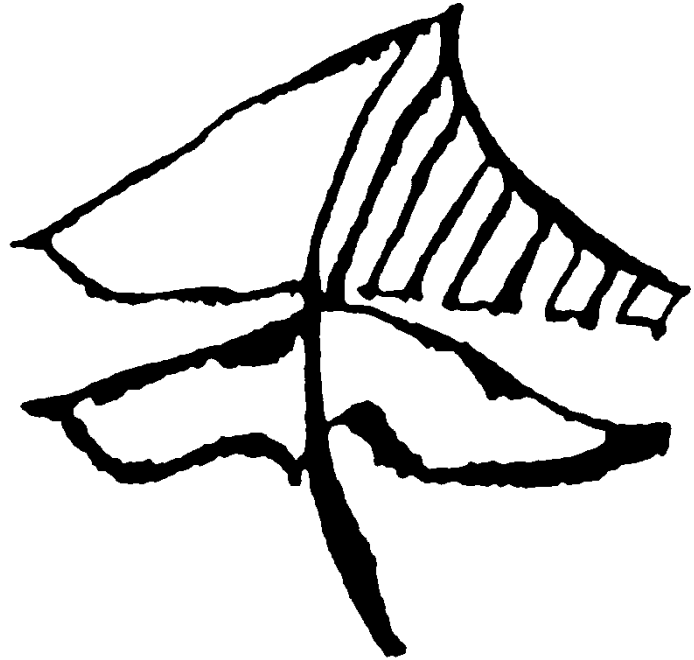


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Grzegorz Cofta, Bartosz Dreger¹

ECONOMIC ASPECTS OF APPLICATION OF DECORATIVE WOOD COATINGS AND THEIR EFFECTIVENESS

Abstract: The paper presents results of mycological tests and accelerated ageing tests for 13 commercially available decorative coatings in relation to costs of their purchase. Mycological tests with the use of *A. niger* showed that only four preparations protect spruce wood against attack of the test fungus. None of the coatings was resistant to the destructive effect of UV radiation. Testing results of resistance against *A. niger* attack and accelerated ageing were compared relative to purchase costs of the applied preparations. It was found that the most advantageous preparations were those with medium efficacy and of low prices. However, for the comprehensive economic analysis of the application of tested decorative coatings it is required to consider costs of coating application and surface renovation.

Key words: economic relation, wood coatings, mold, UV radiation

INTRODUCTION

Decorative coatings are among the wood protection chemicals most extensively applied by a wide variety of different users. These preparations have a dual mode of action – they protect the material against degradation and improve esthetic value of the coated material [1,2,3]. They protect it against the adverse effect of biological, chemical and physical factors, particularly against UV radiation, molds, algae and invisible bacteria. For this reason protective properties of decorative preservatives result from their chemical composition, particularly pesticides and substances alleviating the effects of solar radiation. An increasing body of data has been published indicating that these preservatives are capable of providing increasingly effective and longer protection against the above mentioned factors. However, the use of these solutions is sometimes unjustified from the practical and economic point of view. Technologies preparing the raw material for preservation and the protectant application procedure may pose a problem for users having no qualifications in wood preservation. Moreover, when considering the economic aspect it turns out that the application of some of these solutions requires considerable financial outlays on application equipment. Such equipment pays for itself only at commercial scale use. The aim of this study was to assess economic efficiency of the use of commercially available decorative coatings, including such properties as resistance to mold attack or the harmful effect of UV radiation.

MATERIALS AND METHODS

A total of 13 decorative preservatives were selected for analyses of efficiency of their use. Prior to their selection the criteria considered included commercial availability and the scope of their action declared by the manufacturer. All preparations may be applied in Hazard class 3 (EN-335 (4)). Wood coatings designed in Table 1 with letters A, G and H, despite no declaration of effective protection against molds, were included in the study due to their highly effective wood protection against weathering. Selected preparations differed in color (acronym 1- low pigment content: -2 – high pigment content), the presence or absence of fungicides, type of resin and the price. Detailed characteristics of analyzed preparations are presented in Table 1.

Samples of 60×40×4mm (the longest dimension along the grain) were prepared from spruce (*Picea abies* L. Karst) sapwood free from defects. Sample fronts were protected using a Jowapur 687.22 adhesive (Jowat Klebstoffe) and next conditioned to a moisture content of 12%. This made it possible to apply the preparation only on tangential surfaces of samples. Coatings were applied

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using a pipette and spread uniformly over the entire surface. Samples were weighed before and after application.

Table 1. Tested decorative coatings

Acronym	Preparation color according to the manufacturer	Amount of preparation applied onto the sample and per m ²	Amount of preparation applied according to the manufacturer	Fungicide/fungicide mixture	Resin	Price of preparation
A1	Pine	3x100 µml. 0.125 l/m ²	Up to 25m ² /l. at least 2 layers. (0.12 l/m ²)	None	Alkyd	57.35 zł
A2	Walnut					57.35 zł
G2	Pine	3x110 µml 0.14 l/m ²	Up to 22 m ² /l. 3 layers (0.14 l/m ²)	None	Alkyd and Polyurethane	49.80 zł
G1	Rosewood					49.80 zł
H2	Pine	2x200 µml 0.17 l/m ²	Approx. 12 m ² /l. Min. 2 layers (0.17 l/m ²)	None	Alkyd	62.96 zł
H1	Dark walnut					62.96 zł
D	Rosewood	2x170 µml 0.14 l/m ²	Up to 14 m ² /l. 2 layers. (0.14 l/m ²)	Tolyfluanid IPBC	Isophthal	21.31 zł
K	Walnut	3x110 µml 0.14 l/m ²	Up to 20 m ² /l. 2-3 layers (0.1-0.15 l/m ²)	IPBC Tolyfluanid	Alkyd	82.43 zł
B1	Fir	3x200 µml 0.25 l/m ²	200-250 ml/m ² . At least 2 layers (0.2-0.25 l/m ²)	IPBC Propiconazole	Alkyd	42.50 zł
B2	Rosewood					42.50 zł
C2	Pine	2x200 µml 0.17 l/m ²	Up to 15 m ² /l. 2-3 layers (0.13-0.2 l/m ²)	IPBC Tolyfluanid	Alkyd	54.96 zł
C1	Rosewood					54.96 zł
E1	Gold Pine	3x240 µml 0.3 l/m ²	300 ml/m ² . At least 2 layers (0.3 l/m ²)	Tebuconazole. Tolyfluanid Permetryna	phthal	17.50 zł
E2	Walnut					17.50 zł
F1	Pine	2x240 µml 0.2 l/m ²	Up to 10 m ² /l. 2 layers (0.2 l/m ²)	Tolyfluanid Tebuconazole Permethrin	phthal	24.44 zł
F2	Rosewood					24.44 zł
I 1	Larch	2x200 µml 0.17 l/m ²	120 - 160 ml/m ² at 2 layers (0.16 l/m ²)	IPBC Propiconazole	Water-borne oil	78.37 zł
I 2	Walnut					78.37 zł
J1	Pine	2x200 µml 0.17 l/m ²	up to 15 m ² /l. 2-3 layers (0.13-0.2 l/m ²)	Tolyfluanid	Alkyd	29.00 zł
J2	Rosewood					29.00 zł
L3	Pine	3x160 µml 0.2 l/m ²	Up to 15m ² /l. 3 layers (0.2 l/m ²)	Tolyfluanid	Alkyd	48.64 zł
L1	Walnut					48.64 zł
L2	Rosewood					48.64 zł
M1	Pine	3x160 µml 0.2 l/m ²	160 - 200 ml/m ² . at 2-3 layers (0.2 l/m ²)	IPBC Propiconazole	Alkyd	50.27 zł
M2	Rosewood					50.27 zł

Source :own study

A total of 5 samples were selected for analyses, differing in saturation rate by 3% from the assumed value given in Table 1

Coated samples before ageing were conditioned for 14 days in a room at a temperature of $21\text{oC}\pm 1\text{oC}$ and relative humidity of $65\%\pm 5\%$. The ageing test was conducted using a QUV/SO Accelerated Weathering Tester equipped with UVA 340 lamps with intensity of 0.77. The process lasted for 1005 h. One cycle comprised 5 h condensation and 7 h of UV irradiation. At the beginning of each condensation phase a 15-minute wetting was performed. Accelerated ageing of protected samples was performed at Obermeier GmbH & Co. KG in their processing plant in Bad Berleburg, Germany. Upon the completion of ageing the samples were conditioned for 14 days under identical conditions as prior to artificial weathering. Efficacy of the preparations was assessed in accordance with the ISO846 standard variant B. The test organism was a microfungus *Aspergillus niger* van Thaigen, which came from the collection of the Institute of Chemical Wood Technology, the Poznań University of Life Sciences. Fungal colonization of protected samples was assessed using a scale presented in Table 2. After 14-day conditioning samples were placed in Petri dishes with agar medium and infected with the test microfungus. Mycelium growth readings on samples were taken at days 4, 7, 10, 14, 21, 28, 35 and 42 of the mycological test.

Color was determined on samples protected with decorative wood coatings, both those subjected to ageing and those not subjected to the test. Determinations were performed using a Datascolor 600 colorimeter equipped with a UV EMITA WT 410 lamp. It was calibrated prior to the test. The whiteness standard was used as a reference standard. For each sample three measurements were taken in three different locations.

Table 2. Macroscopic scale of sample colonization rate.

Mold index	Sample colonization rate
3	No mycelium growth on the sample: an inhibition zone is found between the sample and mycelium
2	No mycelium growth on the sample: no inhibition zone is found on the medium between the sample and mycelium
1	Sample surface overgrown in less than 1/3 with test fungus mycelium
0	Sample surface overgrown in more than 1/3 with test fungus mycelium

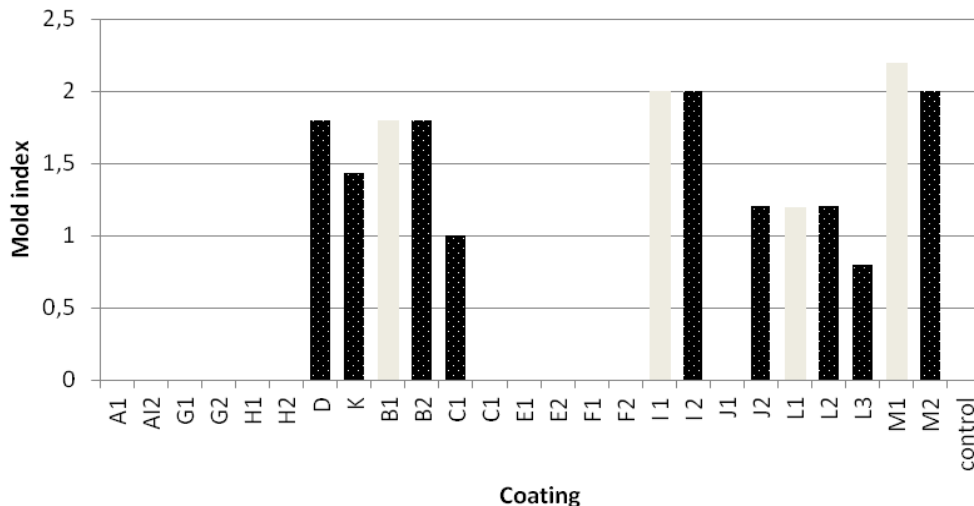
Source :own study

PROPERTIES OF COATINGS

Testing results for the fungicidal effectiveness of preparations are given in Fig. 1. In order to provide a clearer presentation of the testing results fungal growth indexes are presented only for day 42 of the test. It was found that among 13 coatings used in the test 5 preparations did not protect wood against attack of the test microfungus. In the case of two wood preservatives (C and J) individual color versions were susceptible to mycelium growth. Four other decorative coatings did not provide complete protection of samples. Only two preparations protected spruce wood against *A. niger*. Samples protected with preservatives A, G and H containing no fungicides were overgrown as early as day 4 of the mycological test to the same degree as the control samples made from spruce wood.

Measurement results for changes in color lightness for decorative preservatives on samples subjected to ageing are presented in Table 3. None of the preservatives protected against changes in lightness caused by UV radiation. Lightness of samples protected with preservatives J I and B II

changed to the smallest degree. The greatest changes were found for preparations denoted as I II, A II, L II, C II, G II, M I and H I. In the case of decorative preservative coatings, which two variants differed in their pigment concentrations, a greater change in lightness was observed for preparations with a lower pigment concentration.



A. niger at day 42 of test (■ - higher pigment concentration, □ - lower pigment concentration)

Figure 1. Fungal colonization degree of samples protected with tested preparations by

Source :own study

It is of interest that in the case of preparations advertised as preservatives effectively protecting against the adverse effect of solar radiation their efficacy proved to be low. When evaluating decorative preservative coatings from the economic point of view their prices, effectiveness of protection against A. niger and change in color lightness. The coefficient k combining all these values was determined according to the formula:

$$K = \left\{ \left(\frac{1}{4} - I \right) / (1/C) \right\} (100 - J) \quad [\text{abstract number}]$$

where:

I - fungal growth index at day 42 of test,

C - price of wood coating in PLN/liter

J - change in lightness (absolute value)

In terms of coefficient k preparations D, E I, E II, J II, B I, B II, M I and M II turn out to be best. However, considering a lack of coating resistance against A. niger attack only preparations D, JII, BI and BII, M I and M II may be recommended for application in accordance with the requirements imposed on such preparations. It came as an unpleasant surprise that the wood preservatives, which main role is to protect coated wood against the adverse action of UV radiation, had low values of coefficient k. Based on the results recorded for these preparations they may not be recommended as applicable for Hazard class 3 according to the standard PN-EN335.1.

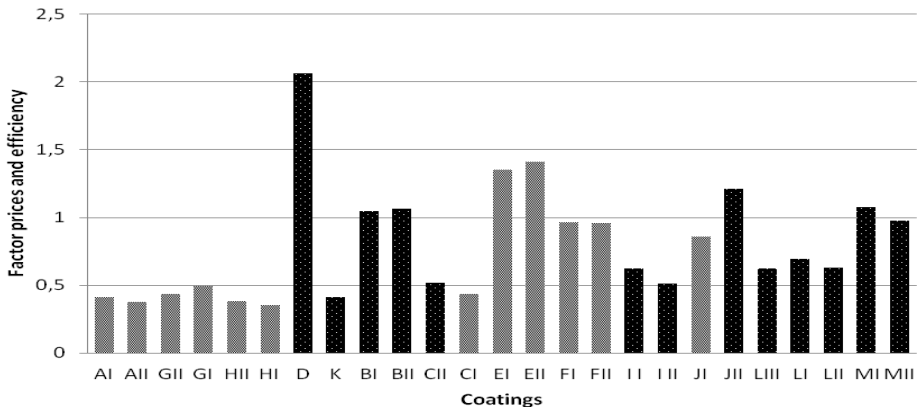


Figure 2. Dependence of price and protection efficacy of wood coatings - coefficient k.

