of this concept, but the existing explanations can be divided into the following groups:

- stability determined by the quality of the banking sector,
- stability in terms of its influence on the macroeconomic situation
- stability understood as the absence of a crisis.

The article is divided into three parts according to the above-described unique division, each part relates to one of the groups of the definition. The preparation of the article was based on the monographic method and the study of documents, as well as a critical analysis of the literature.

BANKING STABILITY DETERMINED BY THE QUALITY OF THE SECTOR

The first group of definitions of stability of banking systems includes views of Lingren (1997), Iwanicz - Drozdowska (2000), Guitian (1997). According to this view banks constitute the basis of the financial system, whose security and well-being depend largely on the stability of banking system. Problems encountered by banks are expensive for the state, both from the financial as well as the economic point of view. At the same time they may contribute to high costs for the international community, as the banking problems of a single country can spread very easily to other countries and their markets. Therefore, bank security is of interest to many institutions, e.g. the International Monetary Fund, the World Bank.

Stability of banking system corresponds to the fulfilment of their basic functions, which ensures an efficient cash flow between its participants - from those with a surplus, i.e. from the savers - to those borrowing for investment or consumption, i.e. the borrowers. In addition, stability of banking system contributes to the proper valuation of assets, which affects stability of their prices, and guarantees a secure and efficient payment run. A healthy banking system is the one in which individual banks effectively intermediate in financial transactions while meeting the capital requirements set by the law. If banking system is to remain stable and solvent in the long term, individual banks must be profitable, well-managed and effective. Stability of banking system is a concept relatively easy to understand in a general aspect, but it is very difficult to define it in practice, due to the lack of adequate financial data [Lingren, 1997]

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The literature abounds with discussions on the impact of the banking sector stability and its competitiveness. In some part of the literature there is expressed a view that too much competition may destabilize financial markets and credit institutions, although competition as such does not create instability. Systemic risk may appear irrespective of the character of competition and in different market structures. Hoggarth, Milne and Wood (1998) compared the British and the German banking systems of the last decade of the 20th century. They proved that profits of the banks in the UK were significantly higher than in Germany, but also much more variable. The German banking system was less competitive, but more stable, while in the UK the banking sector was more competitive, but at the expense of stability. Vives (2010) agrees with this opinion and claims that although competition itself does not create instability, it may contribute to the emergence of problems related to stability of the banking sectors. A similar issue was raised by Fernández and Garza-Garcia (2015) who studied the banking sector in Mexico.

It is also increasingly emphasized that it is not always the case that stronger competition affects only the deterioration of the stability and efficiency, as an adequate deposit protection policy (e.g. the creation of the deposit protection fund) may have a stabilizing effect on the relationship between competitiveness and stability. Staikouras and Wood (2000) conducted a study in Spain and Greece and proved that the Spanish banking sector was more competitive and stable than the Greek one, where a significant share is possessed by the state treasury and public funds. These views were convergent with the results of studies on various aspects of competition in the market and its stability. In summary, it can be noticed that the main conclusion of the conducted studies is the fact that there is no clear answer to the existence or lack of interchangeability between stability and competitiveness of banking systems.

It is difficult to determine without ambiguity when the banking sector is stable, and when it is not anymore. There are no reliable indicators that would facilitate the determination of the time when the banking sector may lose its stability and when a banking crisis is likely to appear. The level of solvency is in this respect the only predictor. It should be emphasized that solvency of the entire banking sector consists of solvency of each individual bank operating in the market, so even one large bank may cause a decrease in the solvency of the entire system below a safe level. There is also a likelihood of cumulative insolvency as a result of the collapse of a large group of small banks. If the banking system is to be stable, most banks must be permanently solvent. The probability of remaining solvent depends on the profitability of the bank, effective management, sufficient collateral of receivables as well as preparation for possible contingencies in the market [Djiwandono, 1998].

Banking stability corresponds also to the ability of the market to meet its obligations, i.e. to carry out banking operations and to fulfil the role of a financial intermediary [Iwanicz-Drozdowska, 2000]. The healthier the market is, the better it fulfils its role of an intermediary between depositors and borrowers. The more effective process of obtaining savings from the local and international market depositors and lending them to profitable investors by the banking system, the greater the likelihood of the economic growth. The more efficiently and better-managed bank, the greater the possibility to analyse the quality of loans and to monitor the borrowers. On the other hand, when the banking system is weak and ineffective, the investment process works inadequately and the economic growth is threatened. Banks and the banking system fulfil a special role in every national economy, mainly because they are perceived as more vulnerable to instability rather than any other institution or sector, but also due to the fact where it is banks that less affluent people deposit their savings. For this reason, banking system stability can be understood as security of deposits located on bank accounts. To fulfil this task, the banking system must be both managed in a modern way, as well as remain highly competitive. Legislation, supervisory regulations, accounting regulations which support security of the sector are also of immense significance.

Guitian (1997) enumerates three pillars of a paradigm necessary for the stability of the banking sector: the supervisory authorities (prudential regulations), internal controls (risk management in each individual bank) and market discipline (healthy banking procedures). This paradigm must be consistent with the activities aimed at reinforcement of the system, such as responsible corporate governance of banks, professional management authorities, properly functioning supervision and, in the era of globalization of the financial system, effective international cooperation. Trichet (2000) emphasizes that financial stability is a harmonious interaction of various financial institutions, including the quality of the money markets operation.

BANKING STABILITY AFFECTING THE MACROECONOMIC SITUATION

Another group of banking stability definitions refers to the views on the links between financial stability and the macroeconomic situation, including issues of international cooperation, the balance of payments and the foreign debt of individual countries. The problem of the impact of the development of the banking sector and economic development is the subject of many studies. Authors' stances on this issue differ. Some of them accept the thesis on the importance of finance for the economic growth [King, Levine, 1993]. Others do not overestimate their impact [Lucas, 1988]. However, it seems reasonable to claim that ensuring the stability of the financial system is a prerequisite for the implementation of all traditionally perceived purposes of the economy. Due to the dynamic process of globalization, the literature points to the need to take actions aimed at supporting the stability of the international banking sectors and international financial markets. Trichet (2000) sees financial stability as a healthy situation and harmonious interaction of various financial institutions, combined with a secure and predictable functioning of money markets. Both the banking as well as the financial market, as the basic elements of the economic system of each country, have a direct impact on the situation in other markets. It means that if the banking system is not balanced, the more difficult it will be for companies from other economic sectors to achieve this balance. Solarz (2004) claims that financial stability is a state of dynamic and sustainable balance on the interrelated financial markets. He distinguishes the current and future stability of the financial system. The former refers to an acceptable range of changes in the states in individual markets. The future stability – the far-reaching one - refers to the absence of significant weaknesses that might prevent an adequate and timely reaction of financial intermediaries to asymmetric shocks.

Fisher (1997) emphasizes that situation in the banking market has a direct impact on the economic growth. A healthy banking system may become a prerequisite for both national and international financial security and contribute to economic growth. Stability of the national banking system supports macroeconomic stability and long-term balance in an open world economy. In the literature on the relation between these categories, the most frequently pointed issues are the complementarity of financial stability and price stability. There is no doubt that distortions in the financial system may significantly hinder the maintenance of a stable price level. On the other hand, the positive development of the price level will facilitate financial stability. It should be noted that this complementarity concerns a long time period. In the short term, financial stability and price stability may be competitive goals. Financial stability is a lack of changes in prices, which might lead to financial losses. Financial stability requires two items. The major financial institutions must be stable, which means that simultaneously they must be solvent and meet their obligations without delays and without necessity to use external assistance. In addition, the main financial markets must be stable, which means that investors may conduct transactions without fear of price changes in the short term and having ensured that no unforeseeable events should appear.

Numerous studies draw attention to the close relationship between stability of banking system and the monetary and economic policy. Djiwandono (1998) claims that both an efficient monetary policy, whose aim is monetary stability, as well as a well-executed economic policy, aimed at the

economic growth cannot be properly implemented without a healthy banking system. It is also regarded that bank stability should be treated as a focus of the monetary policy, as well as price and monetary stability. Also Guitian (1997) believes that the systemic stability of banking system is now seen as a component of the monetary and economic policy. At the same time, as a matter of policy interest, the banking system should strive for economic balance and stability. In the case of an unhealthy banking system, monetary transmission will be weak and, therefore, the effectiveness of the monetary policy will not be achieved [Lingren, et.al 1996]. Banking instability may appear in an unsustainable monetary environment as the activities of banks in the economy struggling with inflation, are not efficient. It also means that a healthy banking system is essential for the effective transmission of signals between the monetary policy and market participants. According to Fisher (1997) the interest of macroeconomics stems from the role of banks in the process of money transfer. The effectiveness of central bank operations on the money or currency markets depends on how the banking system transfers funds to the borrowers and lenders. If the banking system is weak, the transfer process will be weak and inadequate, with a low interest rate on the money market, and unhealthy banks will put pressure on the authorities in situations when interest rates begin to rise.

Stability of banking system consists of three issues,which are of interests to central banks. An efficient and stable payment system is essential for execution of transactions in the economy, where money is a medium of exchange, in order to eliminate barter. The payment system must be stable, because otherwise its users will bear the risk of impairment. Intermediation between savers and investors is supposed to improve the efficiency of the economy by supporting the system of mutual settlements. Banks provide valuable information through monitoring of investment projects, as well as by enabling the cash flow from depositors to investors. Development of financial markets is a process in which also the banking system is involved. When the level of uncertainty lowers and confidence increases, other financial markets are also growing and at the same time the possibility of execution of commercial projects with the use of available cash funds is increased [Guitian, 1997]. The impact of the central bank on market and financial stability was also studied by Żywiecka (2013).

All the researchers' views regarding the stability and health of banking system lead to the conclusion that their significance to the overall economy is so huge due to the immensely important function of the banks as financial intermediaries. The dependence of other sectors of the economy on the banking system proves its importance for the whole economy. Stability and the healthy banking system, combined with the balance of public finances may contribute to the maintenance of the stability of the whole economic system. An interesting stance at the problem of stability of the banking sector is to study it in the context of the impact of public finances crisis [Gemzik-Salwach, 2013]. The influence of insolvency of countries on the situation of banking sectors takes place through various transmission channels [Smaga, 2012]. It illustrates how important role the banking sector plays in the economy.

BANKING STABILITY UNDERSTOOD AS THE ABSENCE OF A CRISIS

The literature most frequently describes financial stability in terms of the absence of financial crises, which can be classified as the third group of definitions of the term in question. However, even such a simple formulation raises a lot of doubts, due to the heterogeneity in the understanding of the financial crisis. It is not easy, because, on the one hand, classical literature on financial crises virtually does not contain their definition, and on the other hand, the review of the literature on empirical studies of crises indicates the existence of many different definitions, whose synthesis by its nature must be of fairly general character.

A financial crisis may be a situation in which a significant group of financial institutions has liabilities exceeding the market value of assets, which leads to panic among bank clients, changes in

the portfolio of assets, the collapse of some financial institutions and government intervention. The term crisis refers to a situation in which an increase in the share of not serviced loans, increased losses resulting from excessive exposure to foreign exchange risk, interest rate gaps, contingent liabilities, and a decrease in the value of invested assets cause general problems with solvency of the financial system and lead to the collapse of some companies, their mergers and restructuring. Bordo, Eichengreen (1999) deem the financial crisis as episodes of rapid changes in the financial market, connected with the scarcity of liquidity and insolvency of the market participants, as well as the possibility of government intervention designed to prevent it. Iwanicz - Drozdowska (2000) writes that Allen defines a crisis as a situation in which the debtor is unable to repay their debts and cannot in any way obtain additional financing. The spread of the financial crisis from a single entity to many participants is reflected in the disturbance in the performance of the basic functions by the system. As a consequence, there occur disturbances in the payment system and in the process of allocation of financial resources and the sudden unpredictable changes in asset prices in the market. Further, there are two approaches to financial crises. In the narrower one, shaped by monetarists, the financial crisis is associated with a banking run. A bank run results in disturbances in the money supply, which leads to a decline in economic activity. Lower asset prices and a rising number of corporate bankruptcies are not - in themselves - a financial crisis. Such a state is referred to in the literature as the financial pseudo-crisis. The wider one defines the concept of a financial crisis as a situation in which there occurs at least one of the following factors: falling asset prices, bankruptcy of large financial and non-financial institutions, deflation or lower inflation, and the foreign exchange market turmoil. Davis (1992), in turn, considers a financial crisis as a process leading to macroeconomic depression and mass bankruptcy of financial institutions and dysfunction of the payment system. According to Kamiński and Reinhart the theory of asymmetric banking crises indicates that the occurrence of crises when negative publicity is spread is more likely as a result of artificial maintenance of a demand for loans and the spread of optimistic expectations [Iwanicz - Drozdowska, 2000].

However, Crockett [Kiedrowska, Marszałek, 2003] claims that the absence of stability should not be confused with a crisis. He defines the notion of financial stability as the state in which the economic activity is not affected by changes in asset prices nor by the problems of financial institutions in meeting their obligations. He notes that a threat to stability may only be significant, in terms of quantity, asset price changes and problems affecting many financial institutions. Periods of asset prices rises or falls as well as bankruptcy of individual institutions are an inherent feature of economic life.

As shown above, there are many ways to explain the concept of banking stability. According to Solarz (2004), economic theorists propose normative definitions of the financial system stability, which conventionally can be divided into three groups. The first one treats system stability in the sense of an attribute – enumeration of financial stability symptoms and situations indicative of its absence. The second is the institutional definition - factual presentation of financial system stability as an institution of the mature market economy, and the third - the process conceptualisation of the definition - perception of the decisions sequence from the point of view of the authority responsible for financial stability of the country. The first group of definitions contains the definition adopted by Davis (2002), according to which the systemic risk, disturbances, instability, which with high probability threaten the financial crisis is defined as a serious collapse of the financial system, which reveals itself in the efficiency of the clearing and settlement system or in the impossibility to allocate a loan for its productive use. Financial system stability understood in the sense of an attribute may also include the concept of the cycle of systemic crisis in the banking sector, which consists of:

- a state of balance;

- an increased demand of economic operators for liquidity,
- introduction or extension of the guarantee on deposits,
- reduction of the effects of loans of last resort – elimination of their negative effects to curb inflation,
- change of the strategy of sector stabilization,
- identification of the scale of losses,
- launch of a sector restructuring programme by the parliament,
- decapitalisation of credit institutions,
- divestitures of financial institutions as technical bankrupts or their nationalisation,
- regaining depositors and borrowers' trust.

Institutional arrangements regarding responsibility for the financial system stability are different in each country. According to Solarz (2004), the institutional approach to the stability of banking system is the fulfilment of the main goal set to the safety net and the main institutional authority, which is responsible for the stability of the financial and banking systems. Overall, there exist four solutions:

1. it is the central bank that is solely responsible for the state of the financial system,
2. it is the ministry of finance that is solely responsible for the state of the financial system,
3. it is a specially appointed state authority that is solely responsible for the state of the financial system,
4. it is the safety net covering all of the above mentioned institutions and funds guarantying the return of deposits for small savers and investors that is responsible for the state of the financial system.

The process conceptualisation of the financial system stability disturbances can be divided into three groups:

1. a loss of credits or a trading loss directly related to the real economy,
2. excessive volatility of institutional investors' expectations and their herd reaction to significant changes in the macroeconomic balance,
3. technical nature, which is expressed in a loss of liquidity of financial institutions and markets and inefficiency of securities designed to amortize the identified risk.

The process definitions of the domestic banking system stability stress that stability of the financial markets and institutions is resultant from many interrelated decisions. Many theories provide the basis for defining stability of financial markets in such a manner:

- theory of the credit cycle - explains financial crises by too violent borrowers' response to economic fluctuations, which results in an excessive credit limit in the phase of a standstill and recession as well as excessive expansionary credit in the phase of economic recovery;
- theory of error in the monetary policy – the monetary policy of the central bank inappropriate to the economic situation leads to disturbances in the real economy, which return to the financial system and cause its slackness;
- theory of uncertainty or a lack of trust to the policy makers - lack of transparency in the market for its participants leads to a loss of trust in the rationality of decisions taken by the monetary authorities;
- theory of herd mentality - market participants and its regulators are inclined to underestimate the risk and to accept low capital adequacy ratio of credit institutions;
- theory of asymmetric information and agency costs – moral hazard causes a shift of risk from borrowers to lenders;
- theory of overregulation - a network of institutions regulating the financial system leads to a sharp decline in the profitability of financial intermediaries and deformation of market competition;

- theory of a wrong order of liberalization of short-term capital flows - leads to excessive competition in the financial markets;
- theory of excessive competition – competition conditions impose the rate of return on capital below the expectations of investors;
- theory of excessive participation in the sector of institutional investors - institutional investors are not directly familiar with lenders, they rely on formal econometric models, which encourages herd behaviours and panic in the market;
- theory of incorrect choice of exchange rate regime - an escape from the national currency in the settlement of loans and borrowings leads to the accumulation of foreign exchange risk when rapid depreciation of the national currency occurs.

Although there exist many theories concerning the determination and explanation of the concept of banking stability, it should be noticed that they all form the basis for determination of the main features indispensable to achieve and maintain stability of banking market in practice.

CONCLUSIONS

As shown above, in the literature there does not exist a universal definition which would explain stability of banking system. Due to the special nature of the financial market, it affects other parts of the economy. The state of balance and development in the banking sector influence the situation in other areas of the economy. In general. we can say that definitions relating to stability of banking system focus on three groups: the quality of the system itself, its impact on the macroeconomic environment and the absence of crises. In light of the foregoing considerations, it may be concluded that stability of banking system depends on both the banks themselves, as well as on institutions external in relation to banks.