Source :own study

Table 3. Results of color lightness measurements for decorative preservative coatings for samples not subjected to ageing before and after mycological tests

Acronym	Mean lightness value		Coefficient of variation
	Before mycological tests	after mycological tests	
A1	54.61	57.42	-5.15
A2	31.08	35.44	-14.03
G1	30.01	29.49	1.73
G2	54.93	47.57	13.40
H1	26.99	30.10	-11.52
H2	66.28	64.10	3.29
D	26.61	27.45	-3.16
K	35.93	31.71	11.75
B1	41.93	41.14	1.88
B2	26.79	26.77	0.07
C1	26.34	27.54	-4.56
C2	47.67	54.34	-13.99
E1	62.82	59.61	5.11
E2	43.92	43.38	1.23
F1	64.94	61.18	5.79
F2	31.47	33.35	-5.97
I 1	60.93	59.53	2.30
I 2	28.50	34.11	-19.68
J1	57.05	57.22	-0.30
J2	28.69	28.26	1.50
L1	29.16	30.22	-5.15
L2	26.78	26.87	-14.03
L3	52.64	53.85	-2.30
M1	61.96	60.61	13.40
M2	29.25	29.21	1.73

Source :own study



When analyzing this coefficient it may be concluded that a more advantageous solution may be to apply more frequently the cheaper decorative wood preservatives of lower efficacy. Such an analysis does not include labor costs connected with frequent preservation of protected materials.

Further research should include labor costs connected with protection of wooden elements using decorative preservatives.

CONCLUSION

Based on the conducted tests the following conclusions may be formulated:

- Preparations containing no fungicide are not capable of providing effective wood protection against microorganisms.
- Pigment concentration in wood coatings has no significant effect on their efficacy.
- Good wood coatings are capable of preventing protected samples against growth of *A. niger* mycelium during 42-day incubation under laboratory conditions.
- UV radiation and water cause changes in color lightness.
- Economically the most advantageous preparations are those of medium efficacy and low price.

The proposed formula for coefficient (k) does not contain costs of repeated coating and surface renovation, which are higher for preparations providing shorter protection against biocorrosion.

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5. EN-335 Durability of wood and wood-based products. Use classes: definitions, application to solid wood and wood-based products

Monika Muszyńska, Tomasz Krystofiak, Barbara Lis²

SOME ECONOMIC-TECHNOLOGICAL ASPECTS OF USING ADHESION PROMOTERS IN FURNITURE INDUSTRY

Abstract: The aim of this work was to provide some economic and technological aspects of using adhesion promoters in furniture industry. The specific surface of wood and plastics as materials for gluing, activation methods of the substrate with particular consult the adhesion promoters, emphasizing economic issues were characterized. It was stated, that physical activation methods require the highest investment costs incurred, but which are quickly compensate by the greater line efficiency and minimum waste. Alternative meriting the attention solution is the preparation of the substrate for gluing by the use of adhesion promoters, and then conducting connecting process with the use of conventional adhesive for the lower prices.

Key words: surface, activation method, adhesion promoters, furniture, adhesive, technology, economic relation

INTRODUCTION

Design significantly has an impact on the economic effects achieved by the company. For the point of view, form, aesthetics and quality of the finished product are the undisputed determinant of the decision which has been taken by the consumer relating to their acquisition, and their commercial success. Therefore, the production of furniture is used exotic wood or wood-based panels, the surfaces of the wide and narrow planes are veneers by attractive materials imitating wood. These are the most common polymeric materials that can sometimes cause problems during the bonding. These include plastics primarily based i.a. ABS, MUF, PA, PE, PMMA and PVC, laminates produced in versions of CPL, HPL or LPL [Krystofiak et al. 2009, Proszyk, Bernaczyk 1995, Żenkiewicz, Gołębiewski 1998]. It is generally acknowledged that the cause of a limited bonding is the presence of substantial amounts of extraction components in the timber, a non-polar character, and very different chemical composition. However, in the case of other materials, the non-porous surface, often showing no polar character and relatively low surface free energy, which usually shapes at the level of 30 mJ/m². High-grade bonding agents used to connect these materials are HM adhesives in PUR version [Krystofiak et al. 2009, Proszyk, Bernaczyk 1995]. However, not only glues are important in obtaining the quality of the connection, also the structure and properties of the surface layers, very often or even mainly, determine the performance characteristics of many products. In the case of bonding processes, they can significantly affect on the adhesion phenomena, and hence the strength and resistance of glue-lines. Having this in mind, innovative solutions are developed or adopted from other fields of technology, ways of materials surface preparation with reduced susceptibility to bonding. The choice of the appropriate method is determined not only due to technological reasons, but also costs [Brunold et al. 1996, Hartwig et al. 1997]. Economic considerations require the use of methods to ensure the required properties with using as low-cost measures. One method of activating the surface of merit special attention from the group of chemical methods are adhesion promoters also known as proadhesive coupling agents or commonly primers. Most of them are based on organic silanes (OSI). OSI world production for various fields of economic, it is estimated at year scale 30-40 Gg based on solid content. This is usually a significant amount given that the solvent agents usually contain 10-15% solids content,

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instead water-soluble at 20-25%, with quantities of the application 5-10 g/m² activated surface [Krystofiak et al. 2009, Proszyk, Krystofiak, Lis 2006].

In view of this reasons the aim of this paper was to provide some economic and technological aspects of using adhesive promoters in furniture industry. The specific of wood and plastics as materials for gluing, activation methods of the substrate with particular consult the adhesion promoters, emphasizing economic issues were characterized.

SPECIFIC OF WOOD SURFACES AND PLASTICS

Domestic wood species in most cases don't cause problems with bonding as opposed to exotic wood species. They contain a large amount of extraction components especially in heartwood parts. Many of them, in particular from the group of fats and waxes, may cause significant problems in the bonding process. These components are usually hinder wetting bonded surfaces or inhibit the process of solidification of the adhesives. In turn gluability of plastic can have a significant effect on way the processing, which affects both the macroscopic structure and the location of the chemical groups on the surface of the materials. Moreover, in the course of their production is often necessary to use different release agents for coating devices, which may also be a source of failure bonding. Besides the cause may be inadequate gluability content in plastics processing aids, which can migrate to the surface inhibiting hardening process [Proszyk, Bernaczyk 1995, Proszyk 1987, Proszyk, Krystofiak, Lis 2006]. Despite this, the plastics are widely used in many industrial sectors such as furniture industry. Due to its unique properties they strike a balance in innovative applications, which makes their popularity constantly increasing as the material (Fig.1). Globally, the long-term forecast is 4% increase in consumption per capita [Anonymous 2011].

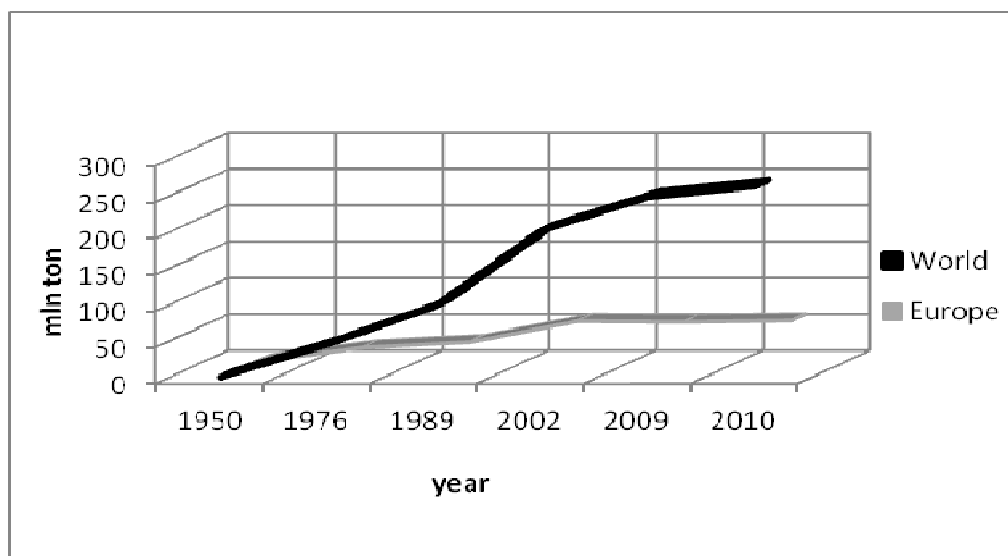


Figure 1. Development of the world production of plastics in the 1950-2010

Source: own elaboration based on: Tworzywa sztuczne – fakty 2011. Analiza produkcji, zapotrzebowania oraz odzysku tworzyw sztucznych w Europie w roku 2010: 1-32. <http://www.plasticseurope.org>

Because of the fact that there are different kinds of plastic, and each of them functions in numerous variants it is possible to select the optimum material for a particular application. The most

popular polymers characterized by the highest share of the market include PE, PP, PVC, PS, EPS and PET. In total, these polymers account for about 74% of the total demand for plastics in Europe [Anonymous 2011]. In furniture industry great difficulty in bonding processes can cause:

- the periphery on the base i.a.: ABS, MUF, PA, PE, PMMA and PVC, which is used for gluing bonding board elements.
- artificial veneers on paper support, and especially synthetic decorative films, mainly based on PVC, used in the lamination technology board elements in 3D presses, a technique of wrapping profiles and the production of folding system drawers.
- laminates produced in versions of HPL or LPL, which among others are designed for postforming technology surface finishing of board elements [Krystofiak et al. 2009, Proszczyk, Bernaczyk 1995, Wróbel 2009].

METHODS OF SURFACE PREPARATION FOR BONDING

Obtaining a quality of products in which there are joining operations, especially materials with reduced susceptibility to adhesive bonding, is associated with the proper surface preparation of the surface layer in order to ensure the physicochemical conditions of adhesion. For this purpose, the polymer materials are subjected to a treatment consisting of cleaning processes, and increasing the adhesion of the surface and modifies in functional terms. In many cases, mentioned processes combine these features.

These treatments aim to:

- the removal of impurities formed during the manufacturing process or due to outside influences,
- development of the material surface,
- increasing the surface free energy to make a difference in the relation to the applied measures amounted no less than 10 mJ/m² [Dobrzański, Dobrzańska-Danikiewicz 2011].

Among the methods of activating polymeric materials surface one can distinguish:

- mechanical - the oldest and simplest treatments for cleaning and processing the surface layer. They help to improve the adhesion by developing the surface, thereby increasing the contact surface of the substrate and the adhesive.
- chemical - affect the state of the surface as a result of the impact of chemical agent. Their importance is decreasing due to pollution, low productivity and high cost processes. To this group also includes mentioned in the introduction adhesive promoters. They produce an intermediate layer on the surface, without changing its quality, allowing you to connect the substrate with adhesive. They contain in their composition chemical compounds with reactive functional groups, exhibiting significant physicochemical affinity for both the bonded surface and adhesive. They contribute to increase in the number of interfacial chemical bonding and surface free energy, and thereby improve the adhesion properties [Maciejewski, Dąbek, Marciniak 2004]. They develop the geometric structure of the substrate to bonding, enabling the mechanical adhesion phenomena [Krystofiak et al. 2009].
- physical - flame, electron, gamma radiation, laser, low temperature plasma and corona treatment. Flame treatment consists of tvery quick exposition of the surface of material to the flame, resulting in the combustion gas in the air, causing the combustion of impurities deposited on it, the oxidation of surface layer and other changes to facilitate wetting processes [Dobrzański, Dobrzańska-Danikiewicz 2011]. The plasma method is based on the impact that ranges from several seconds to several minutes low temperature plasma which arises under the influence of partial discharges, has been taken place in a vacuum chamber [Brunold et al. 1996, Żenkiewicz, Gołębiewski 1998]. Partial discharges are generated by the rapidly changing electromagnetic field in the medium gas (oxygen, nitrogen, helium, argon, xenon, air, and chlorine). Corona discharge occurs in the space filled with air, which

is located in atmospheric pressure. As a result of the potential difference in the space between electrodes their activator followed on ionization of air a low temperature plasma is formed. The advantage in comparison with the plasma modification is the reduction of the cost of activators and the ease of performing activation processes in a continuous manner [Brunold et al. 1996]. Interaction of electromagnetic radiation with the top layer (e.g, UV, γ , x-ray, laser, stream of electrons). In practice, the largest UV radiation emitters were used (at a wavelength of 150-250 nm), which include specially designed lasers, gas discharge lamps and microwave devices [Hartwig et al. 1997, Krystofiak et al. 2009]. After the layer treatment, as a function of time usually follow deactivation processes the surface. In Fig. 2 presents the life cycle of the technology of surface modification of polymeric materials.