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SPATIAL AUTOCORRELATION OF THE SYNTHETIC MEASURES OF LIVING STANDARD WITH REGARD TO RESIDENTS OF DISTRICTS IN WESTERN POLAND

Abstract: An aim of the article is to carry out linear ordering and classification of districts of the macro-regions in Western Poland with regard to living standard of residents in 2013, as well as analysis of the spatial autocorrelation of synthetic measures in considered phenomenon. The study included 112 districts in Lower Silesian, Lubusz, Opole, Greater Poland and West Pomeranian Provinces. Hellwig, Ward and PAM methods were used in the study, as well as analysis of the spatial autocorrelation was conducted based on Moran's I statistic.

Keywords*:* living standard, linear ordering, classification of objects, spatial self-creation

INTRODUCTION

Living standard of residents, similarly to infrastructure equipment, or investment attraction, becomes a factor that increases competitiveness of individual regions. This concept is directly related with regional development. M. Kozak defines regional development as an increase in the economic potential of regions, as well as constant improvement in their competitiveness and living standard of residents, which contributes to development of the social-economic country [Kozak et al. 2001]. In view that entities of regional and local development are mainly residents of specific areas, thus an important category that identifies the regional development (or local) is to improve the living standard of population. The fact that idea of regional development corresponds with an increase in the living standard causes that analyses concerning this category can be used e.g. to shape the politics of regional development (local). This causes that demand for information concerning the living standard of residents increase. An aim of the article is to carry out linear ordering and classification of districts located in Western Poland Provinces with regard to living standard of residents, as well as analysis of the spatial autocorrelation of synthetic measures of the living standard of residents. In the analysis of spatial diversity of districts in terms of the living standard of residents, it is necessary to compare many described research facilities with numerous set of variables; therefore it is hard to express the level of this phenomenon with one measurable feature. This means that in order to determine the level of living standard of residents, it was necessary to use methods of multidimensional statistical analysis based on the synthetic measures of development. Analyses included all of 112 districts in Western Poland. Their completeness and availability for all studied objects in 2013 were a main criterion for selection of variables. Data source describing the living standard of residents in individual districts was Local Data Bank based on Central Statistical Office.

SPATIAL DIVERSITY OF THE LIVING STANDARD OF RESIDENTS IN DISTRICTS OF WESTERN POLAND

In 1954 the UN committee of experts defined the living standard of residents as "an entirety of real living conditions of people, as well as degree of their financial and cultural meeting needs through a stream of goods and services paid, and from social funds" [Zeliaś 2004]. This definition became a basis for many other formulated in the future. C. Bywalec and L. Rudnicki define the living standard as a degree of meeting needs arising from consumption of human tangible and

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intangible assets [Bywalec, Rudnicki 1992]. J. Piasny [1993] claims that "living standard is a notion, which defines, generally speaking, the quality of living standard in terms of degree to meet the important needs, settling, comfort and pleasure of life".

Districts included in two regional units of NUTS 1 type were provided with analysis, i.e. south-west (Lower Silesian and Opole Provinces) and north-western macro-region (Lubusz, Greater Poland and West Pomeranian). According to the data at the end of 2013[30], this area was inhabited by 10121760 people and the territory of analyzed area has 96065 km^2 (over 30% of total area of the country). Analyzed area is divided into 112 districts - 14 so-called urban districts and 98 land districts. The smallest district in terms of inhabitants number is Sulęciński district (35768 residents), while the largest Wrocław (632067). Poznań district is characterized by the greatest area (1900 km^2), while the smallest Leszno (32 km^2).

One of the most often used in practice linear ordering methods is Hellwig method, widely described in the literature [see Dziechciarz 2002, Balicki 2009, Panek 2009]. Application of the synthetic measure of development is justified with fact that it replaces the description of studied objects with many features (in this case variables describing the living standard of residents), with description of one aggregated size, which much facilitates analysis of similarities of studied objects (with determined point of reference - unlike in case of non-model method) and their ordering.

Due to limited availability of statistical data the objective and comprehensive measurement of the living standard of residents in individual regional units isn't a simple task, because the level of this phenomenon indeed is determined by a degree of satisfaction both tangible and intangible needs. In the first research stage, as a result of substantive and formal analysis of variables, 23 sub-indices were suggested (potential diagnostic variables), which were divided according to the substantive criteria into 7 thematic groups: I. Labour market: X_1 - unemployment rate, X_2 - number of total working in the national economy to 1000 persons, X_3 - gross average salary towards the domestic average (in %). II. Health care: X_4 – number of people to 1 pharmacy, X_5 - number of doctors to 10000 persons, X_6 - number of hospital beds to 10000 persons, X_7 – birth rate to 1000 residents. III. Environment: X_8 - urban waste water treated per 1 km^2, X_9 - gas emission in tones per 1 km^2, X_{10} - population number supported by sewage treatment plants to 1000 residents. IV. Transport: X_{11} – number of cars registered to 1000 residents, X_{12} - public district roads of a hard surface on 100 km^2. V. Housing: X_{13} - percentage of homes in the village equipped with central heating, X_{14} - usable area of homes to 1 person, X_{15} - percentage of homes equipped with bathroom, X_{16} - percentage of homes with network supply gas. VI. Culture: X_{17} - number of public libraries readers to 1000 residents, X_{18} - population numbers to 1 cinema seat, X_{19} - accommodation in accommodation facilities to 1000 residents. VII. Education: X_{20} - primary school students per one computer with access to the Internet, X_{21} - net schooling rate to the level of secondary school, X_{22} - number of children in nursery schools to 1000 children, X_{23} - number of pre-school children to 1 place in the nursery school. Taking into account the questioning by many authors regarding validity of variables weighing procedures to spatial data, the further analysis doesn't include variable assignments of diagnostic weighting rates. For such a solution speaks among others the fact that variables which weren't selected, would receive zero scales [Młodak 2006, Balicki 2009]. Sub-variables taken into account are indicative, rather than absolute values, which enabled in some extent to avoid interferences associated with certain characteristic features by some objects (e.g. much greater area than remaining objects).

It was accepted that from a set of potential variables that present the living standard of residents, there will be eliminated those features, for which the value of variation rate was smaller than determined on an arbitrary basis, the critical threshold value of this rate at a level of 10% (these

[30] Data from the LDB (Local Data Bank) based on Central Statistical Office (www.stat.gov.pl).

features were considered as quasi-fixed). Apart from the variation their correlation is an important criterion of variables selection. It is assumed that two high correlated variables provide similar information, so it is recommended to eliminate one of them. One of discrimination feature methods was used to evaluate the information value, depending on the value of correlation matrix - so-called matrix inverse method of the correlation. For each thematic subgroup of variables the matrix inverse of correlation was calculated. In the next step - if necessary - a variable characterized by diagonal maximum value, exceeding the arbitrarily set threshold value was eliminated (r*=10). The above initial set of diagnostic features was reduced due to low degree of diversity, eliminating variables that reflect: X_{13}, X_{15} and X_{21}. Remaining variables due to high discriminatory ability, as well as high information capacity (low correlating with remaining variables), were used to create the synthetic measure of the living standard of residents. X1, X_4, X_9, X_{18}, X_{20} and X_{23} variables were classified to destimulant set (minimum values are desirable), and remaining to stimulant set. None of variables is nominant. Hellwig method enabled to order districts with regard to living standard of residents. Calculated synthetic measures present the position of districts towards remaining areas.

Based on the analysis of measure values of the living standard of residents (calculated based on Hellwig method) it is possible to state that in Western Poland there is a considerable differentiation of values in analyzed variable on a level of districts. The ratio of maximum value (Wrocław) to minimal (Kaliski district) was 15.51. The average value of synthetic measure developed on a level of about 0.13. In case of 75% districts, this measure didn't exceed a level of 0.1446 at maximum value 0.3980 and minimal 0.0257. It is worthwhile to point that the synthetic measure was characterized by a right-handed asymmetry, which means that dominate values didn't exceed the average value of synthetic measure of the living standard of residents. Rankings of districts were created based on the synthetic measure values with Hellwig method. The highest place in the ranking occupied cities with district status – Wrocław, Poznań, Opole, Szczecin and Zielona Góra, which results from a relative maximum values of individual diagnostic variables in each thematic group. A very low position in the ranking of Wałbrzych city draws attention (to 1998 capital of Wałbrzyński Province). Significant importance in this context has a fact that the decision to exclude Wałbrzych from borders of Wałbrzyński district and simultaneous reinstatement its district status, was taken by councilors "not until" 10.01.2012 (by nearly a decade, the only among 100 thousands cities without the district status). It is possible to assume that this temporary loss of urban district status contributed to limited budget revenues and simultaneously reduced efficiency in raising EU funds for pro-development investments. It is necessary also to pay attention to very low investments of districts in the immediate vicinity of former province capitals, i.e. Kaliski (112 deposit), Koniński (106), Koszaliński (101), Legnica (98), whether Gorzowski (86) districts. A phenomenon of "the shadow of large city" can be a cause of such a state, which justifies the need to analyses the spatial autocorrelation. Cities with the district status constitute a considerable social-economic potential of the entire province (enterprises, business environment institutions, cultural and educational units), which contributes to reduced rates of the living standard in so-called land districts. Often as a positive factor, which determines the living standard of residents, is considered vicinity to border with the Federal Republic of Germany. From conducted analysis it results that border location of districts most often (an exception constitutes Policki (17) and Żary (29) districts) doesn't express in the living standard rates of these districts. This regards in particular Gryfiński (102 place in the ranking), Zgorzelec (88), Gorzowki (86) and Krośnieński (82) districts.

In order to widen the analysis, classification of districts was carried out with regard to similar living standard of residents with two methods based on taxonomical similarity - with Ward method (as for measurement the distance between objects a square measure of Euclidean distance was used (in order to assign the greater importance to objects in larger vicinity from other)) and with PAM method (*Partitioning Around Medoids*).

Table 1. Synthetic measure of the living standard regarding residents of districts in Western Poland

District	SMR	District	SMR	District	SMR	District	SMR
m.Wrocław	0,3980	ostrowski	0,1399	kluczborski	0,1117	jaworski	0,0844
m.Poznań	0,3706	pilski	0,1386	głogowski	0,1117	strzel.-drezd.	0,0840
m.Opole	0,3163	kościański	0,1385	złotoryjski	0,1107	żagański	0,0727
m.Szczecin	0,2944	chodzieski	0,1376	wschowski	0,1103	lwówecki	0,0701
m.Zielona Góra	0,2604	oleski	0,1375	bolesławiecki	0,1084	kolski	0,0697
lubiński	0,2365	szamotulski	0,1370	strzeliński	0,1081	wałecki	0,0683
wałbrzyski	0,2271	obornicki	0,1367	sulęciński	0,1058	turecki	0,0679
m.Leszno	0,2253	polkowicki	0,1366	prudnicki	0,1040	legnicki	0,0664
kołobrzeski	0,2158	grodziski	0,1364	średzki	0,1029	szczecinecki	0,0645
m.Jelenia Góra	0,2110	gostyński	0,1347	gryficki	0,1025	kamiennogórski	0,0633
m.Gorzów Wlkp.	0,2098	świebodziński	0,1335	namysłowski	0,1024	koszaliński	0,0625
m.Koszalin	0,2010	strzelecki	0,1307	nowosolski	0,1012	gryfiński	0,0597
m.Legnica	0,1942	rawicki	0,1298	ząbkowicki	0,1008	choszczeński	0,0570
m.Kalisz	0,1932	wołowski	0,1231	myśliborski	0,0983	białogardzki	0,0543
krapkowicki	0,1756	gnieźnieński	0,1211	kępiński	0,0977	złotowski	0,0541
kędz.-koziel.	0,1667	słubicki	0,1199	poznański	0,0976	koniński	0,0500
policki	0,1643	lubański	0,1195	ostrzeszowski	0,0975	drawski	0,0466
jeleniogórski	0,1601	głubczycki	0,1186	wrzesiński	0,0967	łobeski	0,0451
m.Konin	0,1600	międzyrzecki	0,1185	milicki	0,0966	pyrzycki	0,0417
wrocławski	0,1597	zielonogórski	0,1184	sławieński	0,0947	m.Wałbrzych	0,0345
średzki	0,1566	krotoszyński	0,1183	opolski	0,0941	świdwiński	0,0324
kłodzki	0,1526	śremski	0,1179	krośnieński	0,0930	kaliski	0,0257
świdnicki	0,1509	jarociński	0,1177	międzychodzki	0,0915	Diversification measures	
kamieński	0,1493	leszczyński	0,1167	słupecki	0,0910	Average value	0,1251
nowotomyski	0,1481	oleśnicki	0,1167	wągrowiecki	0,0888	Standard deviation	0,0626
nyski	0,1478	goleniowski	0,1146	gorzowski	0,0887	First quartile	0,0904
m.Świnoujście	0,1462	brzeski	0,1145	górowski	0,0885	Third quartile	0,1446
pleszewski	0,1450	trzebnicki	0,1136	zgorzelecki	0,0871		
żarski	0,1445	wolsztyński	0,1125	czarnkow.-trzcian.	0,0865		
oławski	0,1421	dzierżoniowski	0,1118	stargardzki	0,0857		

Source: Own study based on data from the LDB (Local Data Bank) (www.stat.gov.pl)

Ward method is quite widely described in the statistical literature [Młodak 2006, Panek 2009], and therefore description of this method algorithm was omitted in this article. In common view the effectiveness of detecting a real data structure based on this method is much higher compared with other agglomerative methods; however tends to connect clusters containing a small number of observation and to generate clusters of similar size [Młodak 2006, Suchecki 2010]. Effects of Ward method are often presented in a form of tree relations – dendrogram. In order to determine the critical distance values, by which dendrogram shoulders are cut off, a formula was applied [Stanisz 2007, Panek 2009]: $d^*_{i+1} > \overline{d} + ks_d$, where: d^*_{i+1} – critical value of distance corresponding to $i+1$ length of the branch; $\overline{d}$, s_d – arithmetic mean and standard deviation of the length of tree's branches, k – parameter, which optimal value is estimated on a level of 1.25. Critical value of distance by which dendrogram shoulders were cut off was 175.50, resulting in 6 separate clusters of districts.

PAM method is more rarely used as classification method. It's a relatively new classification method (clasterization algorithm around medoids was proposed by Kaufman and Rousseeuw in 1990). Algorithm consists in searching for k of representative objects, which are centrally located in clusters (so-called medoids). An object is a representative of the cluster, in which average

dissimilarity (distance to the representative) of all objects in the cluster is minimal. In fact, PAM algorithm minimizes the dissimilarity sum rather than average dissimilarity. Selection of *k* medoids is carried out in two stages. In first stage "initial clasterization" is obtained through another selection of representative objects, all the way to checking *k* objects. The first object is the one, which dissimilarity sum to all other objects is as small as possible (it is a kind of "multidimensional median" of *N* objects; hence it is called "medoid"). Next at each step, an object is selected, which reduces the target function (dissimilarity sum) as much as possible. The second phase consists in attempt to improve a set of representative objects. It is carried out by taking into account all pairs of objects (*i, h*), for which *i* object was selected for a set of representatives; however *h* object isn't included in a set of representatives, checking whether after change *i* to *h* the objective function was reduced [IDAMS 2008]. Results of the classification were presented in table below. In order to facilitate the interpretation, classification results were presented in decreasing order, according to arithmetic average of individual variables within the given cluster.

Table 2. Classification of districts with regard to living standard of residents

PAM method
Group I: m.Poznań, m.Wrocław; **Group II:** lubiński, m.Gorzów Wielkopolski, m.Jelenia Góra, m.Kalisz, m.Konin, m.Koszalin, m.Legnica, m.Leszno, m.Opole, m.Szczecin, m.Świnoujście, m.Wałbrzych, m.Zielona Góra; **Group III:** bolesławiecki, chodzieski, czarnkowsko-trzcianecki, drawski, głogowski, gnieźnieński, goleniowski, gostyński, grodziski, gryfiński, jarociński, kościański, krapkowicki, krotoszyński, międzychodzki, międzyrzecki, myśliborski, nowotomyski, obornicki, oleśnicki, oławski, ostrowski, pilski, policki, polkowicki, poznański, pyrzycki, rawicki, słubicki, stargardzki, strzelecko-drezdenecki, szamotulski, szczecinecki, średzki, śremski, świdnicki, świebodziński, wałecki, wągrowiecki, wolsztyński, wołowski, wrzesiński, wschowski, złotowski, żarski; **Group IV:** wałbrzyski; **Group V:** białogardzki, brzeski, choszczeński, dzierżoniowski, głubczycki, górowski, gryficki, jaworski, jeleniogórski, kamiennogórski, kamieński, kędzierzyńsko-kozielski, kluczborski, kłodzki, kołobrzeski, koszaliński, krośnieński, legnicki, lubański, lwówecki, łobeski, nowosolski, nyski, prudnicki, sławieński, świdwiński, ząbkowicki, zgorzelecki, złotoryjski, żagański; **Group VI:** gorzowski, kaliski, kępiński, kolski, koniński, leszczyński, milicki, namysłowski, oleski, opolski, ostrzeszowski, pleszewski, słupecki, strzelecki, strzeliński, sulęciński, średzki, trzebnicki, turecki, wrocławski, zielonogórski
Ward's method
Group I: lubiński, m.Gorzów Wielkopolski, m.Jelenia Góra, m.Kalisz, m.Koszalin, m.Legnica, m.Leszno, m.Opole, m.Poznań, m.Szczecin, m.Wałbrzych, m.Wrocław, m.Zielona Góra; **Group II:** m.Konin, opolski, zgorzelecki; **III grupa**: jeleniogórski, kamieński, kołobrzeski, m.Świnoujście; **Group IV:** wałbrzyski; **Group V:** bolesławiecki, brzeski, chodzieski, czarnkowsko-trzcianecki, dzierżoniowski, głogowski, głubczycki, gnieźnieński, goleniowski, gostyński, grodziski, jarociński, kędzierzyńsko-kozielski, kępiński, kluczborski, kłodzki, kościański, krapkowicki, krotoszyński, leszczyński, lubański, międzychodzki, namysłowski, nowotomyski, nyski, obornicki, oleski, oleśnicki, oławski, ostrowski, ostrzeszowski, pilski, pleszewski, policki, polkowicki, poznański, prudnicki, rawicki, słubicki, słupecki, strzelecki, strzeliński, sulęciński, szamotulski, średzki, średzki, śremski, świdnicki, świebodziński, trzebnicki, turecki, wolsztyński, wołowski, wrocławski, wrzesiński, wschowski, ząbkowicki, złotowski, żarski; **Group VI:** białogardzki, choszczeński, drawski, gorzowski, górowski, gryficki, gryfiński, jaworski, kaliski, kamiennogórski, kolski, koniński, koszaliński, krośnieński, legnicki, lwówecki, łobeski, międzyrzecki, milicki, myśliborski, nowosolski, pyrzycki, sławieński, stargardzki, strzelecko-drezdenecki, szczecinecki, świdwiński, wałecki, wągrowiecki, zielonogórski, złotoryjski, żagański

Source: Own study based on data from the LDB (Local Data Bank) (www.stat.gov.pl)

After classification with various methods, their correctness was verified [cf. Młodak 2006]. For that purpose homogeneity and heterogeneity measures were appointed. Homogeneity measures of clusters determine the homogeneity level of clusters (the lower value the better). However, heterogeneity measures determine the heterogeneity level of separation groups of objects (maximum values of this measure provide greater distance between centers). Measure reflecting the arithmetic average of object's distance in the group was used for evaluation of the homogeneity of clusters, described by the formula: $hm = \frac{1}{k}\sum_{l=1}^{k}\overline{d_l}$; $\overline{d_l} = \frac{1}{(n_l^2 - n_l)}\sum_{i=1}^{n_l}\sum_{j=1}^{n_l} d_{i,j}$, where: n_l – number *l* group; *k*

– number of groups. However, in order to assess heterogeneity of clusters, a measure reflecting the arithmetic average among groups was calculated, expressed by the formula: $hr = \frac{1}{k}\sum_{l=1}^{k} d_{\min}^{(l,l')}$, $d_{\min}^{(l,l')} = \min_{p}(\min_{i \notin \{p\}} d_{p,i})$, where: {p} – set of objects of *l* group; *p* – object included in a set {p}; *i* – set of objects not included to *l* group.

Measure of cluster correctness is a quotient of the homogeneity and heterogeneity measure. In case of PAM method the summary homogeneity measure of clusters was 3.551, and heterogeneities of clusters was 3.965, however correctness of clusters was 0.895. In case of Ward method these indicators were: 25.492, 28.894 and 0.882. Use of different classification methods, resulted in different results. These disagreements can result among others from a different calculation of the distance between objects, or also a distance between clusters. Both in case of PAM method as well as Ward method, in the analyzed period, one-element group was distinguished, which creates Wałbrzyński district. Moreover, as a result of these two taxonomic methods use, cities with district status (apart from Świnoujście in case Ward method) largely were classified only in two groups. In order to assess the compliance of classification PAM and Ward methods, an adjusted Rand index was used (*ARI*). Its value for data from 2013 was high and it was 0.6670.

ANALYSIS OF SPATIAL AUTOCORRELATION

In the context of spatial diversity analysis of the living standard of residents it is worthwhile to analyze the phenomenon of spatial autocorrelation. Analysis of spatial relations enables to determine the strength of relations between districts in the living standard of residents, and enables to distinguish clusters of districts similar to each other due to level of analyzed phenomenon. The basis for analyzing the impact of living standard of residents in a given spatial unit to neighboring units is to adopt the assumptions that there is a functional relation between values of synthetic measures of the living standard of residents in individual districts. That kind of premises results from so-called first law of geography formulated in 1970 by W.R. Tobler, which reads as follows: "everything is related to each other, but closer objects are more interdependent than distant" [Suchecki 2010].

In subject literature, the spatial autocorrelation is identified with a correlation degree of observed variable in the given location, with a value of the same variable in other location. This means that the value of studied variable determine and simultaneously are determined by its implementations in other locations. There are two variants of spatial correlation relations, i.e. positive and negative autocorrelation. Positive autocorrelation is spatial collection of high or low values of observed variables. However, negative autocorrelation means that high values are adjacent to low and low to high [Suchecki 2010]. For this article purposes, an approach recognizing common border of districts as the proximity criterion was accepted (so-called first-order neighborhood). In this most common way of modelling neighborhood a binary matrix is the starting point, compound of elements zero-one, which value *1* means that given areas (districts) have a common border, whereas *0* when they don't have such [Kopczewska 2007]. In order to study the relation between values of synthetic measures of the living standard of residents in individual districts, with values of these indicators in neighboring districts, values of Moran's I statistics were calculated (global and local). Global Moran's I statistics was used to calculate the strength and character of correlation in the entire analyzed area. It is described by [Suchecki 2010]:

$$I = \frac{1}{\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}} \cdot \frac{\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}(x_i - \bar{x})(x_j - \bar{x})}{\frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^2},$$

where: x_i – observed value in n various regions or locations (i = 1.2, …, n), $\overline{x}$ - average in all studied areas, w_{ij} - elements of spatial weight matrix.

Local Moran's I_i statistics was used to find the global autocorrelation participation for each of analyzed locations. Local Moran's I_i statistics in case of not-standardized value of variable and standardized lines of weight matrix is described by [Suchecki 2010]:

$$I_{i(w)} = \frac{(x_i - \overline{x}) \sum_{j=1}^{n} w_{ij}^{*} (x_j - \overline{x})}{\sum_{i=1}^{n} (x_i - \overline{x})^2}$$

Table 3. Local values (statistically significant) Moran's I_i statistics[31]

District	Statistics	District	Statistics	District	Statistics
choszczeński	-1,1628**	pilski	0,2796*	szczecinecki	-1,0304**
drawski	-1,3461**	poznański	-0,4450*	świdwiński	-1,5958*
kolski	-0,9374*	pyrzycki	-1,4321*	turecki	-0,9703**
kołobrzeski	1,6416**	stargardzki	-0,6561*	wałecki	-0,9633*
myśliborski	-0,4332*	strzel.-drezd.	-0,6850*	złotowski	-1,2130*

Notes: Due to the lack of relevant data, in the analysis of spatial autocorrelation omitted cities, such as: Legnica, Wałbrzych and Wrocław.*Values statistically significant at the level of p<0.05;**Values statistically significant at the level of p<0.01.

Source: Own study based on data from the LDB (Local Data Bank) (www.stat.gov.pl)

Value of global Moran's I statistics, calculated for the synthetic measure of the living standard of residents was 0.0269 and it was statistically insignificant[32], which means that value of analyzed variable is located in a random way between individual spatial locations. Next stage of study was to analyze the structure of spatial distribution of studied variables in the entire area, which can be carried out with a use of local correlation rates.

By analyzing the value of local Moran's I_i statistics, calculated for the synthetic measure of the living standard of residents, it is possible to state that only in Kołobrzeski and Pilski districts, this statistics assumes positive values and statistically significant. This means that these districts are neighboring with districts of similar synthetic measure values of the living standard of residents. However, in case of 13 districts a negative and statistically significant values of local Moran's I_i statistics were observed (in case of districts: Choszczeński, Drawski, Szczeciński and Turecki statistically significant at the level of $p < 0.01$, while in case of 9 remaining districts statistically significant at the level of $p < 0.05$). Therefore, it is possible to conclude that these districts are neighboring with areas of significantly different values of the synthetic measure of the living standard of residents. In case of remaining districts, local Moran's I_i statistics for analyzed variable assumed a positive values for 40 districts and negative in 54 districts, however they weren't statistically significant, which doesn't allow to assign special importance to obtained results.

CONCLUSIONS

Synthetic measures of the living standard of residents were appointed in the article based on Hellwig method, which were used to rank districts with regard to the level of analyzed phenomenon. Conducted studies enabled to observe considerable disproportions between individual districts in the living standard of residents. As a result of conducted studies, based on Ward and PAM methods, six

[31] Due to editorial requirements (limited size of the article) Moran's I_i statistically significant values were presented.

[32] Globally statistical significant test was based on histograms analysis of the permutation randomization test, and verification of the hypothesis was carried out based on value pseudo significance level.

groups of districts were created, characterized by a similar living standard of residents. From conducted analysis it results that cities with district status are characterized by the highest living standard of residents, such as Wrocław, Poznań, Opole and Szczecin, which results from relatively maximum values of individual diagnostic variables in each thematic group. Very low values of the synthetic measure of living standard were reported among districts in the immediate vicinity of former province capitals (among others in Kaliski, Koniński, or Koszaliński districts). A phenomenon of "the shadow of large city" can be the cause of such state. Cities with the district status constitute a considerable social-economic potential of the entire province, which often contributes to reduced rates of the living standard in neighboring areas. In order to study the relation between values of synthetic measures of the living standard of residents in individual districts, with values of these indicators in neighboring districts, values of Moran's I statistics were calculated. Value of global Moran's I statistics, calculated for the synthetic measure of the living standard of residents was statistically insignificant. By analyzing the value of local Moran's I_i statistics, calculated for the synthetic measure of the living standard of residents, in case of two districts - positive and statistically significant values were identified, however in case of thirteen districts - negative and statistically intrinsic values of local Moran's I_i statistics were observed. Basically, conducted analysis didn't confirm that there is a negative and statistically significant spatial autocorrelation between urban district and land districts.

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FORMS OF SALES OF VALUABLE WOOD BY THE STATE FORESTS NATIONAL FOREST HOLDING

Abstract: The State Forests National Forest Holding is systematically reforming the round wood sales system. It involves clients' adjusting to the volumes and forms of round wood offered (timber logs) on the domestic market. It is particularly important for the acquisition of valuable assortments with specific usability. The holding has followed the experience of Western European countries and introduced the auction system or submissions as an alternative for clients interested in purchasing high quality wood or raw material with specific dimensions or quality. We can see a gradual increase in the amount of wood acquired, both the material with standard quality parameters and valuable wood.

Key words: wood material, sales, valuable wood, auctions

INTRODUCTION

The State Forests National Forest Holding manages 77.1% of the tree stand area in Poland (Report on Forests in Poland 2014). It also sells the most wood material on the domestic market. In 2013 the total volume of round wood (large timber) for sale by the State Forests was 34,152,000 m^3, whereas the total amount acquired in Poland was 35,796,000 m^3 (Central Statistical Office – Statistical Yearbook of Poland, Forestry 2014). According to the decision of the General Director of the State Forests, the volume of wood to be acquired in 2015 was 37,700,000 m^3 (Appendix 6 to Decision 56 of the Director of the State Forests, 13 October 2014 - GM-900-8/14), whereas the volume planned to be offered on the market in 2016 is 38,468,000 m^3 of round wood (the table in Appendix 6 to Decision75 of the General Director of the State Forests, 30September 2015). Wood material is distributed in different ways in the domestic market. Modern forms of data transfer are commonly used, including the Internet. It is a universal work environment in terms of time and space . All registered clients interested in purchasing products can participate in the sales procedure at any time and any place on the Earth with access to the Internet. The introduction of the Internet in wood trade in 2006 was an important breakthrough in the State Forests and clients purchasing wood.

The development of the round wood sales process has a long history. There were a lot of limitations in earlier procedures (Strykowski 2002, Adamowicz, Szramka 2003). The procedures involved clients submitting their purchase offers in sealed envelopes. There were numerous doubts and potential allegations addressed tothe State Forests. Most Western and Central European countries have developed their own methods and standards of round wood distribution based on market rules (Adamowicz 2014, Bernadzki 2006, Lis 2007, 2008).

Access to advanced information technologies enabled the use of an application which adjusts to dynamic changes in the demand on the market, where numerous wood-processing business entities need to operate. Theround wood turnover by the State Forests involves the following forms of sales (Directive No. 59 of the Director of the State Forests, 13 October 2014; Directive No. 64 of the Director of the State Forests, 16September 2015):

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- bid sales on the forest and wood portal, including the volume of wood purchased by an entity so far,
- bid sales on the forest and wood portal for enterprises making new investments,
- system online auctions in the 'e-drewno' system,
- online auctions in the 'e-drewno' system,
- other auctions and submissions,
- trade negotiations,
- sales based on retail pricing.

The methods of wood distribution used currently are not faultless. The following issues are the most frequent areas of conflict between the monopolistic State Forests and over six thousand clients: the place of storage and provision of wood, the amount of wood prepared for transport, the sales time and procedure, mechanical damage to wood and its contamination during logging, the need to store wood, untimely transport, the lack of access roads to material, higher costs of transport due to the collection from the place of wood storage, wood damaged while loading and unloading (Piszczek, Janusz 2014)

Current forms of sales are undergoing transformations. They require continuous work so that clients will no longer think negative of the wood distribution system. It is particularly important due to further changes and proposals of adjustments to the needs of the market. Long-term contracts have been introduced as a form of wood distribution (State Forests 2015, www.drewno.pl 15 September.2015). The analysis of the current wood market reveals that two aspects of its functioning are most frequently and most strongly emphasised, i.e. the amount of raw material in the market (the amount of raw material offered for sale by the State Forests National Forest Holding) and its price, which has been growing considerably in recent years (Fig. 1). Naturally, both elements are interrelated – high demand and low supply generate high prices.

In this situation it is very difficult to find a compromise. On the one hand, we have the Polish wood industry, which is strongly fragmented, based on an inefficient, often underinvested machine park. On the other hand, we have primary processing of wood at the stage of restructuration and development of new enterprises, usually with limited access to the sources of finance both from domestic and European funds (Hruzik 2006, Wieruszewski et al. 2010). There are few enterprises, chiefly financed with foreign capital ,which are waiting for guarantees of successive deliveries of significant volumes of raw materials to maintain the continuity of production.

There is a significant trend in the technological development of the Polish wood industry and increased demand for timber. The increased demand for the investment pool of wood is a good example indicating the development of primary processing plants, which results from the increased production capacity of wood enterprises. In 2013 the production capacity increased in 75 companies, reaching the total volume of 2.75 million $m^3$of wood, whereas in 2015 489 companies increased their production capacity by as much as 12.37 million m^3 (Wnorowska 2014). Some of the developed production capacity is fictional and its most important aim is to acquire much cheaper wood for investments. Therefore, in order to ensure the clarity of rationed wood turnover (the forest and wood portal) it is necessary quickly to eliminate the abuse resulting from the investment pool and move this wood back to the forest and wood portal.

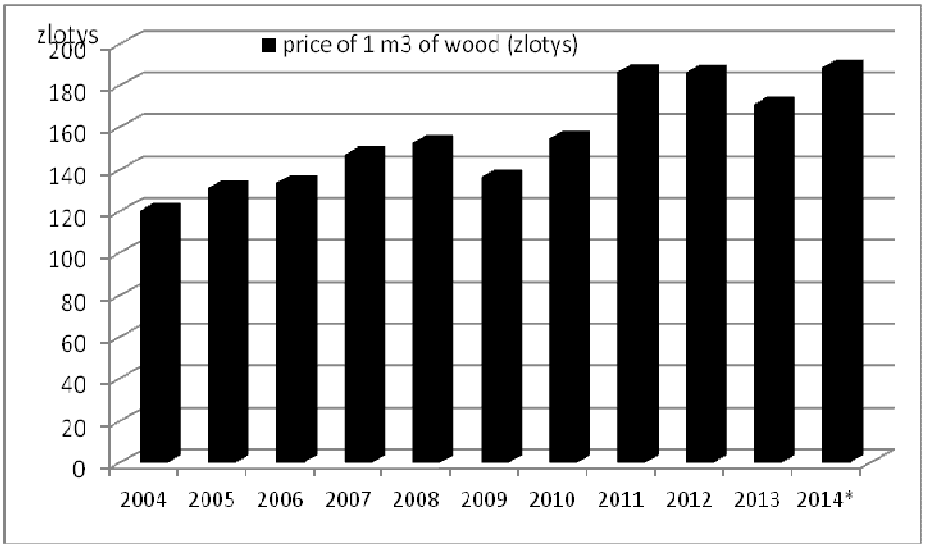

Fig. 1. Variation in average wood prices in Poland

Source: The author's compilation based on the data of the Central Statistical Office (Central Statistical OfficeYearbook 2014)
*- data covering three quarters of 2014

The increased wood processing capacity and its dynamics are conspicuous when we compare it with the recent downturn and take the increasing number of new investments in the branch into consideration (Lis 2005, www.strefabiznesu.nto.pl 15 September 2015).