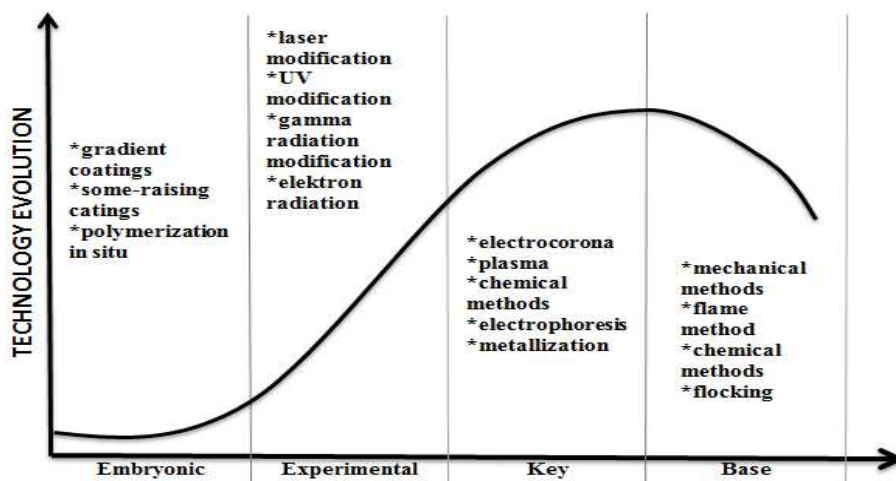


Figure 2. The life cycle of technology surface modification of polymeric materials

Source: Wróbel G.: *Obróbka powierzchniowa polimerów. 2nd Workshop on Foresight of surface properties formation leading technologies of engineering materials and biomaterials in Białka Tatrzańska. Poland 29-30th November 2009: 1-17*

Table 1. Technology assessment

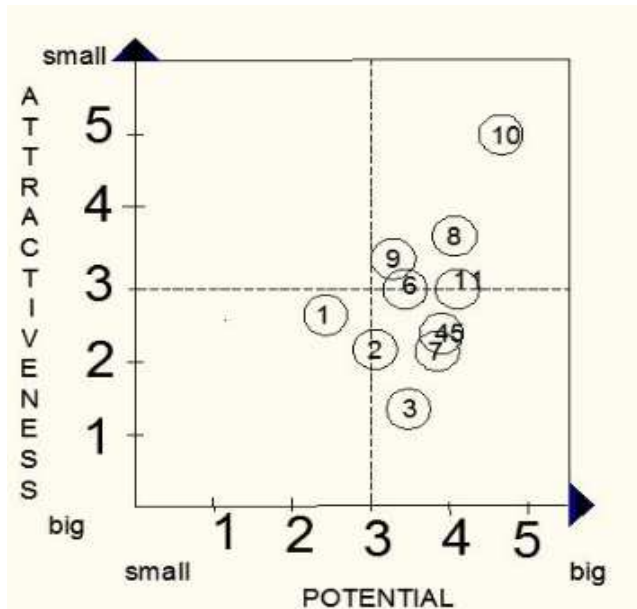
Technology	Atractiveness			Potential		
	economy	social	ecological	creational	application	research & development
By electrons	5	3	3	3	5	2
Plasma	3	3	5	5	3	5
Chemical methods	4	2	1	5	5	5

1 - least, 5 - the most advantageous solution

Source: Wróbel G.: *Obróbka powierzchniowa polimerów. 2nd Workshop on Foresight of surface properties formation leading technologies of engineering materials and biomaterials in Białka Tatrzańska. Poland 29-30th November 2009: 1-17*

Based on expert opinion taking into account the potential and attractiveness of methods of the surface treatments, polymeric materials in foresight studies developed by Delphi rank as the most promising technologies (Figure 3).

Table 1 summarizes the assessment of selected technologies.



Ranking technology in accordance with adopted attractiveness and potential ratings: 1. by electrons, 2. plasma treatment, 3. chemical treatment, 4. metallization, 5. laser treatment, 6. UV treatment, 7. treatment with gamma radiation, 8. treatment with electron radiation, 9. gradient coatings, 10. same-rising coatings, 11. polymerization in situ

Figure 3. Analysis inter-relationship the selected technology of surface treatment polymeric materials due to their potential and attractiveness

Source: Dobrzański L. A., Dobrzańska-Danikiewicz A. D.: *Obróbka powierzchni materiałów inżynierskich*. Open Access Library 2011, 5: 16-32. <http://www.openaccesslibrary.com/index.php?id=81>

Some of the submissions ways of activating the surface layers of plastics, attempted to adapt to wood. The most important in this field are adhesive promoters which compared to other methods of treatment are an interesting alternative due to the relatively high efficiency, versatility, and in particular ease of application, without incurring capital expenditure. Primers are offered in the form of water-borne system and solvent-borne system [Proszyk, Krystofiak, Lis 2006]. They can be applied by any methods in the form of very thin layers, which are subjected to drying. In the case of solvent-based products is done at ambient conditions due to their high volatility, instead water-borne systems assisted a source of convection heat or IR. They are unrivaled in technological situations related of limited susceptibility of bonding polymeric materials in which action is required immediately. The application can perform manufacturer of polymeric materials as the operation of finalizing the process, or their user directly before bonding. It should however be noted that the effective time of the effectiveness of the measure is limited, therefore it is essential to the time elapsing between the application adhesive to implement the process of bonding.

ECONOMIC AND TECHNOLOGICAL ASPECTS

Economic aspects constitute an important part of industrial activities. In order to obtain high quality glue-lines and resistance to various factors high quality specialty adhesives, requiring the advanced technology solutions for their applications should be used.. An alternative solution is suitable preparation the substrate for bonding through the use of adhesion promoters and then a process of lamination using substantially cheaper conventional binders.

Data in Table 2 lists the sample data to estimate the cost of materials for selected routes.

Table 2. Influence of adhesion promoters on the structure of costs at veneering of the wood based materials surfaces with foils and edges of chosen HM adhesives

Costs	Adhesion promoters		HM adhesive		
	solvent-borne system	water-borne system	POR	PUR	Without fillers EVA
Unit [PLN/kg]	20		35	40	25
Spreading [g/m ²]	10-15	20-25	150		
Materials [PLN/m ²]	0,20-0,30	0,40-0,50	5,25 ¹⁾	6,00 ¹⁾	3,95-4,25 ²⁾

¹⁾ costs without taken into account adhesion promoters, ²⁾ dependent from used adhesion promoters

Source: Krystofiak T., Proszyk S., Lis B., Józwiak M.: *Economic-technological conditioning In the range of applied of HM adhesives in furniture industry. Intercathedra 2009, 25: 65-67*

Commenting in advance interpretation on the data in the Table 2, it should be noted, that in the case of surface edging strips with limited susceptibility for bonding reactive adhesives HM in PUR or POR version can be used, their unit cost amounts to 35-40 PLN/kg, assuming a usual amount of glue applied about 150 g/m², without the use of an adhesion promoter, is the cost of 5.25-6.00 m². Price of silane adhesion promoters doesn't exceed the global level of 20 PLN/kg, which in their recommended imposition of the adequately for solvent systems in the amount of 10-15 g/m² and water-borne systems 20-25 g/m² generating costs of 0.20-0.50 m². The use of adhesives promoters allows the use HM adhesives without fillers, based on EVA copolymers in price not more than 25 PLN/kg, applied in the amount of 150 g/m², which is with regard the cost of adhesion promoters 3.95-4.25 PLN/m² and allows obtain of glue joints about comparable properties to the above-mentioned HM adhesives in POR or PUR version [Krystofiak et al. 2009].

CONCLUSIONS

Technology of bonding exotic wood species and plastics requires specific knowledge of the properties of polymeric materials, methods of activating surface, which should be taken into account during designing of technological process. Physical activation methods require the highest investment costs incurred,, which are quickly compensated by the greater line efficiency and minimum waste. Alternative meriting the attention solution is the preparation of the substrate for gluing by the use of adhesion promoters, and then conducting connecting process with the use of conventional adhesive for the lower prices.

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WOODEN RESIDUE - FIRST TECHNOLOGICAL MATERIAL AND THEN BIOMASS

Abstract: The problem of allocating round wood to meet the needs of fragmented (approximately 8200 business entities), and mostly very diversified (2200 recipients – buy 1% of wood; 50 recipients – use 50% of wood that comes from National Forests) Polish wood industry and commercial energy sector – in order to generate „green” energy and heat, in accordance with the EU requirements and the Ministry of Economy Directives concerning the amount of electric energy generated from renewable energy sources (RES) has been analysed.

Key words: wood, wooden residue, biomass

ADMISSION

Wood is one of the driving powers of Polish economy simultaneously being the most easily accessible and the most import source of biomass also for commercial energy sector. It leads to numerous repercussions, among which currently the most basic one is whether to sell round wood at a price as unprocessed material of low added value – overstating its price by significant limits in its supply or sell it to the entrepreneurs, who in Poland will process it into ready-made products of high added value.

WOOD FOR TECHNOLOGICAL APPLICATIONS AND BIOMASS

Value of annual export of Polish products for which production wood is used is worth approximately 8.4 billion euro. It is almost 12% of the total Polish export. Among the products made of wood furniture holds the leading position as the highly processed product of the greatest added value. Each year we sell abroad furniture worth more than 4.5 billion euro. We are the fourth furniture producer in the world and the third in Europe, preceded only by China, Italy and Germany. The share of furniture in the value of Polish export is about 5%.

Due to ever growing usage of wood by commercial energy sector – the price of wood for entrepreneurs up till the end of 2012 had been steadily increasing and was at the same time ever more difficult to obtain due to restrictive tree felling at National Forests.

Because so far high price of “green” energy significantly negatively influenced the competitiveness of the whole economy including wood industry additionally depriving it of its main raw material and increasing its price. The urge to achieve the ratios of energy production from renewable sources as expected by the EU and Polish ever more restrictive directives of the Minister of Economy intensified the shortage of round wood and escalated the difficulties of supply for wood as well as pulp and paper industries causing unprecedented increase in the prices of wood in all of its forms.

High profitability of using wood by commercial energy sector resulted from very high, unfair subsidies for commercial energy sector burning all kinds of biomass. Wood since 2001 (15.12.2000 – first directive of Minister of Economy on detailed scope of obligations ... related to confirming the data on the amount of electric energy generated from RES – Journal of Laws 122/1336) till 2012 was its main source. Especially large quantities were burnt in intensively developing processes of co-burning it with coal. In 2012 for the first time since 2001 in Poland a number of installations co-

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burning biomass with coal decreased from 47 to 43. Before it grew rapidly by 3-4 units each year (Lis 2011). Non-effective process of highly profitable for commercial energy sector co-burning of wooden biomass was definitely stopped only when mid-sized wood could not in any form come under the term of subsidized wooden biomass. It was changed by the definition of standard value wood and cereal both embraced in the directive of Minister of Economy from 18.10.2012, published 09.11.2012 in Journal of Laws 1229/2012. It was a very important, positive step towards regulating the aspects of wood accessibility and its prices for the entrepreneurs from wood industry.

Explicit definition of wood caused the decrease in the prices of wood residue by 1/3 in the first half of 2013. The prices of round wood used for transactions at forest and wood portal as well as via electronic application: e-drewno have stabilized.

BIOMASS

Biomass is defined in the UE Directive 2001/77/EC. Biomass is all the biodegradable fraction of products, waste and residues from agriculture (including vegetal and animal substances), forestry and related industries, as well as the biodegradable fraction of industrial and municipal waste. Biomass may be used to generate energy and can be convert into its numerous types. (Kowalik 2003).

Woody biomass is this type of biomass or biofuels which has a great economic significance in regulating Polish obligations concerning the usage of renewable energy sources and biomass. Among woody biomass there may be:

- Bark and primary residues,
- Secondary residues (sawdust, wood shavings, chips, wings, cut-offs, edgings)
- Tertiary residues.

Biomass as the most extensively accessible source of energy, as such gains ever bigger recognition. As the sources of ecologically clean fuel may constitute a significant renewable energy source with a profound impact on worldwide economy of energy systems. From 1.5 up to 2 tonnes of biomass may efficiently substitute 1 tonne of coal. In developed countries - biomass provides approximately 4-18% of energy.

As natural raw material - biomass is not concentrated. Its usage in localized processing centres most frequently requires transport. That increases the costs simultaneously decreasing the economic efficiency of the process. Biomass, with the exception of its processed forms (briquette and pellet) is of low density. That contributes substantially to the increase in the costs of its storage and transport as it is the material bigger in bulk than in mass.

An alternative for collecting biomass to be processed at large energy or heat generating plants may be using it locally at the place where it has been created, for example at sawmills, carpenter's shops etc. – for the owners' heating or energy generating purposes.

Economic analysis shows that wooden chips may be efficiently transported using road haulage up to 250 km. An adequate distance for tractor is 100 km, for railway transport it is 500 km, for waterway transport it is 1000 km. Generally speaking, when transporting wooden energy material there is a worldwide trend aiming at decreasing the distances hence reducing the overall costs of transport. For example in Sweden a distance of 30 km is considered to be very profitable when transporting biomass to a large scale unit. While a distance of 42km is considered to result in average profitability level. The cost of transporting biomass from a distance of 30-42 km equals 20-25% of the total cost of biomass. The overall production efficiency and biomass transport is estimated at 95-97% (Piotrkowski, Wiltowski, Mondal 2004).

RESIDUE AND ITS CLASSIFICATION

A big range of residue definitions is the result of it being analysed by various authors and considered for various purposes, as well as numerous criteria of its allocation and evaluation. In general terminology residue is considered to be a material of no use.

In article 3, paragraph 1 act from 27 April 2001 on residue – residue means each substance or object that belongs to one of the categories specified in appendix 1, of which the owner disposes, is going to dispose or is obliged to do so.

From the definition it is not clear whether the substance or object are residues in accordance to the act and hence are subject to its regime. It can be checked at the level of the act's appendix. If the substance or object meet the criteria indicated in the appendix to the act the circumstances should be considered that is whether the owner is disposing of the substance or the object, whether he has the intention or duty to do so.

Large Encyclopaedia PWN (2003) defines residue as by-products of human activity of no use in the space and time of their creation, harmful or burdensome for the environment and classified in accordance to a whole range of criteria:

In accordance with the directive of the Minister of Environment from 27 September 2001 on the catalogue of residue – residue from primary wood processing belongs to group 03 – “residue from wood processing and the production of furniture and wood based panels, pulp, paper and cardboard”. The second degree of classification, subdivides residue groups into for example residue from sawmill as subgroup 03 01 – “residue from wood processing and the production of furniture and wood-based panels”. The third degree of division classifies the following subgroups:

- 03 01 01 – residue of bark and cork,
- 03 01 04 – sawdust, wood shavings, cuttings, wood, chipboard, veneer including hazardous substances,
- 03 01 05 - sawdust, wood shavings, cuttings, wood, chipboard, veneer other than those classified as 03 01 04,
- 03 01 80 – residue from chemical processing of wood including hazardous substances,
- 03 01 81 - residue from chemical processing of wood other than those classified as 03 01 80,
- 03 01 82 – residue from sewage treatment plants,
- 03 01 99 – other previously not mentioned residue.

Hence residue is understood as this part of raw material, or half-finished goods which was created in the process of the production of final product.

CONCLUSIONS

Recapitulating the problem of round wood supply: the offer proposed for 2014 seems to be adequate for the current phase of development and market demand at the end of 2013 and the beginning of 2014. Together with the elimination of promoting burning of valuable wood by commercial energy sector and the ever more visible signs of the end of recession period both in Poland and the European Union it should result in increasing the sales, what even with an already definite decrease in the prices of raw material, may bring along the growth in sales of the products of Polish wood industry on international markets.

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ENVIRONMENTAL ASPECTS OF GERMAN BREWERIES REGISTERED WITH EMAS

Summary: The article discusses direct and indirect aspects of brewing production in German companies registered with EMAS (Eco-Management and Audit Scheme). It also includes a classification of pro-environmental activities in breweries by individual aspects, i.e. water, sewage, waste, energy and noise. The presented data result from the analysis of environmental statements of the studied breweries. The analysis indicates that the implementation of EMAS by the studied breweries has encouraged companies to introduce projects and investments which have contributed to a reduction of their negative impact on the environment and to a more economical use of a number of factors of production. Consequently, there has been a decrease in production and distribution costs.

Key words: environmental aspects, breweries, Eco-Management and Audit Scheme.

INTRODUCTION

The majority of contemporary companies are responsible for environmental pollution caused by economic activity. However, in order to comply with increasing legal requirements, companies are currently obliged to take up actions aimed at minimising their negative environmental impact. For a number of enterprises, environmental care is becoming an element of a conscious marketing strategy, playing an important role in building a positive image among customers. In order to address the problems arising from reaching the efficiency of pro-environmental actions in companies, the idea of an environmental management system was created. It can be defined as a system of managing the natural environment or its part, integrated with a general system of managing a company. The system is expected to provide for solutions of environmental problems in the management process, in accordance with social interest, but also the interest of a given company (Nowosielski, 2010). One of the most popular systems of environmental management is the system of Eco-Management and Audit Scheme (EMAS) which was introduced in the European Union as an entirely new approach aimed at promoting and popularising environmentally-friendly attitudes and principles, especially in the areas which are particularly difficult to manage through legal regulations, and even more to control in practice. EMAS is mainly applied to promote a continuous improvement of the environmental activities of an organisation through the establishment and implementation of environmental management by an organisation, but also a systematic, objective and periodical assessment of how the system functions, providing information about the effects of environmental activity and open social dialogue with the interested parties; active involvement of the people co-operating with the organisation, and appropriate training, enabling it to participate in the determination and implementation of a system of environmental management. (Ciecińska, 2006).

Eco-Management systems originated from the concept of sustainable development, which is a doctrine of political economics which assumes a quality of life which the stage of civilisation development allows at a given time. The awareness of a negative influence of a company on the environment obliges the company to continually improve and consider the issues of environmental protection in short- and long-term plans and even to make one of the priority of its activity. It is a

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duty of the top management to compile a public declaration (of environmental policy) which would oblige a given company to continually take actions aimed to diminish their negative impact on the natural environment (Rogala, 2003). Therefore, in order to implement environmental policy, companies introduce environmental management systems.

RESEARCH MATERIAL AND METHODS

In order to determine the direct and indirect environmental aspects of brewing production among German breweries registered with EMAS, an analysis of environmental statements published at regular intervals by the studied companies has been conducted. The present papers involves the use of comparative and descriptive methods as well as the method of analysis and deduction. The data was collected from twenty deliberately chosen breweries located in Germany.

RESEARCH OUTCOMES

The system of environmental management should be carefully planned in each organisation aiming at its implement. Three elements can be distinguished which need to be taken into account in the process of planning: the aims and tasks of the system, environmental aspects and legal requirements. The planning process which is connected with environmental aspects is primarily focused on the procedures of identifying and defining those environmental aspects which can significantly influence the environment. The environmental aspect is the part of an organisation's operations, its services or product, which remains in mutual interaction with the environment. Environmental aspects connected with the processes of production and distribution in the brewery industry can be divided into direct and indirect aspects. Direct aspects comprise all actions or processes taking place inside a given company, on which the company exerts a conscious influence while indirect aspects are the actions and processes connected with the operations of a given company which take place either prior to or after accomplishing the production process. The identification of environmental aspects in an organisation should start with analysing all the essential sources of information. With reference to breweries, these sources include e.g. reports on raw materials used in production, energy or the emission of waste (Ogrodnik 2011).

DIRECT ENVIRONMENTAL ASPECTS OF BREWING PRODUCTION

Raw materials

The basic raw materials in beer production include water, yeast, hops and malt, which is the product obtained from processing barley. The taste of the future product depends mostly on the quality of the used raw materials. The total use of malt, hops and yeast in brewing production amounts to 16.5 kg on each hectolitre of produced beer in the analysed breweries. The ingredients are usually analysed jointly. The analysed breweries pledged to manage the resources rationally. While purchasing raw materials, they take into account the size of packaging, transport and the amount of processed and non-processed waste.

Noise emission

Due to the location of the studied breweries, they have to be concerned about the level of sound intensity. A number of them are located in inhabited areas of cities, which may significantly hamper the lives of the local inhabitants. Others are situated in direct neighbourhood of forests, which may result in problems with game. All breweries are obliged to obey relevant regulations. Breweries make attempts to run their operations in a way which minimises noise emission. Bottling and capping take place in tightly closed halls and the entire process of distribution takes place in day seasons when it does not disturb the quality life of the neighbouring inhabitants. At the same time, investments made in order to muffle the noise of production halls, contribute to the comfort of the employees.

Odour emission

Apart from the used air and exhaust gas the malt house is also a place where dust is produced. Its emission is efficiently reduced by means of filters, which prevent the external emission of various odours. Another way of reducing the emission of dust and unwelcome odours is the use of water vapour, which stops dust and odours when it condensates.

Waste

Brewing production results in mainly recyclable waste. The efficiency of waste management requires its effective separation from non-recyclable waste. All fractions of waste which cannot be subject to recycling are placed in one container. A specialist company deals with their utilisation. Recyclable waste formed in brewing production is also its by-product, e.g. draff is used as a high-grade fodder for dairy cattle and its sales results in additional profits on the part of breweries. The prices of draff depend on its humidity. Environmental statements of the analysed breweries refer to two constituents. An example of this kind of division is illustrated by figure 1. Direct waste of production processes amount to over 90% of waste emitted in the brewing industry. The second-biggest emission is that of GLASS which is directly connected with the distribution phase. The remaining waste constitutes less than 5% of overall waste emission.

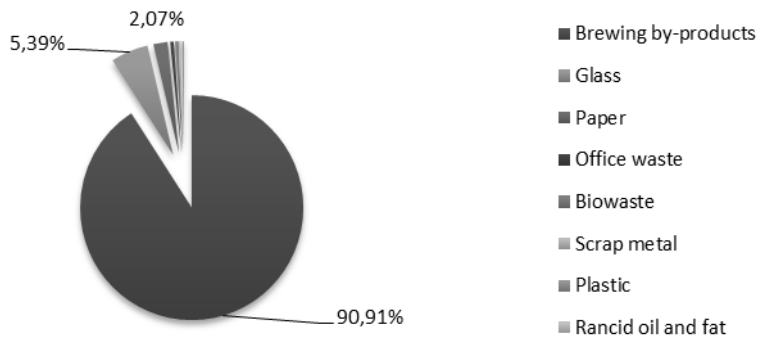


Figure 1. Waste emission by function in the brewery Sternquell-Brauerei

Source: Author's own compilation based on the environmental statement of Sternquell-Brauerei 2011

Water

Water is one of the basic ingredients in the process of brewing. All breweries in Germany using the EMAS norm aim at the reduction in the use of water throughout the entire production process. The amount of water intake in the analysed breweries is minimised due to two factors, i.e. the financial factor and the ecological factor. A lower amount of water used in the production process results in a lower amount of produced sewage, which directly results in lower production costs. In the case of the analysed breweries, water is obtained in two ways. A substantial number of the companies draw water from their own deep water wells whereas the rest of the companies use municipal water conducts.

Average use of water in the production of one hectolitre of beer in the breweries recorded with EMAS amounted to 0.43 m³ for recent certifications while the average value for the entire brewing industry in Germany amounted to 0.56m³. Therefore, the difference in the use of water for producing one hectoliter of beer was a significant one and amounted to 0.14m³, which amounted to nearly 8%. Taking into consideration the total production of all breweries USING EMAS, the saved volume of water amounts to 15841807,8m³. In 2012 the price of one cubic meter of water in Bayern reached 1.6 EUR. Hence, the total savings of all breweries amounted more than 250k EUR. The

brewery of Radbrauerei can serve as an example of a gradual reduction of the use of water in brewing production. This is illustrated in figure 2.

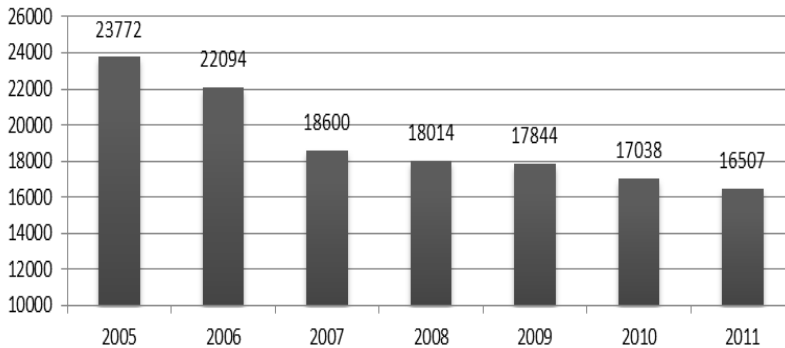


Figure 2. Use of water in the production process in cubic meters in the brewery Radbrauerei

Source: Author's own compilation based on the environmental statement of Radbrauerei 2012

Sewage

Water is one of the three most important ingredients used in brewing production. After it is used in the production process and mixed with other ingredients, it becomes sewage. The amount of the produced sewage is directly connected with the amount of water used in the production process. Because of high costs of sewage disposal, its amount is gradually reduced. In the case of large breweries, decisions were made to build sewage treatment plants, thanks to which the water circuit is, to a large degree, closed. Breweries not possessing sewage treatment plants use the public system of public sewerage.

Energy

The decrease in the use of electrical energy and the use of natural gas has constituted a major problem for the analysed breweries for a long time. A number of options are available in this respect, e.g. optimising the cooling process aimed to reduce the use of electrical energy, which is frequently the case in the analysed breweries. The use of natural gas is minimised by means of installing the condensing boiler. Average consumption of electrical energy per one hectolitre of beer in the brewing business in Germany amounted to 11.5kWh and hence saving 1.5kWh of electrical energy per hectolitre amounted to 16973365.5kWh. The price of electrical energy for the industrial sector in Germany amounted to 0.11 EUR per kWh. Therefore, within one year, in comparison with the entire brewing industry in Germany, the analysed companies saved approximately two million EUR on the use of electrical energy. The analysis of the use of natural gas is not as simple as the analysis of the use of electrical energy. Natural gas, which is mostly used in gas boiler stations to heat rooms and production halls in breweries, is currently being replaced with substitutable energy sources, e.g. furnace fuel oil. However, it needs to be emphasised that the majority of the studied breweries still use natural gas. The comparison made between the studied breweries and the entire brewing industry proves favourable for the former group. As regards the brewing industry in general, each hectoliter of the produced beer needs 45kWh of natural gas for its production whereas the amount for the studied breweries amounts to 25kWh. The price of one kWh in Germany in 2011 amounted to 0.07EUR which resulted in savings in the EMAS companies of about 100k EUR. The Würzburger Hofbräu brewery in Bayern can serve as an example of a brewery which managed to substantially reduce the use of natural gas and, as a result, saved a considerable amount of money (Figure 3).

Chemical substances

The use of chemical substances by employees takes place under strict surveillance in each of the analysed breweries. Employees undergo trainings of using and storing chemical substances. The choice of a chemical substance depends not merely on its efficiency and its usefulness in the production process, but also the pollution which it produces in sewage. According to environmental statements, chemical substances are most frequently used by the studied breweries in supporting production and distribution.

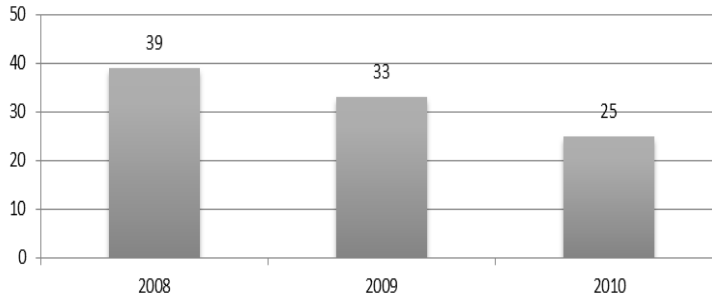


Figure 3. The use of natural gas in the production process in the Würzburger Hofbräu brewery [kWh/hl]

Source: Author's own compilation based on the environmental statement of Würzburger Hofbräu 2011

The use of cleaning agents and disinfectants, which is particularly important for the food industry, can serve as a good example. The average use of cleaning agents and disinfectants in the studied breweries in the last reporting period amounted to nearly 0.5 kg per hectolitre of produced beer and their use in the majority of the studied breweries remained constant (figure 4).

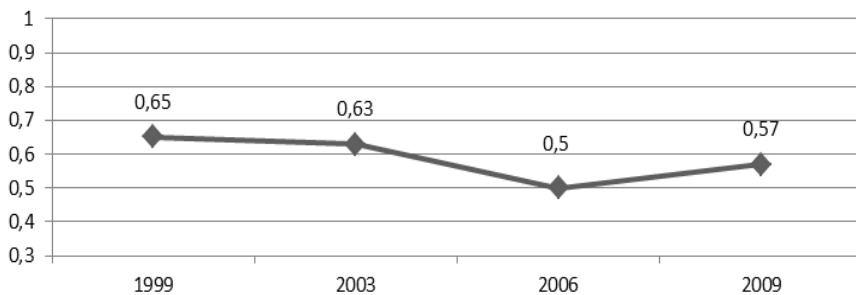


Figure 4. The use of cleaning agents and disinfectants in the process of beer production in the brewery Brauhaus – Faust [kg/hl]

Source: Author's own compilation based on the environmental statement of the brewery Brauhaus Faust 2010

INDIRECT ENVIRONMENTAL ASPECTS OF BREWING PRODUCTION

Suppliers

It results from the environmental statements of the studied breweries that the criterion of price is not the most important one when choosing suppliers. What matters more are their pro-environmental activities. Therefore, companies assess the work and products of their suppliers not

only basing on the quality, price and the efficiency of service, but they also analyse their market awareness, which plays an important role in their bilateral relations.