On the other hand, the market of suppliers is predominated by the State Forests – a large, state-owned enterprise whose primary aim is to protect and maintain the continuity of material distribution as well as stability of forests in Poland. Being the main source of income, the sales of wood enables the State Forests to execute all its statutory tasks, although formally the sales is treated as a secondary aim, following the maintenance of the stability of forests. Wood turnover makes 90% of the income of the State Forests National Forest Holding. In 2014 the income from the sales of wood material amounted to about 6.6 billion zlotys (http://biznes.pl15 September 2015). It is also important that we can observe a gradual increase in the acquisition of wood whose parameters allow its mechanical processing (Table 1, Fig. 2). The results of sales indicate that in recent years the acquisition increased considerably, i.e. by 134%, as compared with 2000 (Central Statistical Office 2014).

Table 1. The acquisition of wood in Poland between 2000 and 2013

Years	2000	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total volume of wood acquired (thousand m^3)	27,659	32,733	31,945	32,384	35,935	34,273	34,629	35,467	37,180	37,045	37,946
Total volume of large timber acquired (thousand m^3)	26,025	30,427	29,725	30,228	34,146	32,407	32,701	33,568	34,568	34,978	35,796

Source: The author's compilation based on the data of the Central Statistical Office (Central Statistical OfficeYearbook 2014)

The stability of forests in Poland can be kept through appropriate forest management, based on the maintenance of tree stands with significant natural values. It does not always meet the demand of the wood industry, but it is guided bythe overall good of society.

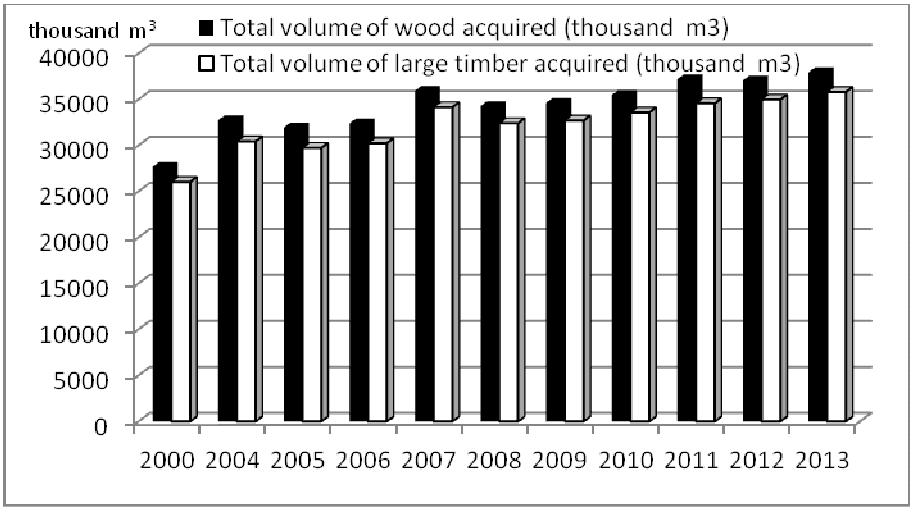

Fig. 2. Variation in the volume of round wood acquired in Poland between 2000 and 2013

Source: The author's compilation based on the data of the Central Statistical Office (Central Statistical OfficeYearbook 2014)

This is a very simplified presentation of two seemingly completely opposite elements of the national economy – wood turnover and processing. In a complete and appropriate interpretation we should point to the cohesion of actions, because forestry and the wood industry make one strongly interrelated mechanism of wood management and processing in its broad sense. Neither party involved in the material turnover and represented by the aforementioned business entities can function on its own. It is necessary to maintain and deepen systematic integration within the common forest and wood sector.

The management of the State Forests tries to meet the demand for the raw material although very often branches of the wood industry, represented by manufacturers' societies and large wood enterprises, differ considerably in their demand. As the flow of round wood from private resources is still low, the monopolistic State Forests holding needs to handle the greatest burden. Apart from large timber, which is the main group sold and provided to the wood industry, the turnover of valuable domestic wood assortments also plays a significant role (Paschalis-Jakubowicz 1999, Zastocki et al. 2012). Hence, the concept of rational sales of this special wood material appeared.

AN OVERVIEW OF SPECIAL SYSTEMS OF VALUABLE WOOD SALES AND THEIR ANALYSIS

The analysis is based on source materials provided by the State Forests. These are mostly submission catalogues published by regional directorates, which are in charge of auctions and submissions. This analysis is based on submission catalogues published by directorates in Katowice, Poznań, Zielona Góra, Krosno, Lublin, Białystok and Wrocław. The documentation from the years 2013-2015 was used in the research. The study was also based on "A Report on the Wood Sales

System in Poland', written by the Market Analysis Department of the Office of Competition and Consumer Protection and published in December 2008.

The analysis also includes the domestic system of sales of valuable wood, which is sold in the auction/submission system by most Regional Directorates of the State Forests holding (the Regional Directorates of the State Forests holding in Katowice and Wrocław use the name 'wood for special purposes'). The name 'valuable wood' renders the character of round wood for sale. Product standardPN-93/D-02002 uses the term' special wood' as a raw material of particular quality and dimensions, which are decisive to its rational use. The term 'valuable wood' can be considered as a name rendering the character of this particular group of raw material. However, first it is necessary to recall some definitions related with wood turnover (the expressions were taken from a submission catalogue of wood for special purposes issued by the Regional Directorate of the State Forests holding in Katowice).

Submission and auction are procedures leading to the sales of individual (sometimes a few) pieces of wood (lots) exposed by the seller at timber yards. **Submission** is a procedure that consists in wood enterprises submitting secret **purchase offers** (in sealed envelopes). An **auction** consists in competitors making **bids** on wood material.

A **lot** is connected with a piece (or a few pieces) of round wood described, which is stored at a submission timber yard by a State Forests unit. A piece of wood or a set of pieces of wood is marked with an identity number (in submissions lot numbers are imprinted on both fronts of a log).

A **submission catalogue** is a collection of information in the form of documents provided to companies interested in purchasing wood in the submission sales system. A catalogue contains documents such as: regulations of the submission procedure, regulations concerning the work of the submission committee, two lists (A and B – identical) of lots with consecutive numbers and detailed descriptions.

A **bidder** is a company which has successfully (on time, at the place and in the manner indicated by the seller) submitted a purchase offer.

Competitors are representatives of companies which have submitted offers to purchase the same material or which take part in its auction.

A purchase offer consists of the purchase offer forms taken from section A of the catalogue and filled according to the submission regulations. They contain clear data about the lots and prices at which the bidder intends to purchase them. The value expressing the bidder's intention to pay the net price for 1 m^3 of a particular lot, written as an amount in zlotys (as a whole number and as words).

The analysis of the sales of valuable wood shows that there are two main systems of its sales, i.e. auction and submission. The preparatory sales procedures are the same both for the auction and submission.

The choice of wood is the first stage in an auction/submission. The sorting staff are in charge of this element of preparatory procedures (there are exceptions to this rule, but they are not important for the analysis of valuable wood offered for sale). Sorters are a competent group of people for appropriate preparation of wood as they have the necessary knowledge of products, the market situation, production profile and clients' requirements.

Wood is taken from planned cuttings (in exceptional cases – from areas of disasters, but the wood is not chosen freely), it is supplied with estimates made by sorters and it is included in acquisition plans. The acquisition of wood is prepared by a forest district employee, who is aided by a super vising engineer. After cutting wood is delivered to submission timber yards or it is directly prepared for sales by the sorting staff.

Wood is dimensioned at consecutive thickness intervals of 10 cm (this measurement method is used by most directorates). As far as the procedures used by the Regional Directorate of the State

Forests holding in Katowice are concerned, length is measured with an accuracy of 0.5 m. The preparation procedure looks similar when wood fronts are protected from damage caused by desorption – the excessive length of at least 1% is used and additionally – up to 40 cm.

Wood is measured according to the following standard: Wood Material. Measuring Wood, Calculating Volume and Marking:PN-D-95000, (with later changes made in 2005). The assortment is acquired and cut to adequate dimensions in the forest, before transport or at submission timber yards.

Wood for special forms of sales is marked in a specific way, too (initially these are contractual procedures, which need to be accepted and verified – then they are approved as an applicable form). Pieces of wood are numbered at the submission timber yard – round wood fronts are marked with symbols painted on them or they are marked with a numerator or special submission plates (standard plates for wood marking are additionally used at the Regional Directorate of the State Forests holding in Katowice as a marketing activity).

Wood is delivered by car transport to a yard prepared for this purpose or to submission yards if there is a large amount of material. This gives clients an opportunity to look at the most valuable pieces of wood prepared for sale by the State Forests. Wood for sale is adequately described in submission catalogues. Every client has a possibility to make a visual assessment of the material during the exposure time, which lasts a week or two.

Valuable wood is sold in the following configurations:

- auctions,
- submissions,
- mixed systems.

Forms of valuable wood sales change when the market demand increases. The State Forests holding responds to it by gradually increasing the share of volume of special material acquired by individual Regional Directorates. The analysis of quantitative changes which have taken place in the last fifteen years (Fig. 3) reveals a noticeable increase in the supply of valuable wood from about 2,500m^3in 2000 and 2002 to about 9,500m^3in 2015 (in 2015 only the spring sales was taken into consideration). There were noticeable changes in the volume of valuable wood for sale. This situation was caused by variation in the quality of tree stands to be felled, according to forest management plans.

The Regional Directorate of the State Forests holding in Poznań is the only regional directorate which sells round wood lots at auctions. Before an auction clients who want to take part in it are registered. Representatives of companies receive identification numbers, which are used to identify bidders during an auction. Prices are increased by 20 or 50 zlotys (the bidding procedure in 2015). A person authorised by the Regional Directorate of the State Forests is in charge of the auction.

The lots which have not achieved the asking price are no longer auctioned and the wood will be sold on the Internet in the e-drewno system. When the auctioneer accepts the highest price offered, it is tantamount to concluding an agreement. An agreement is signed to confirm the sales transaction. If the purchaser fails to abide by the rules of the agreement (e.g. fails to pay for the wood purchased), they will have to bear financial consequences and they will not be allowed to take part in further auctions. An unreliable client is not allowed to take part in auctions for three years.

The other regional directorates of the State Forests sell valuable wood by submission or in a mixed system. In order to take part in the purchase procedure it is necessary to fill in section A of the submission catalogue (section B is a rough copy). A correctly filled section A of the catalogue (the catalogue is published in Polish; the Regional Directorates of the State Forests holding in Katowice and Krosno publish the catalogue in German, whereas the Regional Directorate of the State Forests holding in Wrocław publishes the catalogue in German and Czech) is submitted at a

specified place and time in a sealed envelope with a title, e.g. ‘A Special Wood Submission Offer – date’.

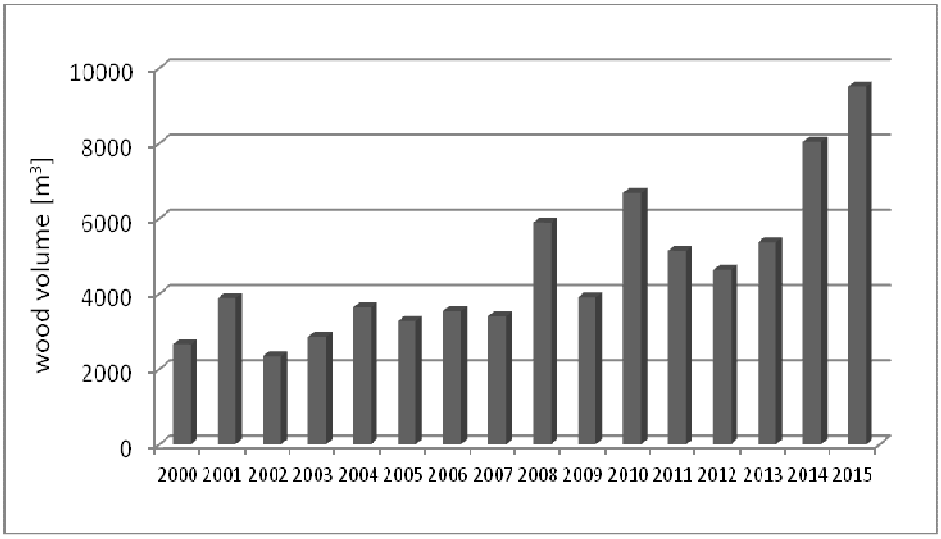

Fig. 3. The volume of wood sold by the State Forests at submissions and auctions

Source: The author’s compilation based on the data fromsubmissions and auctions made by the State Forests

In contrast to bidders, submitters cannot compare their offer with competitive offers. The price written in section A of the catalogue is the final price, which cannot be changed. The submission committee chooses the winning offer (the one with the highest price). If identical prices are offered, the submission committee decides about the winner. The decision about the winning offer is taken according to the submission regulations. The highest average price of all lots of a particular kind that have been sold so far is decisive to the Regional Directorate of the State Forests holding in Katowice, whereas in Zielona Góra the winner is selected in a lottery. In Lublin the purchaser is selected in a computer lottery, whereas in Wrocław the committee decides whether the winner will be selected in a lottery or according to the average price of all lots of a particular kind that have been sold to purchasers.

Directorates reserve the right to withdraw a particular lot with or without a reason for their decision (usually an offer is withdrawn if its initial price is too low). Due to the fact that before purchasing it is possible to verify the wood material precisely, all directorates make a provision in the regulations that once the material has been purchased it is impossible to make any complaints about it.

Failure to abide by the rules of the agreement (failure to pay, delayed payment or delayed collection of wood) results in contractual penalties. Depending on the regional directorate, the State Forests holding authorises the following people to sign agreements: the Director of a Regional Directorate (Wrocław, Krosno, Lublin), the Forest Inspector(Poznań), the Director of the Transport and Forwarding Department of the Regional Directorate of the State Forests holding in Katowice. The wood which has not been sold by submission is offered for sale on the e-drewno Internet portal. The Regional Directorates of the State Forests holding in Katowice and Wrocław enable clients to purchase by auction the wood which has not been sold by submission. The Regional Directorate of

the State Forests holding in Katowice organises an auction immediately after the submission results have been published. In Wrocław the submission committee announces when the auction will take place.

Wood is always collected after making a due payment for it. According to the regulations, failure to stick to the wood collection deadline results in financial penalties.

SUMMARY

Appropriate qualitative preparation of wood material and adjusting its form to clients' expectations are the most important elements in valuable wood sales procedures. There should be mutual benefits resulting from the sales of wood. The State Forests holding makes a considerable profit from the sales of valuable wood. Valuable wood is offered for sale in order to achieve the optimal financial effect. In consequence, it is possible to make investments to restore tree stands – thus, the statutory aim of the State Forests holding can be achieved.

On the other hand, clients do not always receive the highest quality products (according to the applicable product standards), but they receive products meeting certain requirements, adjusted to particular industrial purposes. Wood sold at auctions by the State Forests holding is one of the most valuable forest assortments in Poland. It is purchased by numerous clients representing Polish companies and enterprises in the neighbouring EU countries.

The funds earned from wood turnover should be used for the purposes that are directly related with the maintenance of tree stands, provision of due care to them and improvement of their usability. These actions will enable further acquisition of considerable amounts of the highest quality wood material adjusted to future clients' needs by optimising its value.

The current methods of sales of valuable wood are not ideal. However, so far no better forms than the aforementioned auctions and submissions have been invented. Selecting the highest quality wood is also a form of optimal use of valuable natural resources. The value of this wood is estimated as a result of market processes influenced by the demand and supply.

However, the market processes of wood sales are distorted by the monopoly of the State Forests holding (95% of the round wood market), as compared with the fragmented wood industry. We can observe a slow concentration of the production capacity in wood enterprises due to the growing demand for round wood .Foreign capital is predominant among enterprises characterised by considerable concentration of the production capacity.

The competence of the staff employed by the State Forests holding and intensified cooperation with representatives of the wood industry play a significant role in reducing conflicts in the forest and wood sector. When clients participate in the market sales, auctions and submissions of valuable wood, they give the State Forests their comments about the forms of sales. They clearly point to the need to modify or abandon particular actions.

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THE IMPACT OF SELECTED FACTORS ON THE VOLUME OF GENERATED SAWDUST AND THE PROFITABILITY OF SAWMILLING

Abstract: When analysing coniferous wood processing one often does not consider the share of by-products on the financial result of individual enterprises. Rational resources management requiers including, among others, the share of sawdust being generated at various stages of wood processing. The studies determined both real as well as theoretical volume of sawdust, as one of the by-products of sawmilling. The study embraced, dominating in the area of wood-processing, medium-size companies. The significant impact of rational energy management of sawdust on the changes in company's level of profit was emphasised.

Key words: coniferous wood, by-products, sawdust value, sawmill energy costs

INTRODUCTION

The structure of products made of wood apart from the basic assortment being the result of optimal wood processing there are also other products, so called by-products of sawmilling (so called residue).

Within this group one may find all „wooden residue" including sawmill sawdust, which is being generated as the result of sawing using gang saw blades, circular saws and band saws used in circular re-saws for logs. (Bidzińska , Ratajczak 2003, Szostak., Ratajczak 2003).