Table 1. Implemented projects in the studied breweries aiming to minimise environmental aspects

Area of operations		Actions
Energy	Electrical energy	<ul style="list-style-type: none">• Optimising the production process• Installing energy-saving pumps and engines• Assembling roof windows in production halls which enable production at daylight and abandonment of artificial light• Installation of light sensors in magazines• Modernisation of cooling systems, economical use of electricity and decreasing ammonia emissions• Change of weekly work organisation
	Natural gas	<ul style="list-style-type: none">• Thermal insulation of buildings• Assembly of heat exchangers allowing heat recovery• Assembly of new central heating installation in the bottling plant joined with the heat exchanger of water vapour• Reconstruction of the gas boiler station in the building of administration staff
	Diesel fuel	<ul style="list-style-type: none">• Construction of gas boiler stations and abandonment of diesel fuel
	Diesel fuel and petrol	<ul style="list-style-type: none">• Purchasing new lorries• Training in ecological driving learning drivers the most efficient ways of using cars
Water		<ul style="list-style-type: none">• Construction of deep water wells• Applying the water from wells in the processes of cooling machines• Modernising the system of filtration• Installation of rainwater harvesting system
Transport		<ul style="list-style-type: none">• Purchasing new lorries compliant with the European emission standard EURO5, economising on fuel and improving drivers' comfort
Cleaning agents		<ul style="list-style-type: none">• Introducing new processes of cleaning and labelling bottles, allowing for reducing the use of cleaning agents and water• A system of controlling the use of cleaning agents
CO ₂ emissions		<ul style="list-style-type: none">• Replacement electrical fork lift trucks in magazines with those powered on natural gas• Implementing carbon dioxide recovery in the process of fermentation
Sewage		<ul style="list-style-type: none">• Installation of the system of heat recovery from the sewage remaining in the bottling plant• Construction of on-site waste treatment plants
Waste		<ul style="list-style-type: none">• Purchasing and plastic press machine used to minimise the volume of waste• Increased control of segmenting waste
Noise		<ul style="list-style-type: none">• Modernising the muffling system in the bottling plant
Society		<ul style="list-style-type: none">• Participation in the pilot study 'Work-Life-Competence'• Organisation of training for children aimed to raise their ecological awareness

Source: Author's own compilation based on environmental statements of breweries

Packaging

As regards beer packaging, breweries seem to have little problem choosing the raw material which it should be made of. Data analysis from environmental statements indicates that the products produced by breweries are packed either in glass bottles or in aluminium cans. The used glass

bottles and paper labels constitute the fraction of recyclable waste. It means that the potential consumer is not charged with additional costs of utilising the used packaging. Moreover, it needs to be mentioned that in Germany the consumer is obliged to pay for the glass or aluminium packaging of the drink that they buy. It results in the increase in the number of returned reusable bottles and cans.

Transport and logistics

The process of distributing the produced beer involves a number of opportunities for savings. In order to reduce the cost of diesel fuel, the majority of breweries have reduced the area of sales and focused on the region of production, which also contributed to a reduction of carbon dioxide emissions. Besides, the possibilities of reducing the use of diesel fuel or petrol are usually considered when exchanging fleet vehicles used in distribution. Some of the analysed breweries have also conducted trainings on the so-called economical driving during which drivers gained knowledge on efficient driving.

Customers

The analysed breweries attempt to inform their customers about the actions that they have undertaken in order to minimise their negative environmental impact. At the same time, customers also learn how to become more environmentally-friendly through their own rational behaviour. Therefore, the breweries using the system of environmental management WG EMAS do not merely inform customers about the changes that they implement, but also indirectly teach environmentally-friendly behaviour to their customers.

The implemented projects and their environmental impact

It clearly results from the environmental statements of the analysed breweries that a great number of them are undertaking actions aimed to minimize their negative impact on the natural environment. Environmental actions of the studied group of companies are strictly connected with the areas which they influence. The table below contains a list of selected projects implemented in the studied companies in order to minimise the environmental aspects of their operations.

CONCLUSIONS

The studied breweries, similarly to other organisations aspiring to implement and sustain EMAS standards should start implementing its pro-environmental activities with analysing the environmental influence of identified aspects. It may serve as a basis for creating environmental policy and, consequently, as it happens in numerous cases, implementing a system of environmental management.

The analysis of environmental declarations of the studied breweries shows that the implementation of the EMAS system has encouraged companies to implement projects and investments which have resulted in reducing their negative impact on the natural environment.

Taking into account the production process, which is similar in all companies in the brewing industry, the companies implemented similarly oriented projects, aiming to reach certain financial and pro-environmental effects. As a result of the implemented pro-environmental changes, the studied companies showed a decline in the use of a number of factors of production, which was directly reflected in lower production and distribution costs. A reduction in the use of water brought approximately 200,000 EUR of savings in the studied companies. Lower electrical energy consumption calculated for the prices of 2011 brought over 2m EUR of savings while lower level of natural gas resulted in savings of approximately 100,000 EUR in the studied companies. As a result of a decline in the use of all three production factors, all breweries made savings of nearly 2.5m EUR which may be interpreted as savings of approximately 125,000 EUR per company in one statistical period. It needs to be emphasized that the companies were not homogenous as regards production levels, therefore the range of savings varied.

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THE IMPACT OF USING MODERN PROCESS INDICATORS ON BUSINESS PROFITABILITY IN WOODPROCESSING INDUSTRY SR

Abstract: The goal of the paper is to highlight the importance of using modern process indicators for improving business performance. The paper is focused on analysis of primary research results dealing with using modern methods of business process management in Slovak enterprises. Precondition is to confirm relevance between business performance and using modern process indicators. In the paper a business performance evaluation is presented by return on equity. This indicator is the most known performance indicator for Slovak managers.

Key words: business process, process management methods, process indicators, return on equity, wood-processing industry

INTRODUCTION

Since the end of the last century, the pressure of globalization and internationalization is rapidly increasing. In 2004 the Slovak Republic entered the European Union and the pressure of globalization on Slovak firms has mostly increased. Competitiveness of Slovak companies now depends on their innovative capacity. Long-term decisions and innovative progress is the aim of the most Slovak shareholders and managers. Strategic control systems and other modern integration process control methods are necessary for improving manager decisions. Corporate performance is an object of interest not only of owners (shareholders) but also of other interested subjects such as managers, employees, creditors, customers, suppliers, municipality and state. Modern management methods preferred long-term perspective to short-term goals. Evaluation of corporate performance includes not only financial perspective but by management decisions also nonfinancial indicators have to be considered. Typical nonfinancial indicators are customer perspective, internal process perspective, customers' satisfaction, and customers' desires and so on. Strategy and vision has to be connected with other management areas. Under these circumstances every company must be future oriented. Only future oriented companies can be competitive in this dynamic market situation.

PROCESS PERFORMANCE MANAGEMENT

In traditional functional organization individual workloads and workflows are allocated in individual function areas like marketing, production, sales and so on. It is hierarchical organization structure and relevance between processes depends on the structure. Relation between processes is based on relation between enterprise functional areas. Whole view on production process is lost. Because of those facts key processes are problematic (Řepa, 2012). In that regard, process management model is more preferred. For many authors a process management is the most substantial breakthrough of the 20th century.

Successful economic development and market environment development require, besides the application of traditional methods in business, also the application of new modern methods adapted to the contemporary market needs, requirements and conditions. In the present new approaches to corporate performance monitoring are winning their recognition. They are based on traditional systems of financial indicators and are completed by time and qualitative indicators. One of modern approaches is based on corporate performance measurement by means of internal processes performance measurement. Business internal processes are objects of process approach to management that has been formed during this century. Principles and methods of process

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management enable continual measurement and improvement of business processes performance and thereby corporate performance.

At present a number of methods and tools focused on corporate performance measurement and management exist in enterprise environment. To the best known concepts and methods belong: Balanced Scorecard (BSC), Six Sigma, Activity Based Costing (ABC), European Foundation for Quality Management (EFQM), Total Quality Management (TQM), Total productive maintenance (TPM), Kaizen, Method 5S, ISO Norms, Benchmarking, Process controlling. (Sujová, 2013)

ABC (Activity Based Costing) is an accounting method by which enterprises calculate indirect cost on the identified activities. 5S method is Japanese method of workplace organization, visually-oriented system. TQM (Total Quality Management) is a managing system oriented to quality, this term is closely related with TPM (Total Productive Maintenance), Lean Management, KAIZEN method and ISO standards. BSC (Balanced Scorecard) is a strategic management tool, long-term oriented system focused on strategy implementation to every enterprise area. Quality Network Dupont is a system for fabricators which was developed by DuPont Company. Benchmarking is a comparative method of evaluation enterprise performance with the best competitor in the same industry or the best competitor ever.

PRIMARY RESEARCH RESULTS

In this part of paper we will show selected research results that present a level of business process performance management in Slovak wood processing enterprises and enable the verification of the stated hypothesis through the existence of connections between an effective process performance management and reached value of ROE indicator as a representative indicator of corporate performance. We have analysed results and relationships by following questions included in questionnaire:

- What was value of ROE indicator reached by your company in 2012?
- What qualitative level of process implementation is in your company?
- What methods are used in your company by process management?
- Which indicators for manufacturing process performance measurement are used in your company?

The research results are shown in the following figures 1 – 5.

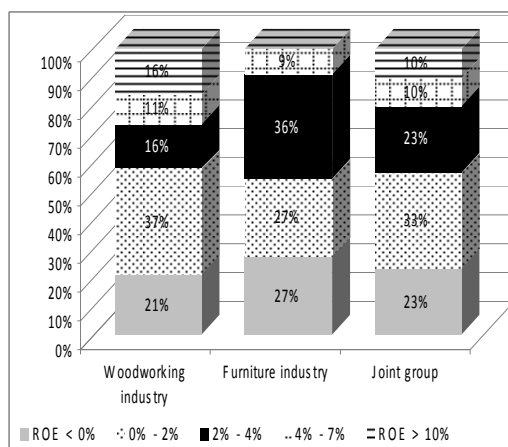


Figure 1. Reached value of ROE

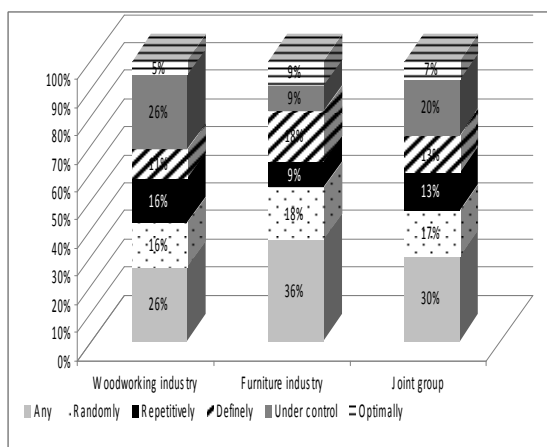


Figure 2. Quantitative level of process implementation

The research results in Figure 1 showed companies' percent occurrence according to the achieved return on equity. Figure 2 illustrates companies' percent occurrence according to achieved quantitative level of process management. It is significant that between these two variables dependence exists. After comparing the results we drew a conclusion that the most of woodworking companies reached low point of return on equity (up to 2%). Same percentage (58%) of these enterprises don't use process-oriented approach to managing or achieved the lowest level of process managing (randomly or repetitively). 43% of woodworking enterprises reached advanced values of profitability indicators and 43% of these enterprises managing their processes on superior level of process managing (definably, under control or optimally).

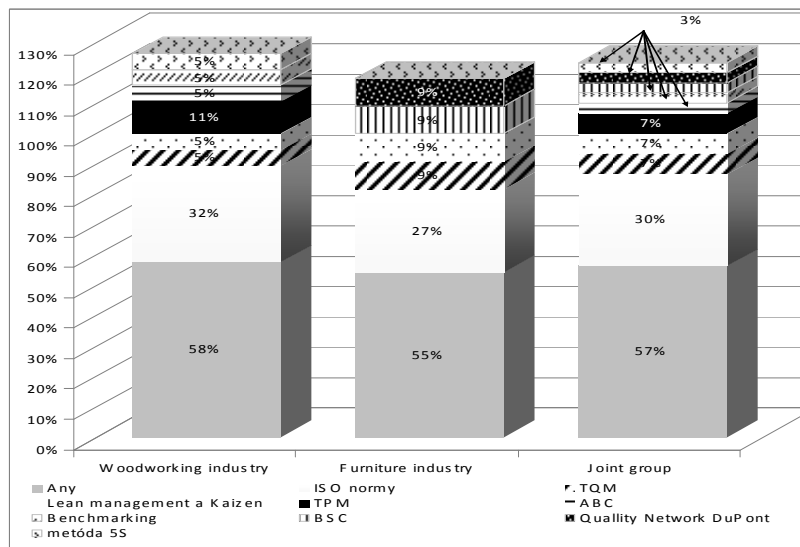


Figure 3. Process management methods

After analysing previous bar graphs for furniture enterprises we know that 54% of these firms achieved the lowest level of return on equity. Same among furniture firms which don't use process-oriented approach to managing or achieved the lowest level of process managing (randomly). In addition enterprises which reached the peak of return on equity is equal amount as ratio of enterprises which optimally managing their processes. Answers to question concerning the use of methods of process performance management (see Figure 3) brought the following findings: there is individual percent lots of woodworking and furniture firms. These firms are divided into groups according to used modern process management methods. If we count lots in woodworking industry we learn, that these firms use 0.68 methods at an average. Furniture enterprises use 0.63 methods at an average. If we count lots of joint group we find out that enterprises use 0.66 methods at an average. Furthermore as it is shown in Figure 3, the most of enterprises don't use any modern process measurement method. Activity based costing, Benchmarking, Balanced Scorecard, Quality network DuPont and 5S method are using by this enterprises at least. These methods are really important for increasing companies' profitability. ISO standard is the most used method. 32% of woodworking enterprises and 27% of furniture enterprises use this one. After analysing common group we found out same results: the most enterprises (57%) don't use any method and the most used method is ISO standard.

We decided to do data analysis of number of used methods because of detailed specification relationship between researched variables. We compared these ratios with percent occurrence of companies according achieved value of ROE as figures 4 and 5 show.

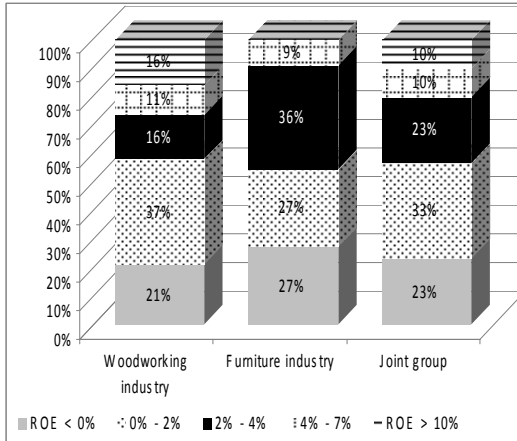


Figure 4. Number of used methods

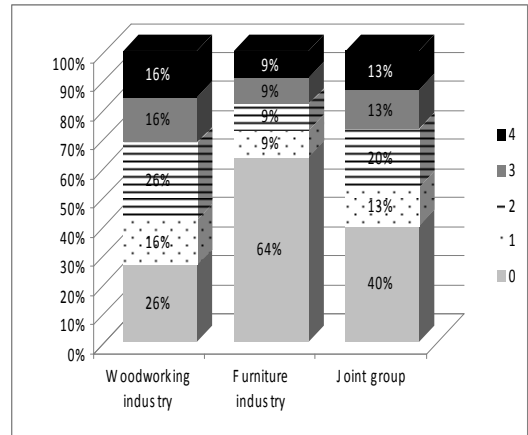


Figure 5. Reached value of ROE

The results showed in figures 4 and 5 indicate the relationship between numbers of used methods and achieved value of ROE. This dependence is positive. It is significant after comparison lots in furniture enterprises. Percentage of furniture enterprise, which doesn't use any method, is same as percentage of furniture enterprises which achieved the lowest profitability in this industry (up to 2%). Amount of firms which use only 1 method respond number of firms in this industry, which achieved medium values of ROE. In addition amount of the best firms is same as amount of firms which used mostly modern process measurement methods (3). In woodworking industry groups of enterprises divided by value of ROE correspond with groups of enterprises divided by number of used methods at least. Nevertheless, we predict relationship between these two variables because 58% woodworking enterprises not using any method represent same amount of enterprises achieving the lowest value of ROE.