Estimating the volume of this type of by-products is made possible by the analysis of sawmill processes in small and medium-size companies. The volume of generated residue might range between 4% and 14% (Mikołajczak 2005, 2006, 2007). This share varies according to such factors as tools for roundwood processing, the size of cross-section of sawmill material or the thickness of the material being processed. Using reciprocating saws working with the kerf of 3,5 mm (company data) results in generating a larger volume of sawdust residue in comparison with saws with a kerf of 1,6 mm amounts to approximately 4%. Significant increase in the volume of sawdust takes place when multi-blade circular saws are being used with a kerf of 4,2 mm and bigger. The material accepted for milling to a large extend determines the amount of sawdust being generated. That however depends on the accepted orders, as well as the availability of the required (optimal) groups of roundwood. (Buchholz, Hruzik 1970, Hruzik 1979, 2001, 2006). Increasing the range of produced assortment has a positive effect on the increase of the volume of generated sawdust residue. A negative effect on that factor has a decrease in the diametre of processed raw material causing a significant fall in the share of thickness in the main product that is timber. (Hruzik i inni 2005, Pachelski i inni 1966, Szczuka, Żurowski 1995).

Industrial sawdust for long has been a source of additional income for wood companies, especially since that material became energy source (Poskrobko, Łach 2005, Lis, et al 2015), both unprocessed, as well as in a form of an ever more popular pellet and wooden briquettes. The possibility of using sawdust to complement the production of wood-based panels is also relevant.

THE AIMS OF STUDY

The basis of current study, as well as the evaluation of share of product accompanying sawmilling was the analysis of raw material purchase documents, as well as the verification of

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processing within the plant, supported by the specification of sawmilling and timber delivery documents. The report was done based on the collected materials related to Company activities as well as specialist literature on wood processing (Hruzik 1979, 1993, 2006; bachelor thesis 2000-2013, master thesis 2000-2013).

The aim of the study was to determine the level of correlation in a medium-size sawmill (up to 20 thousand m^3 of processed wood) verification of the study results achieved in industrial environment with the data from literature concerning experimental plants of a similar scope of production.

For the need of this comparison an exemplary process of coniferous wood processing has been adopted for the technology based on gang saws and supplementary band saws.

STUDY RESULTS

With regards to the presented justification and the volume quoted in sawmilling specifications (table 1), the size of real wooden raw material processing was given that is characteristic for the medium-size sawmills (20-30 thousand m^3 of roundwood). Based on the model processing in the first half of 2014 the share of sawdust thickness generated in the process of sawmilling was determined at the level of 12%. The premise envisages the unified processing for the basic types of wood with pine wood being a dominating component. Taken as the starting point the density of wet pine wood at the level of 700 kg/m^3 one may calculate the weight quantities of the associated product. Unfortunately, determining the actual volume of sawdust in this way is not possible due to the fluctuations in moisture content and in consequence also the weight. Therefore, to determine the volume of sawdust one uses volume conversion rates linked to the fill space. The study used a company rate of mp = 0,33 m^3, which was a result of arrangements related to transport and the level of sawdust settling in relations to the filling volume. Used replacement is larger than the one given in the normative documents recommending using mp = 0,32 m^2.

Table 1. Summary of a simulated sawdust density for an exemplary company between 2010 – 2013 as well as the actual density for the first half of year 2014.

Accounting year	2010	2011	2012	2013	I half of 2014
Assortment	The summary of possessing and processing coniferous wood				
Logs processing [m^3]	31 283	30 223	27 950	30 719	14 890
Production of sawn timber [m^3]	17 423	17 728	16 167	17 922	8 885

source: authors' own elaboration

Table 2. Summary of a simulated sawdust density between 2010 and 2013 as well as the actual density for the first half of year 2014 assuming that an average resource efficiency is 12% (sawdust rate was set at: 1mp = 0,33m^3)

Measurement unit	Volume of sawdust generated during sawmilling				
year	2010	2011	2012	2013	first half of 2014
m^3	3 754	3 627	3 354	3 686	1 787
mp	11 376	10 990	10 164	11 171	5 415

source: authors' own elaboration

Table 2 presents a summary of a simulated volumes of possessed by-product assuming that the rate of sawdust share amounts to 12% of total roundwood being processed

Based on the studies it has been determined that the 12% rate of sawdust efficiency in sawmilling of coniferous wood allows for an approximate estimation of its volume. It needs to be noted however that this ratio relates to the controlled results obtained in real circumstances in the first half of 2014.

It is assumed that in a so called storage and transport related loss, up to 2% of the material may be lost (depreciation and structural decay). This loss is linked to the process of mixing various fractions of material being generated during conversion of wooden material. This problem relates to the more fragmented by-product that is dust.

Table 3 presents simulated volumes of sawdust possessed between 2010 and 2013 in relation to the model first half of 2014. An average level of prices of wet and dry coniferous sawdust was given, from the period between 2010 and 2014. Profits from sawdust sales have been calculated, as well as the difference between the simulated and real income most likely due to the partial usage of sawdust for generating energy at the sawmill.

Table 3. Summary of simulated sawdust volume sold as well as real sawdust volume for the period between 2010 and 2013 and the first half of 2014 accounting for actual sales prices.

MEASUREMENT UNIT	**VUOLUME OF SOLD SAWDUST**					**TOTAL**
	2010	2011	2012	2013	I half of 2014	
	Calculated simulated volume [a]					
m^3	977	850	577	909	398	**3 711**
mp	2961	2575	1748	2756	1207	**11 247**
	Actual volume at sales [b]					
m^3	899	369	470	47	398	**2 183**
mp	2723	1120	1424	142	1207	**6 615**
	Difference between the actual and simulated volume [a - b]					
m^3	78	480	107	862	0	**1 528**
mp	238	1455	325	2 614	0	**4 632**
	Sawdust prices [c]					
zł/mp	25	33	35	45	40	–
	Value of simulated sales [a x c]					
zł	74 025	84 975	61 180	124 020	48 280	**392 480**
	The value of actual sales [b x c]					
zł	68 075	36 960	49 840	6 390	48 280	**209 545**
	The difference between actual and simulated sales [d - e]					
zł	5 950	48 015	11 340	117 630	0	**182 935**

source: authors' own elaboration

Simulated volume of generated by-product and juxtaposing it with the amount of sawdust assigned for sales to external recipients allows to determine what part of sawdust is used for energy

purposes that is maintenance of drying rooms and heating of production halls. According to sawmill data for the first half of 2014 it was about 1 388m3 (4 208 mp), which amounts to approximately 2 777 m3 (8 415 mp) per year. One can notice significant difference between simulated and actual volume, especially in 2011 and 2013, exceeding 480 m3 and 860 m3 of sawdust respectively. It might be the result of both changeable demand for fuel in various years, as well as the lack of consistency in the processes of keeping records of moving the sales of sawdust towards the end of accounting year. The consequence of the differences presented in the material balance is the decrease in the profit from sales of generated sawdust. The total shortage related to this between 2010 and 2014 (first half of the year) amounted to almost 183 thousand zł. The biggest shortage (117 630 zł) of assumed profit in relation to their simulated value was recorded in 2013. Apart from the supposed increase in the use for energy purposes to about 95% of generated sawdust, this noticeable disproportion was also influenced by the increase in its prices by 28,6% in comparison to the previous year 2012.

CONCLUSIONS

1. The analysis of material balance in companies presents the differences in relations to determining average efficiency ratios of by-products. Usage of roundwood is connected to the changes in its form and as a consequence its volume. In the analysed case of the simulation of sawmilling process the significant loss of volume in relation to possessed material being among others a consequence of desorption changes, which in natural conditions may reach up to about 12% of wood volume.
2. In the first half of 2014 that has been treated as a model year for the verification of processing:
   a) About 15 thousands m^3 of logs have been sawn, about 8,9 thousands of m^3 of timber at an average efficiency of 59,7%, higher than the efficiency in 2010, 2011, 2012, 2013, respectively by: 4%, 1%., 1,9%., 1,4%,
   b) 1 206 mp (about 398m^3) of sawdust was sold, out of which about 4 208 mp (1 388m^3) was used to generate energy of an average production of sawdust at the level of 12% of sawn wood.
3. On the basis of sawmilling characteristics, as well as adequate calculations, potential ratios and volumes of sawdust that should be reached as the result of processing purchased wood have been simulated as follows:
   a. in 2010: timber production – 18 676 m^3 allowing for sales of 2 960 mp (about 977m^3) of sawdust, while the actual sales reached 2 723mp,
   b. in 2011: timber production – 17 728 m^3, possible sawdust sales– 2 57 4mp (about 850m^3) while the actual sales reached 1 120mp,
   c. in 2012: timber production – 16 167 m^3 potential sawdust sales – 1 748 mp (about 577m^3) while the actual sales reached 1 424 mp,
   d. in 2013: timber production – 17 922 m^3 which allows for sawdust sales at the level of approximately 2 755 mp (about 909m^3) while the actual sales reached 142 mp.
4. Verification of ratios of generating sawdust within a period under analysis was corrected with the value of its usage for sawmill internal energy purposes at the level of 2 777 m^3 (8 415 mp) and it showed significant differences between the estimated volume and the data on the level of sales. Those differences meaning the shortage of sawdust volume in 2010 amounted to about 78m^3 (238 mp), 480m^3 (1 456 mp) in 2011, 107m^3 (324 mp), in 2012 and 862m^3 (2 613 mp) in 2013
5. In relations to the determined levels of roundwood processing taking into account by-products one may verify efficiency ratios based on estimated value of sold sawdust. Lost

income for those by-products amounted to 182 935 zł, what in a significant way may affect company's financial result.

6. The material analysis that was carried out for the first half of 2014 proves a significant discrepancy between the results obtained in 2014 and the sales data available for the year 2013 that was taken as a comparative year. It may be a proof of a significant impact of an adequate energy management on company's financial result.

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IMPROVEMENT OF THE ORGANIZATION OF FURNITURE PRODUCTION APPLYING THE TEAMWORK METHOD

Abstract:In this article the analysis of complaint about furniture manufactured in one of the Sub-Carpathian factories - PPH "Więcpol" was discussed. The conclusions from this analysis allowed for the methodical improvement of the production process of furniture. For the first stage of improvement one of the teamwork methods, i.e. brainstorming was applied. The result of this method pointed at the need of improvement at the stand of the transverse-longitudinal circular saw.

INTRODUCTION

Economic reality is constantly changing. Along with it the view of enterprises is changing, and their environment is becoming increasingly complex. This is the result of many factors such as huge technological progress, globalization of markets and increasingly shorter product life cycles. It all means that companies find it harder to survive in the demanding, competitive market. To achieve this it is necessary to use such tools through which it will be possible to improve the efficiency of processes, increase customer satisfaction and reduce production costs.

One of the most important elements that have an impact on customer satisfaction is the quality. Due to the fact that quality has proved to be a suitable way to take over a substantial part of the market, The interest in it has increased significantly. Consequently, in recent years, quality has become a subject of strong competition. To win customers one should, in fact manufacture products that meet their expectations, that is the products of high quality. [5, 7] Quality thinking can serve a deeper use of resources, and the potential of the business. One such resource for improving the quality are the intellectual resources of the organization. The most important resource should be used for qualitative research, but also to improve workplaces, which indirectly leads to higher quality and better competitiveness.

TEAMWORK

In all organizations one can meet with the various manifestations of the action, including work of teams, committees, groups. There are those that work well and those thahtwork badly. In some teams employees want to be involved, and avoid others. Some teams allow to achieve even better results than individual work and others do not give such a chance. [1]

In the teamwork the key components are applied techniques and methods. This set of tools affects the work results. In order to achieve the result, and that it was effective it is necessary to use the available tool skillfully. Brainstorming is such a basic technique which is often used in teamwork. It has a large impact on the effects of team work. Therefore, it should be carried out in accordance with the methodology.

Brainstorming is an intuitive technique of looking for solutions to the problems or potential problems. According to Alex Osborn brainstorming, also known as a creative discussion, this is an unconventional way of collaborative exploration of new ideas about methods of solving problems. [1]

Adam Hernas defines a brainstorm as: a technique of collaborative search for solutions, collecting ideas and making optimal variant, assessing the quality of products, solving complex problems of organizing technical and technological bases. [3]

Katarzyna Szczepańska defines brainstorming as a tool that is used to develop creative new solutions. Brainstorming is carried out in a team, this is one of the arguments for submission of innovative proposals. It is used to identify possible solutions to existing problems and identify

potential opportunities for improvement of quality. Brainstorming consists primarily in obtaining a large number of ideas in a relatively short period of time, by using all the possible association team members associated with the problem addressed. Every new idea promotes creativity not only of the person who reported the idea, but also the rest of the team members. Therefore, brainstorming uses group dynamics and synergy of teamwork. [6]

It is used in circumstances where there is a need for an extensive range of different options, picking original ones, creative ideas and, when an active attitude of a group of employees is required. [4] Typical sphere of brainstorming applications are: fixing existing or potential problems and finding all the possible causes of the problem. It is also used to establish a hierarchy of causes and effects of the problem, looking for possible ways to solve the problem as well as searching for potential solutions to reduce costs, improve quality. [1]

Brainstorming should proceed as follows:

A. Creation stage

Lecturers carry out a review of the guidelines to conduct the session and the objectives that should be achieved as a result of brainstorming. Next team members prepare a list of ideas.

The purpose of this stage is to generate as many concepts as possible.

B. Explanation stage

The team checks the list of ideas to make sure that all participants fully understand all the submitted ideas. The feedback on the ideas is carried out after completion of the brainstorming session. [6]

During the brainstorming, it is important to follow basic rules:

• no criticism, in order not to evaluate ideas before their disclosure,
• expression of no praises assessments which could indicate that another idea is not as good as the previous one. Rating and creativity cannot walk hand in hand,
• registration of the ideas in such a way that all participants have an insight,
• encouraging participants to present ideas quickly,
• using of ideas of the rest of the participants to create their own.
• concealing any ideas, unconventional thinking,
• the more the better. [4]

In addition to the classic brainstorming (which is also often modified) the following types can be also included, e.g.:

• Method 66,
• Brainwriting,
• Philips 66 BuzzSession,
• Method / Delphi technique.
• Reverse brainstorming
• Questions storm
• Method / Technology Writing 635 Brain. [1]

An important element of brainstorming is to choose a team that should count 5-15 members and a different way should be related with an analyzed problem.

ANALYSIS OF FURNITURE PRODUCTION PROCESSES IN THE "WIĘCPOL" COMPANY

Furniture production process consists of cutting process, laminating, drilling, milling, spotting, sanding, varnishing and shaving. The production process is complex, thus maintaining high quality

of the product is sometimes difficult. In order to ensure an appropriate level of quality the tools that would prevent the occurrence of errors should be used.

Due to the large number of complaints in 2014 (fig. 1) all production processes in the "Więcpol" company which had an impact on complaints in 2010-2014 were analyzed.

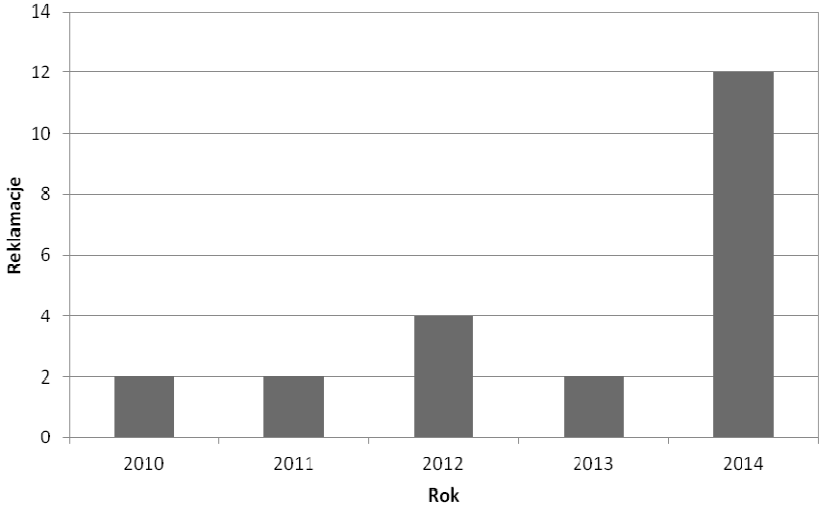

Fig. 1 Number of complaints in the years 2010-2014.

On the basis of the histogram it is possible to conclude that the poor quality of the product is a source of additional financial losses in the company.

In Table 1 the failures underlying the complaints in 2010-2014 were enumerated helping todetermine which processes cause the most defects which then become the basis for the complaint.

Table 1 shows that 73% of defects occur during 2 production processes implemented in two stands, on the veneer stand and circular saw stand. The remaining 6 positions, i.e. 75% produces 27% of the identified quality problems. The organization of work in the stands where there are most defects and which cause complaints needs to be improved.

"Więcpol" company bears the large financial losses due to the complaints. The problem is the quality of the products because the customer is very demanding and expects the highest standard. Therefore, the company needs to improve the quality of products it manufactures, and thus, implement appropriate changes. The proposed changes should be well thought out as bad proposals will have a negative impact on production processes, which can lead to further financial losses. For this purpose the technique of brainstorming which would involve the employees should be implemented. This technique can help find the right solution to the problem.

Table 1. The list and an analysis of production processes in the Więcpol company.

Production processes									
Failures	Quantity	laminating	Varnishing	Cutting	Miling	Drilling	Spotting	Sanding	Shaving
Laminate damage	4			X 2010 2011					
Crooked elements	2					X 2012			
Adhesive contamination	2	X 2012							
Deformed front	2						X 2013		
Imprecise cust of the edges	4			X 2014					
Inclusions on the paint	2		X 2014						
Removal of the PVC periphery	6	X 2014							

PROPOSALS TO IMPROVE THE ORGANIZATION OF WORK IN THE "WIĘCPOL" COMPANY USING BRAINSTORMING

P.P.H. "Więcpol" was established in October 1989 as carpenter service. Then the company employed 3 people and had a production hall with an area of 150m2. From the beginning the company was engaged in production of kitchen furniture. The production initially was targeted at the local market. The company grew rapidly and the production halls were, warehouses were built. There were also purchased new, modern machines such as veneers semi-format saws, multi-spindle and multi-head drills, as well as transport vehicles.