In regard to aforementioned facts we can point out that there exists dependence between firm profitability and number of used methods. Depend on data analysis of joint group this statement can be applied also for this group:

- amount of the best enterprises (ROE>10%) is the same as amount of enterprises using 3 – 4 methods,
- 33% of analysed enterprises achieved medium values of ROE that responds to percentage of enterprises using 1 modern process management method,
- at once 57% of surveyed enterprises don't use any modern process management method and 56% of these enterprises achieved the lowest value of ROE.

Following figure 6 shows the results in question concerning process measurement indicators used in Slovak wood processing enterprises. We found out by counting lots of enterprises that woodworking firms use 1.79 process measurement indicators. Furniture firms use 0.9 process measurement indicators at an average. It is applied to common group that enterprises use 1.47 process measurement indicators.

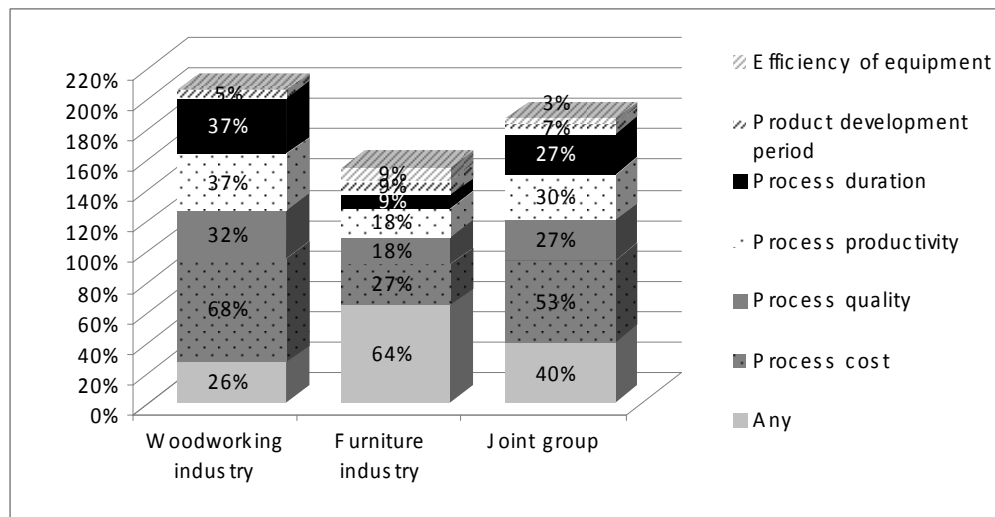


Figure 6. Percent occurrence according number of process measurement indicators

CONCLUSIONS

Based on presented findings of performed research and data analysing we can draw conclusion that the most of analysed wood processing enterprises operating on Slovak market don't use any modern process management method. On the other hand the most of surveyed woodworking enterprises use one or more process measurement indicators. The most of furniture firms don't use any process measurement indicators. Our analyses indicated existing dependence between enterprise profitability and using process management methods. Business process performance constitutes one unit with total corporate performance. There is a direct and strong connection between them. In regard to aforementioned statements we recommend to Slovak enterprises owners and managers to implement process approach to managing their firms. They have to manage their processes on the highest level (process management optimization) because it enables them to predict future processes and they would think to be future-oriented enterprise. Future-oriented enterprise is only competitive. Slovak wood processing enterprises should pay an increased attention to regular evaluation and improvement of core processes.

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*Dorota Moron*⁷

NON-GOVERNMENTAL ORGANISATIONS AS PART OF NEW PUBLIC MANAGEMENT CONCEPT

Abstract: For public administration New Public Management (NPM) constitutes an instrument of boosting the efficiency of activities by means of management techniques and solutions taken from the practice of the business sector. One of the methods to enhance effectiveness is to use the activity and potential of the third sector. This paper aims at providing a theoretical analysis of the concept of the New Public Management and its implementation in practice to investigate if non-governmental organisations can be included in the process of providing public services. The introduction of the market basics to public administration demonstrated that non-profit organisations, with their strengths and administrative support taken into consideration, can effectively serve as a provider of social tasks. And this builds the foundations for the cooperation between the sectors.

Key words: New Public Management, non-governmental organisations, inter-sector cooperation, multisectoral approach

INTRODUCTION

The concepts of public administration management, which are being formulated theoretically and put into practice and which are to replace the traditional Weber's model for bureaucracy, is the answer to growing inefficiency of public administration and to its new challenges. Today, as B. Guy Peters points out, it is possible to claim that market, participation, flexible, or deregulated management is in operation. These management models are to bear fruit in effective work of administration [Peters, 2001, p. 21]. New Public Management is the most popular and practically developed concept of market management [Pollitt, Bouckaert, 2000, p. 8-18; Hauser, 2002, 62-64; Peters, 2001, p. 31-32].

This paper aims at providing a theoretical analysis of the concept of NPM and its implementation in practice to investigate if non-governmental organisations can be included in the process of providing public services. Glorifying the market mechanism in NPM triggers a question about the place of non-governmental organisations, which constitute one of the most essential elements of multi-sector economy of welfare. This is the question not only about their role as an entity being independent of public authorities but also their role of a performer of public tasks.

My aim is to provide in the article the answer to the following research question: does the concept of New Public Management, which highlights the implementation of market mechanisms to public administration, include the non-governmental organisations as the providers of public services?

I put forward a thesis that both the theory of NPM and the practice of its implementation indicate a possibility to include the third sector in the performance of public tasks. For public administration New Public Management constitutes an instrument of boosting efficiency of activities by means of management techniques taken from the practice of business sector. One of the methods to enhance effectiveness is nothing else but the use the activity and potential of the third sector.

In my article I focus exclusively on the issues of the third sector and ignore other aspects of the NPM theory and practice. Moreover, I do not discuss in detail the issues of defining non-governmental organisations, as numerous publications deal with this subject matter.

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It is necessary to explain why the issue of the non-governmental organisations' role in NPM has been chosen, particularly if the concept of the cooperation between administration and the third sector is peaking in the perspective of *governance* and *good governance*. The inclusion of the third sector in the process of providing services started along the introduction of NPM, which has created a mechanism of cooperation between public authorities and the third sector. The cooperation solutions and standards developed in relation to this concept have become a starting point for shaping the cooperation as part of the participation management concepts.

THIRD SECTOR IN THEORY OF NEW PUBLIC MANAGEMENT

The concept of New Public Management was born as an alternative to the classic Weber's administration. Although different theorists focus on specific aspects of the approach, it is possible to point the representative features, which include:

1. decentralisation of public administration, emphasis on organising structures around individual services, predominance of self-governed and autonomous systems;
2. rules of competition, relationships based on contracts on the grounds of competition rules;
3. managerial governance, adapting the management methods from the private sector;
4. emphasis on financial discipline and economy in the use of resources;
5. transparent management, clearly determined responsibility;
6. clearly specified goals and results, tasks to be assessed on the basis of specific, measurable criteria, standards, rates;
7. result orientation, control of performance [Hood, 1995, p. 96-97; Hood, 1996, 271; see Supernat, p. 7-13; Krynicka, 2006, p. 194-197].

What is the key element of the NPM concept is the emphasis put on the use of the mechanism of market competition to boost the effectiveness of actions. This includes several possibilities: applying "the market-based approach" to the operations of public administration, introducing competition among administrative organs as well as purchasing the services provided by market and non-governmental entities by administration, or simply introducing multi-sector competition among public, private, and non-governmental entities on the market of public services [Supernat, p. 8].

The transformation into the market-oriented economy is leading us to the multi-sector approach in providing public services, thus to the actions and cooperation of the public, private, and non-governmental sectors to satisfy social needs. In the multi-sector concept the state, market, non-governmental and informal sectors contribute to the act of providing welfare; what is more, the arrangement of relations among the sectors indicates variability in time and space [Powell, 2010, p. 19-22; Stewart, 2010, p. 57-58].

The third sector, thus the sector of independent, self-governed, voluntary, and non-profit organisations [Moroń, 2012, p. 13-24], can be included in the performance of public tasks, just like the private sector. In NPM the non-profit sector is mentioned in the very context of the obligation to introduce competition, which also means including the entities of other sectors as the performers of public tasks. Moreover, the obligation to maintain financial discipline involves the necessity to search for economical methods of providing services and this is possible also through the use of the third sector's resources.

The NPM concept requires greater responsibility and flexibility of public authorities and makes them cut down the costs of providing public services. Furthermore, the citizens expect to have an influence on the way public services are provided. Thus, it seems to be a good strategy to include non-governmental organisations in order to reach numerous, contemporary goals of public management [Smith, Evans, 2003, p. 2].

More and more often the contemporary non-governmental organisations, similarly to public administration, have been introducing managerial governance within their own structures, which aims at reaching goals, results, and effective use of financial resources. This results, on the one

hand, from a belief that managerial governance enhances the efficiency of an organisation's activity, and on the other, from the cooperation of non-profit entities with administration (implementing the NPM principles) and business as well as from the completion of projects, especially those funded by foreign resources. In this context it is often mentioned that the third sector is being commercialized, hence it is assimilating to market enterprises. From the perspective of NPM it is an advantageous phenomenon as it facilitates including non-governmental organisations in the process of performing public tasks.

In their book „Reinventing Government”, being a peculiar manifest of the NPM concept, David Osborne and Ted Gaebler underline the importance of the third sector and indicate that public authorities should: stimulate, transfer power to the community, introduce competition, follow the sense of mission, be performance-oriented, care for the beneficiaries' interest, act resourcefully and cautiously and in a decentralised way [Osborne, Gaebler, 1994]. Osborne and Gaebler emphasise that the social sector, which despite its frequently significant role in social and economic life, is often underestimated. The social sector is perceived as the sector to fill the gaps and act in the spheres overlooked by public authorities. In fact, it constitutes a socially preferred mechanism for providing goods and services. Nevertheless, it had existed much earlier, before the state started to provide social services, whereas the communities in which the third sector is strong and active deal with social problems better, even in the case of these problems which are addressed by public authorities [Osborne, Gaebler, 1994, p. 72-75].

CONCEPT OF NEW PUBLIC MANAGEMENT VS. TRANSFORMATION OF TRADITIONAL WELFARE STATE

For several dozen years the reforms related to providing public services have been taking place in the majority of the countries in the world. They were originated also by fiscal pressure, globalisation, new ideas referred to public management, the citizens' preferences, and emphasis to include their opinions when providing public services. As such authors as Steven Smith, Michael Lipsky, and Daniel Evans highlight, the inclusion of the non-profit sector and private enterprises in the process of providing public services, based on the mechanism of contracting these services, is one of the most significant elements of the public services' transformation [Smith, Evans, 2003, p. 2; Smith, Lipsky, 1993, p. 4-5]. Can it be claimed, however, that the traditional welfare state had no relationship with the third sector? This statement is completely unjustified.

Public resources were transferred to non-governmental organisations already in the 19th century, however, the amounts and the number of involved organisations were little. The contacts among the organisations and public authorities started to become closer in the 1920s.

The post-war period brought the creation of welfare state which generally took responsibility for providing prosperity to its citizens and thus for providing public services. The state became the main entity of social policy [Szarfenberg, 2008, p. 18-19, 351-359]. At the same time, however, welfare state does not mean passing uniform rules to pursue social policy. This was expressed also by Gøsta Esping-Andersen [1990] who showed a possibility to distinguish different institutional orders (regimes) such as: the liberal welfare state, corporatist (conservative) version, and socio-democratic model. These regimes indicate, on the one hand, the specificity of a welfare state, while on the other – the differences among the countries in which these regimes are implemented, including also the differences related to the role of other entities involved in social policy, except for the state.

The greatest involvement of the state can be observed in the socio-democratic model, in which the state is the chief provider of public services of the highest possible standard for all citizens. According to the conservative model, it is the family which plays the main role but also – in line with the principle of subsidiarity, to non-governmental organisations. This, however, does not mean that the state is not involved. It serves as a guarantor of social rights as well as an entity being



responsible for the creation and for the operation of the social security systems, mainly related to insurance. The liberal welfare system is characterised by poorly developed public support system, because mainly the market methods are to satisfy needs [Esping-Andersen, 1997, p. 60-62].

The non-government entities play a significant role in the liberal and conservative models. This, however, originates from different ideological premises and results in different treatment of non-profit organisations. The liberal welfare state supports restricting the public authorities' intervention and favours market mechanisms also in social policy, whereas the third sector is deemed a support centre for the citizens in difficult social situation, whose activity is charitable, independent of the state, and which does not interfere with free game of market forces. The conservative state refers to the principle of subsidiarity, which gives priority of action to the entities being closest to citizens and obliges the state to support, and not replace, the actions of families, citizens' groups, non-governmental organisations and local governments. In the countries of socio-democratic orientation the third sector is also present but more often it fulfils expressive and not service-related functions. It allows citizens to cultivate their interests, hobbies and express their opinions and beliefs. The third sector does not focus on providing public services, for this is the state's task [see: Salamon, Sokolowski, List, 2003, p. 23-49]. In welfare state public authorities and non-governmental organisations cooperated to a great extent on the basis of the support being discretionary in nature without clearly specified formal standards of funds distribution such as: tendering and competition procedures, rules of task fulfilment and accountability for their completion [Smith, Evans, 2003, p. 5-6].

The reforms of public administration undertaken in line with the guidelines of New Public Management introduced significant changes to the operation of public authorities. They focused especially on the issues previously considered less significant, such as financial regime, emphasis on the results of actions or the responsibility for their completion. Moreover, it was highlighted that public institutions do not necessarily have to serve as a performer of public services, whereas the completion, financing, and supervision can, and actually should be distinguished, as this guarantees effective task fulfilment.

New Public Management supports the concept of the multi-sector approach, thus the concept of including the private and non-governmental sectors in the process of completing public tasks. At the same time, it involves the introduction of the rules of market competition, contracting the services according to transparent rules, emphasis to guarantee appropriate standards of providing services, and assessment based on clear, measurable criteria. In reality non-governmental organisations as the providers of public services, publicly funded and accounted for the completion of tasks, became increasingly accepted. Simultaneously, the relations between the state and the third sector were codified in detail in order to eliminate latitude in stipulating cooperation principles in specific situations.

NON-GOVERNMENTAL ORGANISATIONS AS PROVIDERS OF PUBLIC SERVICES

One of the NPM principles says that public services must be decentralised, transferred to lower administration levels, adjusted to citizens' preferences, and adaptable to their needs. These goals can be reached if the services are provided by non-governmental organisations, provided that the principles of this procedure, with the rule of contracting the services being at the top, are appropriately specified.

In practice the rules of the cooperation between public administration and non-governmental organisations based primarily on the contracting mechanism in relation to the services began to be implemented at the beginning of the 1970s and became popular in the 1980s and 1990s. This involved, first of all, the implementation of the NPM concept, which – as Osborne and Gaebler emphasised, is to replace paddling with managing, i.e. separate decision making (steering) from providing services (paddling) [Osborne, Gaebler, 1994, p. 61-65]. In other words, NPM must apply

the market approach to the process of providing public services so that public administration becomes a service purchaser, whereas private and non-governmental entities are responsible for providing the service. This enables more effective and cheaper provision of services.

It is clear that the public administration-third sector relationships are being liberalised. This liberalisation involves the introduction of competition among non-governmental organisations which aspire to become the providers of public services, and often between the non-profit and for-profit sectors, which compete in the same competitions or tenders to provide a particular service.

The fact that the reforms of public administration are being implemented and non-profit organisations are being involved to provide services does not mean that the differences related to the role and importance of the third sector between the countries representing various models of social policy fade away. One can refer here to the models characterising the operations of the non-profit sector and its relationship with public authority. Such concepts were proposed for instance by Lester M. Salamon and Helmut K. Anheier (the theory of social origin/social sources of the non-profit sector) or Lester M. Salamon with S. Wojciech Sokołowski and Regina List [see: Salamon, Anheier, 1996; Salamon, *et al.*, 1999]. However, Tom Christensen and Per Laegreid highlight that NPM is a global trend and the reforms implemented in individual states are similar. Yet, in some aspects significant differences can be observed, e.g. the specificity of the Scandinavian states which put less emphasis on market mechanisms [Christensen, Laegreid, 2001, p. 69-72]. The introduced solutions either support independent non-governmental organisations, or develop the solutions creating a *quasi-non-governmental* sector, which is based on relations with the public, financing, and controlling actions sectors [Rajca, 2009, p. 75-84; Kennet, 2001, p. 111-113].

New Public Management puts great emphasis on market mechanism and the implementation to public administration of the solutions or management methods being characteristic for enterprises. Hence, the created frameworks support the cooperation between administration and the private sector. Nevertheless, one cannot forget that the third sector is fundamentally different from business enterprises. The terms "non-profit" and "for-profit" themselves indicate the specificity of each sectors' activity. Non-governmental organisations are geared to reach statutory goals, not to gain profit. In their activity they follow primarily a mission and adhere to their beliefs and values. These beliefs and values are extremely different as the third sector itself is not homogeneous, but constitutes a collection of diverse organisations. Thus, including non-governmental organisations in the process of performing public tasks on the basis of the NPM standard involves some problems. The greatest problems result from the characteristic features of the non-profit sector, and these are:

1. the non-governmental organisations' higher tolerance for beneficiaries and their problems, basing not only on formal but also on the criteria of discretion;
2. selection of beneficiaries due to the organisation's mission and values (e.g. excluding non-believers or those cohabiting from the group of charges, etc.), imposing own value system and behavioural patterns (e.g. bans on drinking alcohol by their charges);
3. activity in specific areas of public services, which are very difficult to describe and assess in terms of market effectiveness but in which such skills as compassion, involvement, care are required (e.g. support for elderly or disabled people, children);
4. deficiency of financial means and infrastructure, which makes it difficult to compete with the private sector;
5. deficiency of professional employees, prepared to work according to the market rules – preparation of projects, project management, accounting for projects;
6. mission more important than the market rules of effectiveness.

It is possible and desired that non-governmental services provide public services, however, this needs the state to provide appropriate regulations which will take into consideration the specific features of the third sector.



Non-governmental organisations suffer from some limitations which are visible in their relationship with public administration; yet, in the case of public services, also the market, so glorified by NPM, can disappoint. Getting involved in the process of providing public tasks, private companies are driven exclusively by the desire to gain profit, they sell a service to earn and care for beneficiaries to get remuneration. In the case of some services in social policy, it is difficult to formulate clear, measurable standards and rates of reaching goals. Sensitivity, warmth, love, or understanding are hard to be described and demanded in market terms, but they are still desired by the beneficiaries of social services (e.g. children, elderly and disabled people). A question arises what is the measure of the actions' efficiency? Sometimes the sale of a public service on market basis leads to inappropriate behaviours like attaching more weight to profit (e.g. sales of diplomas instead of the education services themselves, for students mean a respectable sum of money). Moreover, there are spheres of social actions in which market enterprises are simply not interested due to lower profits, difficulty to complete tasks or their specificity. Naturally, additional financial support could motivate entities to get involved in the spheres in questions, but it would clash with the obligation to maintain financial discipline.

The use of the third sector to complete public tasks can be one of the forms of boosting efficiency of actions. Non-governmental organisations usually have deep insight into the needs of the communities and groups for which they care. That is why, they are able to adjust themselves to the users' needs much better. What is characteristic for these organisations is the originality and speed of actions – no formal rules of conduct and no need to obtain approvals in line with the bureaucratic hierarchy let the organisations response immediately to social needs and use non-standard solutions. They also provide space for implementing new, sometimes controversial ideas. What is significant, non-profit entities involve local communities and are able to stimulate their charges – their activity is not limited to providing services only. These organisations constitute a peculiar buffer enabling to shorten the distance between the state and citizens [Smith, Lipsky, 1993, p. 3].

Osborne and Gaebler [1994, p. 458-465] point out that each sector – public, private, and non-governmental, have features which are their assets and which distinguish them from other sectors. The third sector's desired features are: ability to reach various populations, compassion and involvement, holistic approach to problems, and ability to win trust. That is why, this sector best fulfils social tasks (especially those which mean providing care for someone), which require voluntary work, give little or no profit, support individual responsibility, local community and involvement in work for the sake of others. In comparison to non-governmental organisations the private sector proves to be better in investment and economic task, thus, tasks which allow for gaining profit.

However, if public administration implements the NPM concept, it does not mean that it is an obligation to use strictly market basis in all areas of public services. Hence, the enterprising public administration has a task to appropriately use the assets of every sector and control the task performance in order to satisfy the citizens' needs in the best and most effective way.

The cooperation of public administration on the basis of the NPM principles limits the potential of the third sector as it requires the actions being in conformity with rules and requirements. In addition to that, such cooperation generates many issues posing managerial difficulties such as responsibility for completing the mission, public resources, cooperation framework, rules of selecting a contractor, agreement conclusion, appropriate infrastructure, particularly when the cooperation procedures are generated both for the private and non-governmental sectors [Smith, Evans, 2003, p. 2-3]. The competition mechanism itself is enough to motivate an organisation to become more professional and effective.

CONCLUSIONS

The New Public Management concept makes public administration pay more attention to the market sector and learn new patterns and basics for greater efficiency in completing tasks. Thus, the market mechanism and management techniques used in private companies are deemed exemplary and possible to be used in the public area. In this context private enterprises seem to be a natural partner for administration. This, however, does not mean that there is no room for the third sector. Also the potential of this sector as a performer of public tasks can be utilised effectively. Non-governmental organisations find a place for themselves in the multi-sector system of service provision, which is highlighted in theoretical concepts and proved by reality. On the one hand, they compete with the private sector, but on the other, they complement the activity of the public and private sector in these spheres in which specific features of non-profit features make them more competitive and thus more effective in the areas in which market entities are not interested due to their profit-orientation.

In my opinion, however, following the NPM principles favours the commercialisation of the third sector. This means that the requirements imposed on entities make them become similar to private enterprises. This is particularly evident in these countries and spheres of social policy in which free competition has been allowed between private and non-governmental entities in the battle for public procurement, e.g. in tendering procedures. The creation of quasi-markets, thus, separate rules of contracting services for private and non-governmental entities, enables better use of the non-profit organisations' assets. As Osborne and Gaebler [1994] indicated, individual sectors prove to be effective in individual spheres of actions and tasks due to their specificity.

The New Public Management concept included non-governmental organisations in the process of performing public tasks by providing foundations for the development of cooperation between sectors as a part of the governance and good governance concept. The concept demonstrated that the multi-sector task completion does not have to pose any danger for public administration but directly provides advantages thanks to using the assets of the entities from particular sectors and limiting their shortcomings eliminated by the activity of other sectors.

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NEW TRENDS IN LOGISTICS – LEAN LOGISTICS SUPPLY CHAINS

Abstract: Logistics is mentioned as a tool for decreasing uncertainty in a business. There are necessary changes within integration of logistics performances, increasing of investment into logistics systems, taking big amount of logistics activities within supply chain, active utilization of information and communication technology and last but not least it is necessary to assure increasing demands for individual products. The most important trends of logistics development lies in more lean supply chains and business processes. A suitable tool seems to be value stream (flow) mapping of activities. This paper deals with the methodology of its application.

Keywords: logistics, lean business processes, material flow, information flow, value flow, value stream mapping

INTRODUCTION

Uncertainty and turbulent changes of conditions for doing business can be easily managed by the acceptance of logistics as the necessary discipline for company leaders and at the same time it is necessary to realise that logistics is a process that relates to the whole company. Building the outstanding logistics systems on the base of compatible communication and transportation standards requires high technology know – how, financial investment and managerial competences. As the decisive changes in the field of logistics can be mentioned the following:

Integration of logistics performances. It is necessary to integrate business processes. When logistics tasks are solved particularly (e.g. if division of purchasing negotiate independently on division of sale) then each division focuses only on its particular improvement of logistics chain and therefore it is impossible to reach the whole chain optimization. Such particular logistics management generate overcapacity and also to other costs of inventory and manipulation.

Increased investment into logistics systems. Logistics costs are an important factor for companies. Top managers are still solving challenges for value increasing and improvement of logistics systems. Economic loses from insufficient amount of resources or from unutilizes resources highly exceed investment into effective logistics.

Taking big amount of activities in supply chain by suppliers and companies which offer specialized logistics services. Concept and level of logistics outsourcing highly vary in particular branches. Some of them are used for the decreasing of fixed costs and others put competences on external institutions for its logistics chain.

Active utilization of the latest information and communication technology. There are various possibilities of its utilization within logistics. We can mention latest kinds of purchasing, e.g. by the internet or more effective kinds of sale, e.g. Online Shops and related change in distribution and parcel structures.

Increasing demands on individual products. When a company wants to struggle with competitors and to meet customers' demands it cannot focus only on operative and key activities. Strategic and target oriented business focus have to assure respect of given market segment demands. Companies would take into account scale of its services because they realise that there are many alternatives for value added services, e.g. assembly activities, receipt of orders in call centre.

Lean logistics focuses on the material and information flow, transport and warehousing of materials. A goal of lean logistics is to assure the shortest throughput times with the small amount of inventory. More than quarter of all employees, half of all production area and nearly 87% of the time time is taken by transport, warehousing, handling and manipulation of materials. The above mentioned activities can reach 15 – 70% of the total product costs. Wrong or inadequate manipulation, transport, warehousing can cause decline in value of materials and also final products.

Among basic forms of waste in logistics there are:

1. Inventories, exceeding amount of material – material delivered before the time of consumption or delivered in big amounts due to inaccurate information, documentation or by the mistake in supplier.
2. Idle manipulation – movement of inventories, idle transport and material movement.
3. Waiting times – on material, components, transportation devices, information.
4. Accidents – repair and elimination of accidents in logistics system.
5. Mistakes – preparation of material and components in wrong time and in wrong amount.
6. Unutilized transportation capacities
7. Unutilized potential, skills and experience of employees (Košturiak a Frolík, 2006).

„Lean“ arrangement of working place (layout) – it is another important condition for the reaching of lean production. Lean layout is created by „the backbone“ which mutually connects particular production places and production processes.

Basic parameters of lean layout are the following:

- Direct material flow towards assembly line and expedition.
- Optimization of transport and transportation directions among operations.
- Decreasing the warehousing areas between operations and decreasing the semiproducts inventory.
- Supplies closer to the customer.
- Direct and short routing.

Value Stream Mapping (VSM) belongs to the methods of lean logistics concept and lean production concepts and there are applied in flows and streams synchronisation (Rother and Shook, 1999). It describes value added and non-value added processes (IPA, 2012).

Value Stream Mapping is modern method which is applied in many companies as a tool for identification of losses elimination within production process. **Production processes are not defined only production process but also all other administrative and service activities.** The most important subject of value stream mapping is the map of the values flow. By this map it can be described all activities in graphic version. The goal is to characterise all activities included in production process from the point of view of value adding to the final product. There are used two various maps:

- Map of the contemporary situation or so called Current Map – it describes contemporary value stream (flow) through the production process.
- Map of the future situation or so called Future Map – it describes future, new, lean value stream (flow) and it includes also suggestions and implementation plans of key and decisive changes for the improvement of value stream. (Chromjaková, 2009)

Value is described by the ration between utility features of a product and costs.

Value stream represents the sum of all activities within the particular processes which allow that transformation of materials into concrete product. Value stream included all value adding and non value adding activities. One can mention the following: offers processing, elaboration of proposal, elaboration of technological and constructional documentation, communication with suppliers, material transport, planning of production, transformation of information and material, financial operations. (Mašín, 2003)

For the analysis of value stream the following techniques and methods of an industrial engineering are used: flow charts, graphical processed analyses, descriptive processed analyses, motion studies for service activities, assembly charts, processed maps, relation charts, CPM method, PERT chart, analysis applying dynamic simulations, 3D animations, video records etc. . A goal of the above mentioned methods is to identify waste times and materials and their further elimination. (Mašín, 2003)

Management of value stream, can be characterised as a managerial approach which allows to apply systemic planning of implementation new steps leading to better meeting of customers' demands. (Mašín, 2003)

- Minimization of throughput times.
- Allocation of warehouses near the place of consumption and control of parts on that place.
- elimination of multiple manipulation.
- FIFO, PULL system, Kanban and DBR .
- Arrangement into cells and segmentation.
- Flexibility at products variability, mobile devices.
- Low costs of implementation (Košturiak a Frolík, 2006)

For the description of value methods there are used various symbols which are divided into 3 basic categories:

- symbols for the material flow;
- symbols for the information flow;
- general symbols.