Recipients of kitchen furniture are now big wholesale markets in Russian, Ukraine and Moldova. The "Więcpol" company also has direct contractors from Russia and Lithuania. In order to improve quality and meet customer needs the furniture showroom was created and the range of manufactured furniture increased. Currently, the company is focused on unit and small-lot production, producing all kinds of furniture of the highest quality, it carries out orders from customers not only in the local market but also sends the furniture to countries such as Ukraine, Slovakia, Sweden and France. Individual client has clearly defined quality requirements. Therefore, ensuring the highest quality in the company various activities to have been carried out. The complaint analysis for the years 2010 – 2014 resulted in the initiation of teamwork methods not used so far in the company.

Effective teamwork may translate into occurring accidental mistakes, but there are more potential rewards: better quality of a unit in the team, new ideas are developed that might not appear at individual work, skills and ability of team members add up, or even strengthen, the team provides support as well as a sense of security, especially when making decisions.

Brainstorming allows to establish in a short time, existing potential problems, seeking of all sorts of possible causes of the problem and the ways to address the problem and searching for potential solutions, improvement of quality, reduction of costs.

At the first stage the subject was formulated and then the organizational matters were established. The subject of the brainstorming was to determine the major causes of defects and to find solutions to help improve the quality of production. This subject was formulated by the company owner who was looking at the results of complaint analysis

The next stage was the establishment of a brainstorming team. According to the methodology the number of members of the team should be in the range of 5-15 people. The PPH "Więcpol" established an 8-person team which, according to the commonly used methodology, included 4 people (i.e. 50% of the team) specialize in the production and sales of furniture (of 2 employees at the stand of the circular saw and position of veneer), 2 people, i.e. 25% specialize in related fields (painter, fitter) and 2 persons not related to the problem (designers). The leader, i.e. the person heading the team's work was chosen.

There were reminded the basic principles of brainstorming, such as: lack of evaluation of submitted ideas, the submitted ideas can be modified and improved, the ideas raised during the creative session are owned by the participants of the session, during one presentation the participant may report only one idea, the next may report when the voice is granted.

The next stage of the team's work was a brainstorming creative session aimed at generating the greatest possible number of ideas and presenting them on the board. A lot of ideas from standard to highly abstract ones were reported.

The next stage was the evaluation session. The aim of the session was a summary of the evaluation, assessment and selection of the best ideas. In this section, reported brainstorming ideas were discussed, as it was necessary to classify the submitted ideas. They were sorted grouped and then evaluated by a team. As a result of the evaluation three lists were prepared:

- ideas that are suitable for immediate use, without large expenditure
    - the application of the 5S method on the circular saw stand,
    - the application of the 6S method on the circular saw stand,
    - the implementation of Poka Yoke solutions ,
    - the introduction of Kaizen approach across the whole company.
- ideas that are suitable for use after certain time, which require some investments
    - sending employees for trainings,
    - improvement of veneering processes.
- ideas that are impossible to use at the moment
    - introduction of new technologies,
    - modernization of the entire machine park.

Following the brainstorming, it can be concluded that the best solution would be a pilot implementation of 6S on the transverse-longitudinal circular saw stand, one can also propose an implementation of Poka Yoke and Kaizen in this position. The proposed changes require a small investment that should not challenge the budget. This is a significant advantage, especially that "Więcpol" company does not have a large budget for investment.

CONCLUSION

Nowadays, companies which wish to succeed use more and more willingly the effects that deliver process improvements. To improve the process it must be first thoroughly analyzed. The right way seems to be methodical use of the intellectual potential of the organization. An example of such activities may be brainstorming. When carrying out discussions on common problems on the stand of the transverse-longitudinal circular saw PPH "Więcpol" proposed some solutions (primarily 6S) and most of them were implemented. Thanks to this method the quality of manufactured kitchen furniture improved and higher customer satisfaction was achieved. To sum up, by using methods the teamwork method we the desired goal, which was the improvement of the furniture production, was achieved.

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ANALYSIS OF TYPES OF CAPITALISATION APPLIED IN FINANCIAL PLANNING

Abstract: The paper presents an analysis of the concept of capital on the basis of applications of this term in literature on the subject. As a result of analyses a definition of capital was proposed and subsequently it was used in this paper. Three methods of allocation of financial resources are used: consumption, hoarding and investing. Indirect and direct capital investment in economic activity are presented in detail. On this basis formulas were developed for the evaluation of efficiency of planned financial investments for four capitalisation types: simple, aggregate, with multiple advance and non-advance payments.

Key words: capital, investing, financial planning, return on equity, interest, types of capitalization

INTRODUCTION

The objective of financial planning is to determine the effect of potential decisions on future financial results of economic entities. This objective may be realised based on analyses of relationships between material and financial aspects of planned operations. In this way the uncertainty concerning the effect of potential decisions on the future financial situation of an enterprise is also reduced [Pluta 2003].

In the course of financial planning various scenarios are investigated for investment proposals and financial options and next the most advantageous variant for the company is selected. Financial planning increases inherent cohesion of undertaken operations and identifies dependencies between specific objectives of the company and return on equity. Analytical tools used by financial planning are also applied to control the course of planned economic processes and to determine the degree of execution of expected financial results [Naruć 2013].

Financial planning focused on investments, i.e. outlays in the form of financial resources incurred for the recreation or increase of fixed assets and financial resources. This is equivalent to the decision not to use the current capital assets (profits or dividends) and to wait for the financial surplus to be generated in the future as a result of investment activity. Financial planning makes it possible to verify, to what extent the selected business model may bring expected profits.

The aim of this paper is to present a detailed characteristic and an analysis of types of capitalisation of interest and their classification in terms of selected criteria. On this basis respective computational formulas were derived for cases of simple capitalisation, aggregate capitalisation, multiple advance and non-advance capitalisation. The starting point for the four derived formulas was provided by the analysis of the concept of capital. In view of the diverse interpretations of this term presented in literature on the subject its definition developed specifically for this paper was proposed. The next stage was to characterise possible methods of use for financial resources. One of them, i.e. investing, is discussed in more detail, through an analysis of classification of investment types. In financial planning the basic indicator in the assessment of results of capital investment is provided by return on equity or internal rate of return. Due to the different methods of capitalisation of interest formulas were derived for four cases, facilitating the calculation of the volume of final

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capital at the assumed initial capital. Based on the conducted analyses relationships were shown between the definition of capital and specific solutions in the form of computational formulas.

CHARACTERISTIC OF THE CONCEPT OF CAPITAL

In literature of the subject the concept of capital is presented in various ways. Characteristics of opinions referring to this term, presented by main representatives of various schools of economic thought worldwide, were given by Marchewka [2000]. This analysis led the author to identify three basic directions for the interpretation of the concept of capital, which she referred to as monetary, fund and material.

In accordance with the first direction, capital is defined as the saved amount generating income, which was transferred to another entity for payment. In this form it is derived from the Latin stem word[39] – *capitali*s – main, derived from the word *caput* – head. In this meaning the word "capital" was used the earliest, first of all by merchants and entrepreneurs to denote the loan base as the amount of money borrowed to distinguish it from interest (payment, annuity/lease[40]). At present this term referring solely to the monetary meaning is rare. When describing the contemporary, complex economic phenomena, such a narrow definition of capital is insufficient. Moreover, when interpreting capital in the monetary terms it would refer solely to loans or credit[41].

According to the second interpretation the word "capital" may refer to goods (material, economic, capital), from which other, new goods will be derived in the future. Based on this definition we distinguish two forms of capital. In one case it refers to material goods (real, material capital), while in the other case it takes the monetary form (money, financial capital[42]). In both these cases the common characteristic is related with the use of capital for investments[43] in economic activity, which makes it possible to derive new goods as the final effect.

In the third approach capital, in this case called funds, is defined as the value of goods or money resources (broadly speaking: financial resources) allocated to the purchase of goods, which will be used in production. In the case of sale of goods generated by the real capital it is possible to obtain money capital. Money capital in turn makes it possible to purchase goods, which may be used in production. In this interpretation capital circulates in the investment and production process, transferred from one form to another: from the money to the material form, and next from the material form again to the money form, etc. However, the meaning in the value approach remains unchanged. Since the real and money capitals are expressed in value, it is possible to compare them and conduct joint financial calculations for them.

Based on the presented interpretations of capital it may be stated that is has the following constitutive[44] traits, i.e. those distinguishing this term unambiguously from others:

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[39] Słownik wyrazów obcych i zwrotów obcojęzycznych Władysława Kopalińskiego. http://www.slownik-online.pl/index.php (access: 30.11.2015).

[40] Ibid. annuity, lease or rent – from German *Rente*, from Old French *rente*, from Latin *reddere* – to give back – income obtained periodically on a regular basis from capital, property (stocks and shares, leader land) or welfare benefits.

[41] Ibid. credit – from Latin *creditum* – loan, debt – release by the creditor to the debtor of a specified value in money or goods under specified terms and conditions for the return of an equivalent at a specified date.

[42] Ibid. Finances – from French *finances* – treasury, from Old French – *finer* – to finish, to pay – financial resources, funds, income. Financial resources in a broader sense may take the form of cash, cash deposits in a bank and paper debit instruments or shares.

[43] Ibid. To invest – from Latin *investire* – to put on, to cover – economic outlays, which aim is to create new or increase existing fixed assets.

[44] Constitutive – from Latin *constitutivus* – constituting the basis for something, the main component of something; basic, primary, constituting a part. Słownik wyrazów obcych PWN. J. Tokarski (ed.). Państwowe Wydawnictwo Naukowe, Warszawa 1971.

– it is composed of material goods (resources), which may be presented in value and financial means (resources),

– it is used to invest in economic activity,

– it is used to generate financial surplus over the invested amount.

Indicated constitutive characteristics make it possible to propose the following definition of the analysed concept: capital comprises financial means and/or material goods expressed in value, which are invested (or have been invested) in economic activity in order to obtain a surplus over the invested amount (outlay). In this paper the concept of capital was applied following such a formulated definition.

INVESTING

Financial means (resources) may be allocated[45] by their owner to: consumption, hoarding[46] or investment (Fig. 1). In the case of consumption means are used for the purchase of immediately consumed goods (e.g. consumption of dinner) or consumed gradually, over a longer period (e.g. non-commercial use of a car). They satisfy specific needs of the owner of financial resources and bring no revenue. In the case of consumption they are used up and may not be further used for another purpose.

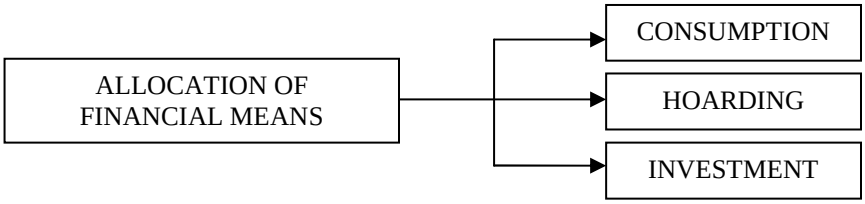

Fig. 1. Methods of use of financial means

Source: Own study.

In the case of hoarding financial means are accumulated and stored generally over a longer period. During that time the value of means (e.g. stocks of gold, precious stones, means of payment, etc.) may change both towards higher values (appreciation) and lower (depreciation). The objective and an important characteristic of hoarding is to maintain financial means ready for rapid use for consumption or investment. Hoarded financial means are a component of the property (wealth) of their owner.

Generally the objective of investing47 (see Fig. 1) financial resources is to obtain financial surplus in relation to outlays (investment costs). In this case financial means may be defined as financial capital. This type of investing may be executed as a result of engagement of financial capital in economic activity directly by the entity, which owns it or indirectly as a result of lending capital to other entities, which are engaged in this activity (Fig. 2).

[45] Means may also be used for repayment of liabilities, but it is a secondary action in relation to consumption or investment. Consumption or investment are first, preceding liabilities.

[46] Ibid. Hoarding – from Greek *thēsaurós* - treasure – accumulation of money, gold outside the economic turnover, i.e. not placing them in credit-providing institutions.

[47] This paper is limited to an analysis of such a type of investment, which objective is to obtain financial surplus. In a broader sense the objective of investing does not have to be connected with the generation of a financial surplus.

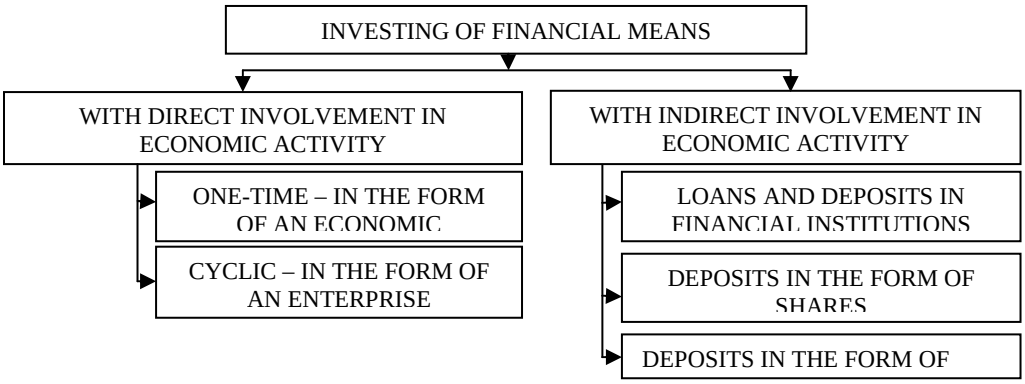

Fig. 2. Types of investment of financial means

Source: Own study.

The process of indirect investing may be executed in three forms: loans and deposits in financial institutions, investment in shares and investments in fixed assets (see Fig. 2). Investing in the form of loans or deposits in financial institutions is connected with one's own financial capital being made temporarily available to other economic entities for payment in the form of interest. Placement of capital in shares is connected with potential losses as a result of economic risk and despite a (general) lack of a direct involvement of the owner of stocks and shares in economic activity. Financial surplus is found in the form of dividend and increase in the value of stocks and shares.

The third form of indirect investing is similar to hoarding, with the difference in the objective to be reached. Placement of capital in fixed assets consists in the purchase of such commercially attractive goods (e.g. outstanding works of art, historical objects) or rights to such objects, which value will only increase in time. Since the time they were created the amount of such goods has been decreasing irreversibly. For this reason they are becoming less and less available and thus the market value of such goods increases in accordance with the law of supply and demand. At the time of sale of the assets the owner obtains a respective financial surplus over the previously invested amount.

Investing with direct involvement in economic activity consists in the allocation of financial capital to purchase such goods, which are used to manufacture other goods (including services) facilitating generation of financial surplus over the invested amount. In this case the investor participates in economic activity and bears full risk. Capital may be invested in an economic operation or in an enterprise (Figs. 2 and 3).

Fig. 3. Investing capital in an operation or enterprise

Source: Own study.

In the former case it is a one-time investment (operation), while in the latter it is multiple (enterprise). After the operation is completed the capital and possibly also the financial surplus will be withdrawn and may be used for consumption, hoarding or a new investment. Each enterprise, irrespective of its legal form, is an operation, in which the investment process occurs many times and in many cases – in a continuous manner. Capital for investments is recovered as a result of sale of manufactured products and reinvested. Financial surplus, defined as a profit, may be invested: either as a whole or in part.

In all cases of capital investment a characteristic feature is the fact that the final capital – after the completion of the investment cycle – should be greater than the initial capital, i.e.:

$$\mathbf{K_1 > K_0}, \quad (1)$$

where:

$\mathbf{K_0}$ – value of capital in the beginning of the investment period – initial value of capital,

$\mathbf{K_1}$ – value of capital at the end of the investment period – future value of capital.

Otherwise the investment does not produce the expected result, i.e. does not generate a financial surplus. If inequality (1) is met, the increment in capital in period t is:

$$\mathbf{\Delta K = K_1 - K_0}, \quad (2)$$

where:

$\mathbf{\Delta K}$ – increment in capital in period t.

For the purpose of analyses of investment efficiency a comparison of only increments in capital is of limited use in a situation, when initial capitals are of the same amounts. Otherwise definite conclusions may not be reached concerning planned effects of financial investments. If initial capitals are different, then for the needs of analyses of their efficiency an appropriate method is to use the rate (index) of return on capital, in accordance with the formula:

$$\mathbf{r = \Delta K / K_0}, \quad (3)$$

where:

r – return on equity (an index of the rate of increment in capital, an index of capital increase).

In the case of capital deposited in savings accounts or short- or long-term deposits in financial institutions, the increment in capital is defined as **interest** and instead of return on equity the term **interest rate** is used. It also presents the rate of increment in capital, but not directly during economic activity, but on a bank account.

The source of financial surplus is the business model, accepted and implemented by the owner of the capital, for an operation or enterprise, which makes it possible to produce goods with market value higher than that of resources (input goods) used for the manufacture and sale of market goods. If the adopted business model does not bring financial surplus, the owner of the capital withdraws from its financing. Otherwise they are at risk of bankruptcy, i.e. loss of a part or all invested capital.

TYPES OF CAPITALIZATION

Investing in an enterprise is a process repeated many times. The primary objective of investing capital is to obtain in each investment and production cycle a financial surplus exceeding the costs incurred for the manufacture and sale of products. The cyclic nature of this process requires recreation of resources, which were used during manufacturing processes and potentially an increase of resources in relation to the initial status in order to develop (increase) production capacity of the enterprise. Each time the completion of the investment and production cycle should be concluded with obtaining a final capital, comprising the initial capital and increment in (surplus) capital [Bień 2011].

Repeated investing (reinvestment) of capital may be executed without the crediting (incorporation) of increment in capital (interest) to the capital invested or with crediting (incorporation) of this increment. If interest is not included, the basis for the determination of the increment in capital (interest) is each time provided by the initial capital. In such a case **simple capitalisation** occurs (Fig. 4 and tab. 1).

If interest is incorporated in the invested capital, then **aggregate capitalisation** occurs, also referred to as **compound interest** (see Fig. 4 and tab. 1). The basis for the identification of new increments in capital is the final capital from the previous period. Incorporation of interest in the invested capital is referred to as **capitalisation (conversion) of interest**.

A arbitrary unit of time, using which the period of capitalisation (investment) is measured, is called the **base period**. An arbitrary unit of time, using which the period of determination of increment in capital is measured, is called **the interest rate period**, e.g. interest rate: monthly, quarterly, annual. Capitalisation is called **consistent** when the measure of the capitalisation period (**n**) and the interest rate period (**r**) are equal (see Fig. 4 and tab. 1). Otherwise capitalisation is called **inconsistent**. The interest rate, which measure of time is equal to that of the base period is called the **base interest rate** (rate of return). #If interest (increment in capital) is credited to the capital at the beginning of the base period, then such a capitalisation is called **capitalisation in advance**. If interest is credited at the end of the base period, then such a capitalisation is referred to as **capitalisation in arrears**. #Due to the frequency of payments of capital (principal installments) we distinguish **one-time** and **multiple** capitalisation (see Fig. 4 and tab. 1). Most frequently it is assumed that installments are equal and they are paid at equal time intervals. Moreover, we distinguish multiple advance capitalisation, if payments are executed at the beginning of the period and non-advance, if payments are executed at the end of the period. Table 1 lists types of capitalisation together with the criteria for their identification.

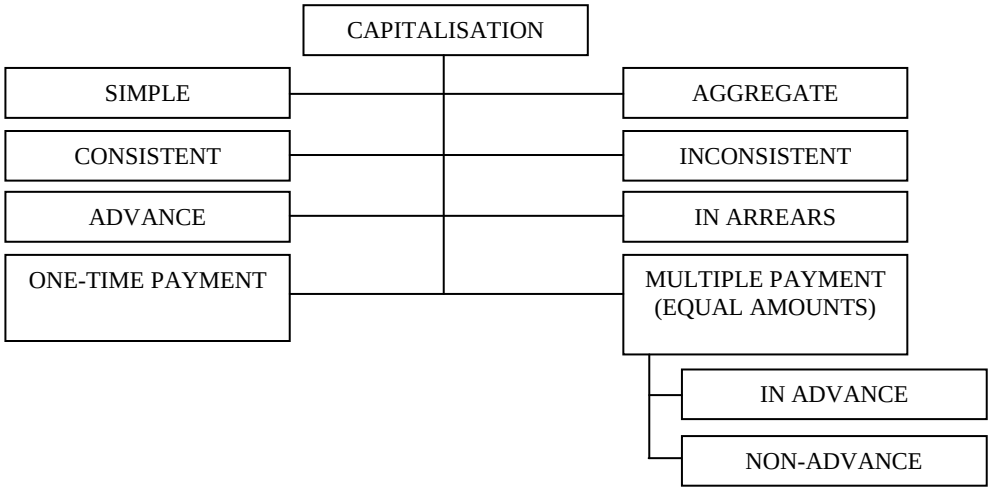

Fig. 4. Types of capitalization

Source: Own study.

Table 1. Characteristics of types of capitalisation

1.	**Criterion for identification**	**Basis for determination of increment in capital**	
	Characteristic feature	Initial capital	Capital from previous period
	Name of capitalisation	Simple capitalisation (with no credited interest)	Aggregate capitalisation (with credited interest)
2.	**Criterion for identification**	**Consistency of measure of period of capitalisation (base) with measure of interest rate period**	
	Characteristic feature	Consistent periods	Inconsistent periods
	Name of capitalisation	Consistent capitalisation	Inconsistent capitalisation
3.	**Criterion for identification**	**Date of crediting increment in capital or interest**	
	Characteristic feature	Beginning of base period	The end of base period
	Nazwa kapitalizacji	Advance capitalisation (in advance)	Capitalisation in arrears (non-advance)
4.	**Criterion for identification**	**Frequency of capital payments**	
	Characteristic feature	Payment	Equal payments at equal time intervals
	Nazwa kapitalizacji	Single	Multiple: – in advance – non-advance

Source: Own study.

CHARACTERISTICS OF SELECTED TYPES OF CAPITALIZATION

1. Simple capitalisation, consistent, in arrears, single payment

If simple capitalisation takes place, interest owed for each base period is equal to the product of initial capital and base interest rate (see Fig. 4 and tab. 1). Determination of value of the final capital may be performed based on formulas 2 and 3, after respective substitutions of ΔK and transformations:

$$\mathbf{r = (K_1 - K_0) / K_0}. \qquad (4)$$

Thus the value of the final capital at the end of the first period of capitalisation is:

$$\mathbf{K_1 = K_0 + r*K_0 = K_0*(1+r)}. \qquad (5)$$

At the end of the second period of capitalisation the value of the final capital takes the value:

$$\mathbf{K_2 = K_1 + r*K_0 = K_0*(1+r) + r*K_0 = K_0*(1+2*r)}. \qquad (6)$$

For successive periods of capitalisation the structure of formula 6 will be repeated. This shows that at the end of n–th period of capitalisation the value of the final capital may be determined from the formula:

$$\mathbf{K_n = K_0*(1+n*r)}, \qquad (7)$$

where:

n – the number of capitalisation periods.

Factor **(1+n*r)** is called the **factor of simple interest rate** or the **factor of future value in simple interest rates**. From the difference between the final capital K_n and the initial capital K_0 we may determine the value of payable interest for n base periods according to the formula:

$$(\Delta K)_n = K_n - K_0 = n*r*K_0, \qquad (8)$$

where:

$(\Delta K)_n$ – total increment in capital during n periods of investment.

In simple capitalisation the financial surplus (increment in capital) is each time withdrawn and does not participate in the investment process. It may be used for other purposes. Only the initial capital in the same amount is cyclically invested.

2. Capitalisation aggregate, consistent, in arrears, single payment

If the basis for the calculation of interest for the successive n-th base period is provided by the value of capital from the previous period (the total of the initial capital and interest payable for n-1 initial periods), then we have aggregate capitalisation (see Fig. 4 and tab. 1). Interest payable for the n-th period is the product of the value of capital from the previous period and base interest rate. When determining the final capital for aggregate capitalisation we may use formulas 2 and 3, analogously as in the case of simple capitalisation. As a result we obtain formula 4 and then 5, which specifies the value of the final capital at a specific rate of return at the end of the first period. In turn, the value of the final capital at the end of the second period is calculated differently than in the case of simple capitalisation. The basis for the calculations is provided here by the final capital obtained at the end of the first period. Thus using formula 5 we may determine:

$$K_2 = K_1 + K_1 *r = K_1 * (1 + r) = K_0 * (1 + r) * (1 + r) = K_0 * (1 + r)^2. \qquad (9)$$

In view of the final form of formula 9 it may be stated that the value of capital at the end of **n-th** period (e.g. after n years) is:

$$K_n = K_0 * (1 + r)^n. \qquad (10)$$

Mathematically equation 10 is a geometrical series with the initial term $\mathbf{K_0}$ and quotient **(1+r)**. Similarly as in the case of simple capitalisation **interest** (interest payable) for **n** initial base periods may be determined on the basis of the difference between the final and initial capital:

$$(\Delta K)_n = K_n - K_0 = K_0 * (1 + r)^n - K_0 = K_0 * [(1 + r)^n - 1]. \qquad (11)$$

After each investment cycle the obtained increment in capital is credited to the next investment cycle. This means that the produced financial surplus each time becomes capital. Such a procedure is referred to as capitalisation of interest. It is characteristic of indirect investing – on savings accounts or deposits in financial institutions.

3. Payments of capital multiple in advance

Capital invested may be successively increased as a result of payments at specific time intervals (see Fig. 4 and tab. 1). If these payments (W) are made at the beginning of a period (e.g. a year), then interest is credited at the end of period (e.g. the year), this is referred to as "in advance". Payments precede interest. The series of payment starts at the beginning of the first period and

concludes at the beginning of the last period. A diagram for such a procedure is presented in Fig. 5, assuming that the volume of payments and time segments are identical for these payments

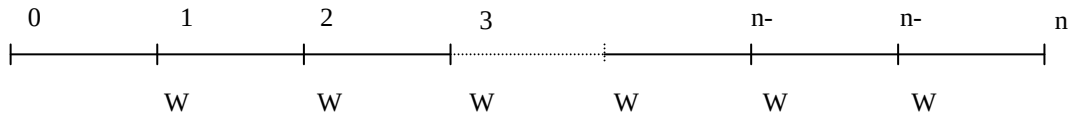

Fig. 5. A diagram for multiple advance capital payments

Source: Own study.

In Fig. 5 horizontal sections mark periods between successive payments. At the end of sections in the upper part of the figure we have numbers of periods. In the bottom part of the figure at the beginning of each period letter W indicates times of successive payments. For such a situation we may determine a future value of total n payments with interest. When calculating the value of total payments at the end of the n-th period we need to total the amounts with payable interest. Then the last payment is also covered by interest. Total of payments with interest, i.e. the future value of payments will be:

$$\mathbf{SW = W(1+r) + W(1+r)^2 + \ldots + W(1+r)^n}, \qquad (12)$$

where:
SW – total of payments with interest at the end of the n-th period,
W – single payment.
Successive terms of the total in formula 12 are ordered from the smallest to the largest term. In this way the first term of the series refer to the last payment, shown in Fig. 5 on the right, while the last term refers to the first payment. After the introduction of respective abbreviations formula 12 takes the form:

$$\mathbf{SW = W(1+r)*[1+(1+r)+ \ldots +(1+r)^{n-1}]}. \qquad (13)$$

Based on the quotient of the next and previous terms, i.e.: a_n/a_{n-1} it may be stated that formula 13 represents an infinite geometric series, win which quotient is **q = (1+r)**. The general formula for the total of n first terms of the infinite geometric series takes the form:

$$\mathbf{S_n = a_1*(q^n -1) / (q -1)}, \qquad (14)$$

where:
$\mathbf{S_n}$ – total of n first terms of the geometric series,
$\mathbf{a_1}$ – the first term of the geometric series,
q – quotient of the next and previous terms of the geometric series.
Thus formula 13, after adaptation to the form of formula 14 and respective transformations, takes the form:

$$\mathbf{SW = W(1+r)*[(1+r)^n -1] / r}. \qquad (15)$$

4. Payments of capital multiple, non-advance

If payments and interest are credited at the end of the investment period, then such a case is called "non-advance". The payment period is consistent with the interest period. The series of payment begins at the end of the first year (period) and ends at the end of the n-th period. Payments and interest are paid at the same time. Such a situation is presented in Fig. 6.

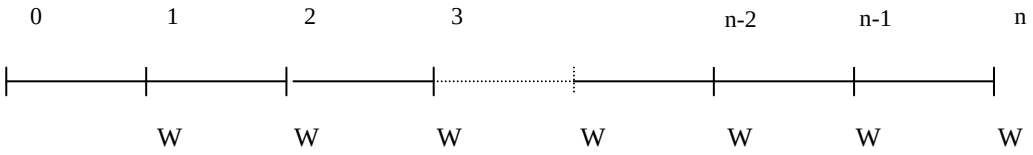

Fig. 6. A diagram for multiple non-advance capital payments

Source: Own study.

Assuming that the periods and volume of payments are identical, the future value of the total of n payments (W) with interest is calculated analogously as in the case described by formula 12. However, the last payment **W** is a component of the total without interest and the lest but one payment receives the interest for one period – the component is **W(1+r)** (see Fig. 6).

In turn, the first payment is $\mathbf{W(1+r)^{n-1}}$. After ordering the terms from the smallest to the largest the total of payments with interest is:

$$\mathbf{SW = W + W(1+r) + \ldots + W(1+r)^{n-1} = W*[1+(1+r)+ \ldots +(1+r)^{n-1}]}. \quad (16)$$

Based on the quotient of the next and previous terms it may be stated that it is an infinite geometric series, in which quotient is **q = (1+r)**. Thus we may use formula 14 and adapt to it formula 16. After respective transformations it takes the form:

$$\mathbf{SW = W*[(1+r)^n – 1] / (1+r-1) = W*[(1+r)^n – 1] / r}. \quad (17)$$

CONCLUSIONS

In financial planning we may apply a numerous group of detailed procedures and computational formulas, using which we may analyse proposed investment scenarios. This facilitates the construction of strategy for an enterprise, which will maximise the efficiency of the future development of this enterprise. In literature on the subject we do not have studies which would present comprehensively the relationships between applied analytical tools and theoretical assumptions on the basis of which these tools are created.

This paper presents an attempt at the partial solution of the above mentioned problem. The starting point was the analysis of the main concept for economics, i.e. capital. It is presented in various ways in literature on the subject. This paper proposes a definition of capital, which includes the most important opinions in this respect. It has also become a good theoretical background for the introduction of the next concepts and classifications, useful in financial planning. The final effect of the presented considerations is connected with the derived computational formulas, determined the final capital for four cases of capitalisation of interest. In further studies it may be possible to

include other procedures and computational formulas used in financial planning. In this way it will be possible to construct a broader systematic background for problems discussed in financial planning.

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Joanna Wiśniewska[48]

THE CONCEPT OF SUSTAINABLE DEVELOPMENT IN AGRIBUSINESS[49]

Abstract: The concept of sustainable agribusiness is a response to ecological, social and health threats in modern society caused by globalization and economic growth. Agribusiness is one of the world's largest manufacturing sectors in terms of output value, employment and international trade. It comprises of: pre-production industries, agriculture, food processing, distribution and trade. The main function of agribusiness is to produce sufficient quantity and quality food to maintain healthy population. Food security and biodiversity are immediate results of sustainable development in agribusiness. During last decades it has become evident that economic and technological development in agribusiness has not only environmental, social and institutional influence, but also has among others essential nutritional and regional consequences. The aim and result indicators of sustainable development are more often of qualitative than quantitative nature. In the paper the broad concept of sustainable agribusiness has been discussed. The aim of the paper is to review scope, object, subject, aims and results of sustainable development as well as the criteria of its evaluation.

Keywords: sustainable development, sustainable agribusiness, sustainable agriculture, food security.

INTRODUCTION

Since the 90s of XX century sustainable development is the main objective of economies all over the world, which aims at continual improvement of life quality and well-being of present and future generations. The sustainable development could be defined as comparable growth in all the regions all over the world and sectors of national economies. It is linked with strive at improving the quality of growth. It is sometimes regarded only as an eco-development. Sustainability means that the achieved progress of an existing generation creates a potential which is necessary to meet the needs of future generations [Pearce et al. 2000]. Frequently, it is described as the need to maintain a permanent income of humankind, generated from non-declining capital stocks. Thus, constant stocks of human, man-made, natural and social capital are considered as necessary and often sufficient criteria of sustainable development [Spangenberg 2005].

Sustainable development is a complicated, long run process, considered in an infinite time horizon. There is a slight probability of self-appearing of sustainability in economy. Every society can be described as comprising of different dimensions which are a complex, dynamic, self-organizing and evolving entity in its own right, making the coupled system one of tremendous complexity. For this system to be sustainable, each of the subsystems has to maintain its capability to survive and evolve, while the interlinkages of the subsystem must enable a permanent co-evolution. This is the context in which the concept of sustainable development has taken root — i.e. that of linking the economic, social and environmental objectives of societies in a balanced way [OECD 2001].

While considering the concept of sustainable development in agribusiness, a holistic approach is necessary with regard to synergic win-win-win options for the triad economy-society-environment. In discussions the need of interaction among these dimensions in order to minimize possible conflicts are the most often emphasised [OECD 2000]. Sustainability means putting into effect all

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the aspirations within the limitations of the present resources. A particular choice of one of a number of aims often requires maintaining the rest of the aimed values at minimum levels. All the aims may naturally oppose each other or even compete with each other. However, they can also be comparative or complementary, creating a closed unit of sustainability.

THE CONCEPT OF AGRIBUSINESS

The first authors who coined in 1957 year the term agribusiness into economics were J.H. Davis and R.A. Goldberg. They defined agribusiness as "the sum total of all operations involved in the manufacture and distribution of farm supplies, production operations on the farm; and the storage, processing and distribution of farm commodities and items made from them" [Davis, Goldberg 1957]. Agribusiness is considered as a complex network of farmers and the industries that link to them. Those links include makers of farm equipment and chemicals as well as firms that provide services to agribusinesses, such as providers of transportation and financial services. The system also includes the food marketing that link farms to food consumers, and which include food and natural fiber processors, wholesalers, retailers, and foodservice establishment [Food…1990]. Agribusiness encompasses all enterprises that take place inside and outside the farm gate, bringing products from the field to the consumer table. Agribusiness is specified by following subsystems:

- input - here all inputs are manufactured, imported and distributed;
- production - inputs are directly used for the production of an agricultural commodity as end-product in itself or as a raw material for the production of other products;
- processing - the commodities from the production subsystem are transformed into various products;
- marketing – is concerned with the transfer of goods from source to end-user, taking all forward and backward routes between mentioned subsystems of agribusiness.

Fundamental for the concept of agribusiness is that many issues are interrelated and dependent upon political, sociological, economic and behavioral aspects. Sustainability is distinct by high productivity, economic effectiveness and environmental balance [Wiśniewska 2011]. There are also other factors of sustainability: administration, science and education, management and organization. Progress in the farming sector is one of the conditions to be met in order to reach the established aims of sustainable development in food industry [Sadowski 2012]. Agriculture is the central issue in the theory of sustainable development in the whole economy and particularly in agribusiness, due to its position connected with using natural resources and earth. Some definitions of sustainability directly result from the principle assumption that it is possible to derive from earth only as much as it is able to offer. Although, agriculture represents only a several percentage of GDP in most of the countries all over the world, it is very closely linked to the sustainable development. The sector uses environmental inputs such as land and water, and simultaneously generates many outputs of environmental significance. As production intensity and output have increased, environmental policy issues have risen in importance across countries. Policy challenges facing state governments include the need reducing environmental impacts and risks from agriculture, responding to international environmental agreements which often touch on different agricultural aspects, and optimizing agricultural overall contribution to welfare [OECD 2000].

The integration of agribusiness companies is the reason to define widely the role of this sector in the national economy considering all above mentioned problems related directly to the nature of food production, and other important features of agricultural production like: long run of capital circulation, the responsibility connected with use of natural resources, soil, seasonality, traditions and culture of rural societies, the importance of food security and contribution to natural environmental degradation. The high degree of interdependence among various levels of food

production makes the modern concepts of agriculture to influence strongly the concept of whole agribusiness. F. Kapusta [2008] indicates on three different concepts of modern agriculture:

- conventional agriculture (industrialized) - is set to maximize production and profit of agricultural producer. In this model a lot of industrial means of production are being used. Although, the high rate of production growth, the income and environmental problems of industrial agriculture are being unsolved;
- ecological agriculture (organic) - it is more comprehensive system of farming, supporting biodiversity, biological cycles and biological activity of land;
- sustainable agriculture - is aimed at increasing quality, screening, animal welfare, traceability of raw materials and products, public welfare, and other food system sensitive social, environmental and behavioral objectives.

The concept of sustainable agriculture includes among others the postulate of multifunctional development of rural areas [Wilkin 2010]. It refers to the functions of agriculture as a source of market and non-market effects of economic character as well as non-economic character. Sustainable development refers to the present implementing actions in order to re-orientate and transform the farming sector and addresses the future and the issue of maintaining a long run balance. G.R. Conway and E.B. Barbier (1990) defined sustainable agriculture as the ability to maintain productivity, whether of a field, farm or nation, in the face of stress or shock such as increasing salinity, or erosion, or debt, or a new pest, or a rare drought or a sudden massive increase in input prices. The United States Sustainable Agriculture Network refers to the sustainable agricultural production and distribution system that achieve the integration of natural biological cycles and controls, protect and renew soil fertility and the natural resource base, optimize the management and use of on-farm resources, reduce the use of non-renewable resources and production inputs purchased from other industries, provide an adequate and dependable farm income, promote off-farm opportunity in family farming and farm communities, minimize adverse impacts on health, safety, wildlife, water quality and the natural environment [Food…1990]. The OECD definition of sustainable agriculture says that this is agricultural production that is economically viable and does not degrade the environment over the long run [OECD 2000].

The main object of agribusiness is to produce and supply food. But its object is also to gain incomes and to survive on the market. The economic aim is the main aim of typical economic entity which is conventionally not very much interested in external effects of its activity especially when it generates private costs. Since that, external costs of production are mostly regarded as public costs and are the objects of public policy which is responsible for sustainable development. The subjective and objective scopes of the public activities are implemented within the limitations of rural and agricultural policy, food policy and international policy. They are targeted not only at farmers and manufacturers, but at the whole rural community and labour force employed not merely on farms and manufactures, but also at the capital and natural resources, not just the income from farming, but also the income parity and the standards of living in farmers' and rural families, as well as manufacturers, in particular small and medium producers of local food.

THE CONCEPT OF SUSTAINABLE AGRIBUSINESS

At the beginning of the third millennium the concept of agribusiness has been changed and broadened. Nowadays each subsector of agribusiness is a developer, a communicator and a user of economic, environmental and institutional resources, creator of information, and human capital. Modern agribusiness creates a new, open, multidirectional and multidimensional financial, social, environmental and institutional links with the rest of the national economy. These changes are driven by changes in food consumer needs, wants, and attitudes, new technological advances at all levels, increasing governmental regulation and changes at the farm production level. In agribusiness

the main modern drivers are general economic processes like globalization, environmental regulation and liability, and accelerated changes in economic surrounding, significant reconstructing of sizes and scopes of agribusiness chains and networks, appearance of new niche and local markets, new marketing channels, integration, coordination and partnering, bundling of inputs, combining product sales and financing investment in the soft assets, research and development, human resources, organizational structure and appearance of boundaryless firms [Boehlje et al 1995].

Table 1. The most important features of sustainable agribusiness

Scope	Subject	Object	Aim
Nutritional	Security	Quality	Self-sufficiency
Economic	Structure	Performance	Effectiveness
Social	Community	Justice	Welfare
Environmental	Ecosystem	Protection	Preservation
Institutional	Institutions	Development	Competence
Regional	Regions	Equalization	Cohesion

Source: own elaboration.

The study of up-to-date literature highlights the extended role of agribusiness which is among others to: provide safety food to the consumer, create new technologies and innovations, develop human capital, increase economic effectiveness and protect natural environment. The concepts of sustainable agribusiness mark a multi-layer range of growth, taking into account conventional economic indicators, as well as indicators of social, ecological and institutional development [Wiśniewska 2010]. The traditional aims of sustainable development in agribusiness are marked by three areas of interaction: social welfare, social justice and respect for natural environment [Macrae et al 1993]. In the recent studies the institutional aspects as well as regional inequalities are being highlighted as the main criteria of effectiveness for the policy of sustainable development in agribusiness [Matuszczak 2013,]. The study of literature let to the conclusions on the most important features of sustainable development in agribusiness as follows (Tab. 1).

The sustainable development in agribusiness should be therefore regarded widely as a set of six scopes, contrary to narrow three scopes of sustainability. Only then, it can completely reflect the impact of agribusiness on the national economy and environment. Sustainability can be defined as the optimal state in co-inherent scopes nutritional, economic, social, environmental, institutional and regional within which agribusiness is operating (Fig.1).

There should be not only typical economic, social and environmental scopes of sustainability, but also specific nutritional (food security), institutional (traditions, private and public institutions, organizations), as well as regional (convergence, cohesion, rural development) scopes of sustainability in agribusiness considered by agribusiness entities performance. In order to implement the rules of sustainable development, agribusiness entities cannot solely act on profit criterion, but they also have to take into account Corporate Social Responsibility (CSR) in the scope of ecological criteria and, first of all social criteria. The studies exploring the domain of sustainability from the agribusiness perspective highlight the particular role of external pressures such as customers, suppliers, and the media to initiate sustainability activities in agribusinesses [Rankin et al. 2011]. The up-to-day concepts of sustainable agribusiness underlines also the stimulating role of supply chains and networks in initiating environmental and social activeness, investments, information exchange (knowledge and experiences), and innovations between food chain and network participants [Haverkamp et al. 2006]. Likewise, The external pressures from

government powers and various stakeholder groups act as a triggers for agribusiness to effectively incorporate sustainability issues into their supply chain management. Sustainable supply chain management escalates competition far beyond a product's price to novel comprehensive quality aspects, namely the environmental and social added value [Gold et al 2009]. Nowadays the most important for agribusiness is to understand that customers will drive the extent of the "green changes" rather than continuing to view sustainability as nothing more than an inconvenient compliance costs [KPMG 2010].

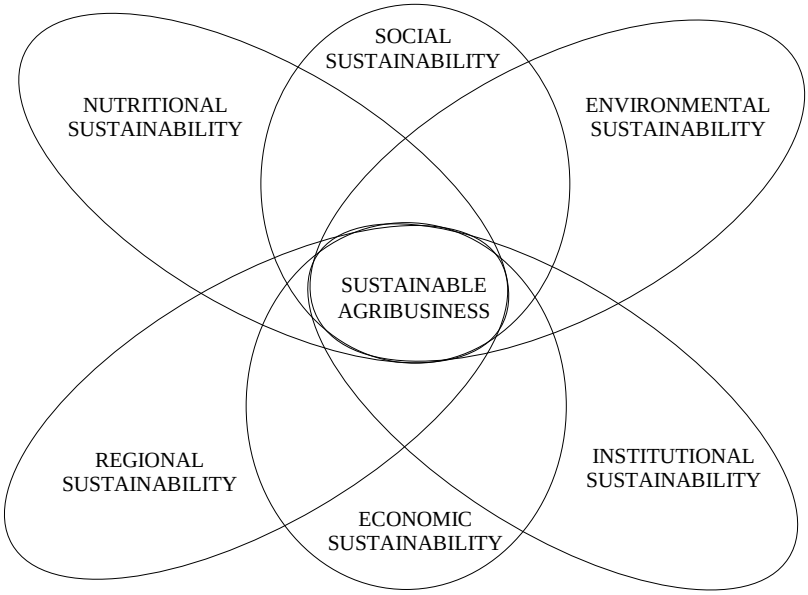

Figure 1. Co-inherence of scopes of sustainability in agribusiness

Source: own elaboration.

To sum up, sustainable agribusiness model is one that should provide sufficient food to meet the current demand and future demand existing in all regions all over the world. For agribusiness to be sustainable it must produce firstly, with regard not only to the natural environment protection (to ensure that production can continue on an indefinite basis) but secondly, also to generating sufficient production to meet the current demand and producing adequate return for producers, operators and consumers to support the lifestyle they and their next generations require. The sustainable institutions play a supportive role in all other co-inherent scopes in sustainable agribusiness, i.e. in: sustainable nutrition, sustainable environment, sustainable economy, sustainable society, and sustainable regions.

THE AIMS AND RESULTS OF SUSTAINABLE AGRIBUSINESS

Sustainability criteria embrace, inter alia, incomparable and immeasurable factors. A wide set of indicators has been approved and developed to recognize a weak comparability and commensurability of some of the sustainable impacts. In recent studies main measures of effectiveness of social security system, environmental protection, and institutional potential and economic development are considered also as indicators of sustainability. In essence, the sustainability is measured by such categories as: preserving resources, implementing transformation

processes and protecting intergenerational equilibrium. Defining standards, minimum and maximum limits, and the way of measuring and monitoring the achieved effects is the condition of efficient policy of sustainable development. The costs and the subjects bearing them constitute primary concerns [UN-DSD 2001]. General criteria of sustained development in agribusiness reflect both economic conditions defined by economic efficiency, social conditions defined by the achieved level of equality, environmental conditions signifying improvement of the natural environment and institutional conditions of organizational improvement. Much recent work on measuring progress in sustainable development has addressed specific issues, such as measuring climate change or the environmental and social impacts of particular sectors (e.g. food, energy and transport). However, measuring sustainable development at an aggregate level requires a broad integration of indicators of economic, environmental, and social changes.

Reaching the optimum level of self-sufficiency, economic effectiveness, social welfare, environmental stability, institutional development and regional cohesion measured as a sum of different outcomes should be unified as comprehensive indicator of sustainable development in agribusiness. These indicator could form the basis for cross disciplinary peer impact reviews as well as for the assessment of proposed policies from the perspective of sustainable development. The main sustainability assessment tools should embrace all co-inherent scopes of sustainability in agribusiness. They are proposed as: economic (cost/benefit analysis, modeling, regressions, scenarios), environmental (life-cycle analysis, material flows, resource accounting, ecological footprint), social (sustainable livelihoods, human and social capital measurement, participatory processes), nutritional (nourishment, health, food access, obesity, micronutrient intakes) and regional (rate of growth, rural development, rural unemployment) (table 2).

Table 2. The main aims and results of sustainable agribusiness

	Nutritional	Environmental	Social	Economic	Institutional	Regional
Aims	• Food security • A healthy, varied diet providing with energy and nutrients needed for health, normal body function and physical activity • Sustainable and secure food supply for present and future generations that supports public health	• Biodiversity • Quality of natural resources • Ecological effectiveness • Ecological innovativeness • Reduction of ecosystem tensions • Reduction of environmental degradation effects on people's lives	• Optimal inter-generational allocation of resources • Ensuring supplies necessary to ensure food safety of the population • Ensuring jobs on rural labour markets • The degree of social exclusion and satisfying the needs among farm families • Adequate level of incomes of present and future farm and non-farm families and adequate standard of living in rural areas	• Increase in productivity on farms and in agribusiness • Competitive farming sector • Ecological efficiency of farms, agribusiness chains and networks • Economic efficiency of ecological farms • Economic efficiency of small and medium local food manufacturers • Entrepreneurship attitudes among youths • Effective food distribution channels	• Optimal allocation of public goods and services • Optimization of transaction costs • Development of economic infrastructure • Public managing natural environment • Internalisation of external costs • Cooperative activity of governments, private and public sectors as well as individual consumers	• Diversified farm landscape, varied produces healthy mix of crops and livestock for local and regional markets • Preservation of rural societies values, culture and traditions, social relationships and networks • Multifunctional development of rural areas • Development of regional and local food and specialities (agritourist and so on)

Results	• Mindful food choices and eating • Decrease in the level of overweight or obese in society • Equal access to adequate, high quality and nutritious food all over the world • Optimization of micronutrient intakes • High traceability of food stocks	• High level of implementing eco-development programmes • High level of participation in ecological initiatives • Equal division of profits and losses from ecological initiatives • High level of eco-creativity and innovativeness of the private sector and individuals	• Equal distribution of incomes • High living standard of farmers and rural communities • Equal opportunities for farmers and non-farmers • Low unemployment rate • Decrease of percentage of population under poverty line • Equal access to education • High accessibility to out-of-farm sources of incomes in rural areas	• Maximising aggregated wealth • Effective distribution of income • Sustained competitive advantages • Fair division of profits and losses • High effectiveness of chain management and network collaboration of public and private entities • The increase of international engagement of companies, international exchange and investments	• High level of economic infrastructure in rural areas • High level of universality and institutional transparency • Common access to public goods and services • Equal access to information • Efficient system of public intervention • Increase in number of networks and cooperative relationships	• The increasing level of technical and economic infrastructure in rural areas • High level of physical, organizational and human capital in rural areas • The increase regional and local collaboration networks in agribusiness • The increase of consumption and investment demands; • Increasing level of regional setups in agribusiness

Source: own elaboration based on UN-DSD (2001).

The immediate results of sustainable development in agribusiness are food security and biodiversity. The food security has been defined at the World Food Summit of year 1996 as existing when "all people at all times have access to sufficient, safe and nutritious food to maintain a healthy and active life". In turn, biodiversity is defined by the Convention on Biological Diversity in year 1992 as the variability among living organisms from all sources (land, sea, fresh water) and the ecological complexes of which they are a part. Thus biological diversity includes diversity within and between species, and diversity of ecosystems. This includes natural and cultivated species, varieties, and ecosystems. The food security is one of the most important components of human needs. The diversified and sustainable agribusiness is fundamental for food security. Accordingly, the threats of growth in agribusiness could be of economic, ecological, social, nutritional, regional and institutional nature.

The main economic insecurities are excessive concentration of agricultural production and market control of transnational food corporations as well as relatively low incomes from agriculture and local food processing parallel to high prices of inconvenient food stuffs. The environmental threats embrace mainly low economic diversity of rural areas, biodiversity as well as negative climate changes. Main social threats are poverty, income disparities, lower standards of living, unemployment. Among institutional threats of growth are high public costs, over bureaucracy and delays in reactions of institutional systems to the unexpected threats and economic changes. Nutritional threats are mainly under nutrition of population and regional are vanishing of natural resources and traditional social relationships.

The further development of measurement and assessment methodologies contributes to the improved design and implementation of economic, ecological, regional, food security and social policies of government. This would allow nations to monitor progress on sustainable development at different levels according to set goals and results. It would also provide a common set of indicators to facilitate comparisons of regions, countries and local districts sustainability.

CONCLUSIONS

The contemporary policy of sustainable development in agribusiness is still determined according to the concept of sustainable agriculture. Yet to meet all expectations towards agribusiness all aims of sustainable development should be considered simultaneously. Nowadays, too narrowly understood sustainability limited to eco-development cannot be accepted especially in multifunctional agribusiness. The endeavor to sustain development in agribusiness should regard different extents of sustainable agribusiness linked as a feedback. Economists, politicians as well as economic entities should consider widened concept of sustainability and its scope, subject, object, as well as aims and results. The main reason is the aspiration for economic convergence and social cohesion of regions all over the world. Indicators of sustainable agribusiness are required at different levels and for different uses; they are important implications for identifying and developing indicator analyses. For example, at local or site specific levels, more detailed indicators may be required than at more aggregate levels. There is value in pursuing work to develop and use a core set of sustainability indicators, which are broadly comparable at the international level.

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