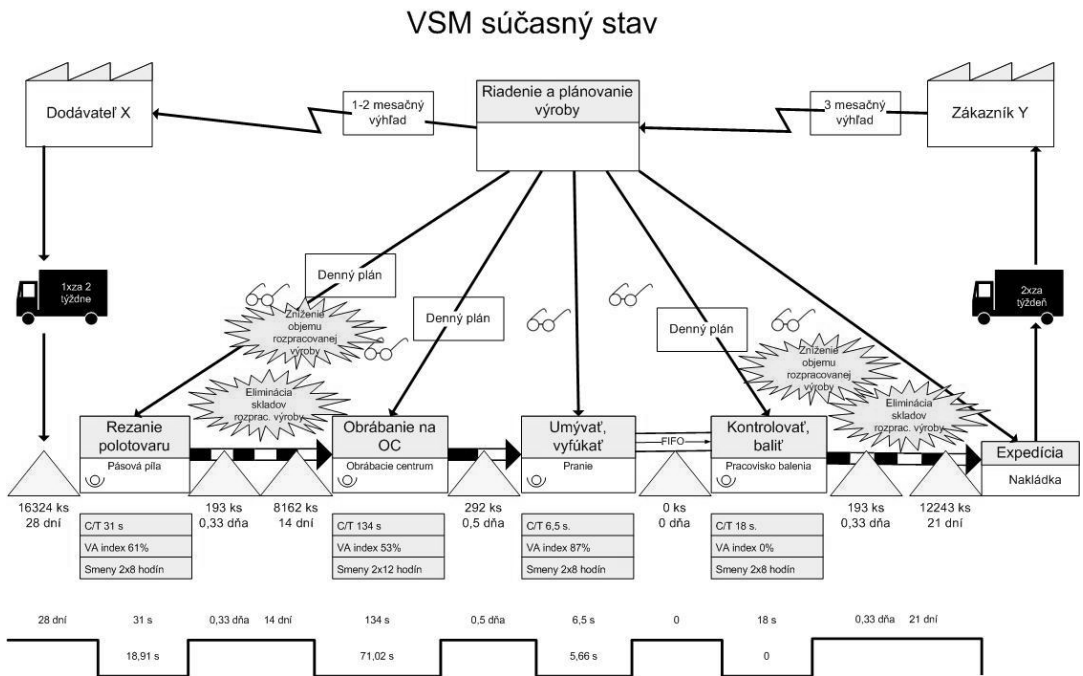


Figure 1. Example of contemporary value stream mapping

CONCLUSIONS

Within the continued integration and globalisation the future of value streams lies in horizontal compression. Number of managerial levels should decrease in a production, there are created production teams or business teams. Technology is also changed into production cells and assembly cells. The same can be realised within value streams in which horizontal compression will

be expressed in the form of suppliers integration and production companies will be moved into cell oriented industrial zones. This progress will support strong companies but weak and unprepared companies will weaken.

Methods and tools of lean production are coherent part of value stream mapping. Hand in hand with elimination of losses in production, support and administrative processes it is suitable to use and to implement specific tools of lean production. An important part of the tools choice is contemporary value stream map which assesses, through analysis, where and how particular steps and tools of lean production for the total improvement of future situation and losses decreasing can be applied.

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THE USE OF TERRITORIAL MARKETING IN THE DEVELOPMENT OF THE MUNICIPALITY – CASE STUDY OF THE THERMAL SPA RESORT IN UNIEJÓW

Abstract: The article presents problems of using and meaning of territorial marketing in the development of local government units. The subject is presented on the example of the Thermal Spa Resort in Uniejów. The starting point of marketing action is learning about the socio- economic situation of the community. The evaluation of this situation for the community of Uniejów is presented in a form of the results of SWOT analysis and own empirical research. They concerned the social expectations regarding the promotion of the new spa function of Uniejów. The article presents chosen activities undertaken by Uniejów local government authorities related to building and promoting the city brand. On the grounds of the analysis of social expectations the directions of marketing activities were proposed. The paper also presents the appraisal of the effectiveness of marketing activities of Uniejów authorities .

Keywords: territorial marketing, marketing management, the brand of place, promotion strategy, the city and community of Uniejów, Spa Resort Uniejów, “Thermal Baths Uniejów”.

INTRODUCTION

One of the aspects of the local government management is the concept of territorial marketing which, in the last twenty years of functioning of local governments (LGs), is gaining bigger meaning and marketing management is becoming the key issue in the implementation of the LGs’ development strategy. In the process of complex and strategic LG development more and more important, apart from using of marketing tools, is community support for realized by the authorities’ practices together with their expectations regarding the management and promotion of places of living. Whereas the brand of marketing activities in LG management is growing and importance of meaning of social factor in creating promotional activities, the author decided to present these issues on the example of Uniejów municipality – which is growing dynamically, and which authorities are particularly open for management innovation oriented on marketing and promotion, considering the needs of the local community.

The first objective of the paper is to present the basic theoretical problems connected with territorial marketing and later referring it to the Uniejów municipality. The case study of Uniejów considering territorial marketing as a basis for planning and implementation of promotional strategy (in the form of the results of review of strategic documents, SWOT analysis and empirical field research) and later showing the concept of the promotion of the city together with already taken activities and those proposed by the author. The second objective of the paper is the evaluation of effectiveness of the current promotional strategy the Uniejów municipality, and proposal of additional activities.

SCIENTIFIC HYPOTHESIS

1. Subject of research

The subject of research is the subject of theoretical meaning and actual practice territorial marketing on the example of Uniejów municipality, with the particular consideration of Uniejów’s city promoting itself as a “Thermal Baths Uniejów”.

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2. Scope:

2.1. Objective of the study

The paper presents the realized and future marketing activities undertaken in the municipality of Uniejów in the context of the socio-economic situation. The aim of the research was to show the meaning of concept of marketing management in the development of the individual territorial local government. As a good example of illustrating the significant role of territorial marketing in the LG promotion, the Uniejów municipality with its capital - "Thermal Baths Uniejów", in which the majority of promotional activities is focused, was chosen.

2.2. Time

The study covers the period from mid -2008 to the presence (December 2013) due to the extremely rapid development of the town. In May 2008 touristic and recreation center in Uniejów began to function. At the same time empirical research was performed.

2.3. Territorial

Territorial scope of the research covers, an urban-rural municipality of Uniejów with its urban centre Uniejów, located in the north-west part of łódzki region. The city is not very big, the number of its inhabitants amounts to about 3 thousand, but its rank is significant in region and also in the country scale because of the rapid development the tourist infrastructure which is mainly based on nature values (thermal water) and history (the tradition of medieval settlement).

3. Description of research methodology

While working out on mentioned topic the author conducted analysis of literature about territorial marketing and the analysed selected source material (strategic documents of Uniejów community and promotional material gained in District Office of Uniejów). As part of the empirical research the author conducted questionnaire interviews with the representatives of local government and touristic entrepreneurs as well as interviews among the group of the inhabitants of the community. The important part of empirical studies was a direct observation.

THE MEANING OF TERRITORIAL MARKETING IN THE MUNICIPAL DEVELOPMENT

4. The concept of territorial marketing, marketing management and the brand of place

Territorial marketing, also called the marketing of the place or municipal marketing, became the subject of interest of many researchers. Among varied definitions in the article, the author decided to adopt the definition proposed by Szromnik (2012), which defines territorial marketing as a process of managing the settlement unit in case of meeting the needs of internal objects – the inhabitants and external, so called 'guests', preceded by recognizing these needs.

The authorities of the municipality, in order to successfully and professionally manage the territorial unit, use more and more the concept and marketing tools as a way of supporting the territorial - economic competition in changing of the external and internal conditions. Settlement units in order to develop must take care of the needs of their stakeholders- inhabitants and external subjects. If they want to deliver on those tasks, local decision makers try to adapt the concept of marketing management to the conditions of managing the territorial units. The concept of the marketing is based on achieving measured economical goals by meeting the need of clients, offering in proper products (material and non- material), being the subjects of exchange between groups (clients and suppliers of the goods). In the event of territorial marketing, the object offered to the clients by territorial autonomy is "the place" – "the settlement unit" (Niestrój 1996).

In process of marketing management of territorial settlement unit much of attention is attached to creating and promoting the brand of place. The brand of place is created in 'branding' process which is designing, planning and communication of the identity of the product, service, institution which aim is to build and manage the image of the place. The brand makes distinguishing product

or service. The image of the brand is created in consumers' minds by the 'prompt' of the owner of the brand (managers of JST and all engaged in its development), which are included for example in symbols, events, graphic signs, advertisements, behaviour of the inhabitants. The capacity of development of the brand depends on the realistic content of territorial product (sources and the characteristics of territory) (Florek, Augustyn 2011). Activities undertaken in terms of territorial marketing should use totality of possessed local sources (Szromnik 2012). Administering the brand constitutes the long-lasting process sometimes. Building the strong brand of the place is giving the possibility of promoting the tourism, supporting local products and services, attracting new residents and investors and improving the identity of the local community (Florek, Augustyn 2011).

5. Marketing management of the settlement unit

Marketing management which at present is playing the more and more great role in the expansion of JST is characterized by such a features as: deliberate knowledge to the key prospects and partners (determining their needs, identifying preferential treatment and selecting priority groups), with observation and understanding functioning of LG surroundings (among others trends, competitive behaviours), with the systematic examination and forecasting behaviours of customers, with setting goals and informed marketing strategies, building the LG brand, influencing partners with marketing instruments (in it of promotion), with taking into account marketing in the organizational JST system (Florek, Augustyn 2011). In marketing action taken by hosts of communities – a very important role plays an approval of these activities by residents of a given settlement unit. For this to happen a process of the participation of the local community has to take place, at least by getting to know problems of residents, identifying ideas to solve them and active involving them into given initiatives (Ptaszyńska 2012).

A marketing analysis should be an initial stage of marketing action which is diagnosis of the regional unit given to the initial situation by getting to know the inner environment and the external environment of it (Florek, Augustyn 2011). Relying on results of research from possibly diverse sources (e.g. from structured questionnaires and from interviews among the local community, concept papers, SWOT analysis) it is possible to set objectives, the directions and priorities of promotional measures and target groups, to which they will be directed, as well as marketing instruments (Świerczyńska-Kaczor 2003).

Influencing opinions, attitudes and ways of behaving are an overreaching objective of territorial marketing both outside (from outside border of the given local community) as and internal (within the limits of the given local community) of groups of interested people, through choosing adequate means and instruments being used for an accomplishment of the purpose. In literature three guiding purposes which should support the realization of local marketing programs behind are distinguished. The first one is promotion of the development of supplied services by public institutions. Next directional objectives are building the positive image of the regional unit, and increasing attractiveness and the position vs those with which this unit competes (Ptaszyńska 2012). The latter two refer directly actions taken by self-government authorities of the municipality of Uniejów described in in the article.

APPLYING TERRITORIAL MARKETING APPROACH – THE CASE OF THE THERMAL SPA UNIEJÓW

6. Local resources as a basis of utilizing of territorial marketing approach in the municipality of Uniejów .

Uniejów is a little, historical city which has a lot to offer thanks to exploiting thermal waters and natural-cultural advantages. Material attractions of Uniejów are: thermal and pool complex with brine hollows, zones SPA&Wellness and catering "Thermal SPA Uniejów" (opened in 2008 and extended in 2012), historical educational-touristic-recreational complex - Knight's Kasztel "Gate of the Time" (from 2008), open-air ethnographic museum "Miller's Homestead" with the

possibility of accommodation and the participation in interactive workshops (from 2012) and House of the creative work (from 2012). Also 14th century's Castle of Gniezno Archbishops along with the Gothic collegiate church and the medieval urban planning arrangement is a historical wealth. Development of tourism, mainly health, a well-developed rehabilitation infrastructure, hotel and catering, functioning largely thanks to private outside investors is supported.

Getting to know the inside and outside environment the community is used as a point of reference to planning and implementation of the territorial marketing approach. Realizing the promotional strategy of the Uniejów municipality, its authorities are guided above all by identifying the situation of the community described in the form of SWOT analysis (being a part of the development scenario to 2020 for the Municipality of Uniejów) and with objectives and the vision of the development formulated in the Plan of the Local Development of the Municipality of Uniejów for years 2007-2015. Strong sides of Uniejów were identified as: increase in attraction for tourists and investors, increasing tourist movements, the growing renown and the prestige for the city as the spa. Chances for the development of the city and municipality of Uniejów were identified mainly in an interest in this area by investors and tourists. As weak points were identified: low environmental awareness of residents and still insufficient amount of the tourist guides (also in foreign-language), but first of all of promotional materials and educational activities.

One should not however be based only and exclusively on documents drawn up already, but systematically conduct appropriate social researches. As a good example of such research could serve own empirical research conducted by the author of the paper in the town of Uniejów about expectations of residents and tourists towards decision-makers with regards to promotion of using geothermal waters. Their statements are an important source of information about directions and purposes of the marketing management. On the example of these examinations it is possible to state that the local community expects municipal authorities and managers "of Thermal waters Uniejów" and "Geothermy Uniejów" to increase the availability of services offered. It can take place mainly by creating preferential financial conditions for residents for utilizing the geothermal heating, of thermal- pool complex, or of balneotherapeutic services. A promotion is important for visitors, advertisement "of Thermal SPA Uniejów" and city on the nationwide level. Similarly, the above referred SWOT analysis results suggest that, respondents reported the need of greater availability of tourist information in Internet and of promotional materials, such as tourist maps, folders, pocket guides, educational booklets. Also creating the infrastructure for education and active recreation is proposed (e.g. educational room, teaching and recreational path). In the opinion of both residents of Uniejów, as well as of visitors, there exists a need of the organization of trips around thermal objects, as well as of conducting educational field classes about the use of geothermal waters.

Implementing suggested empirical research, can contribute to implementation of the marketing strategy targeting local community and visitors, focusing on building their knowledge about geothermal energy and spreading interests in using thermal waters.

7. The use of marketing approach in the promotional strategy of Uniejów and its implementation

Taking into consideration results of SWOT analysis and social research, Uniejow authorities promote advantages and tourist attractions of the municipality as well as projects aiming at increasing the degree of social identity of residents with its municipality, presentation of the image of Uniejów as the city which is innovative and friendly to the environment worth living in and investing. For that purpose numerous promotional initiatives were undertaken, with the use of diverse territorial marketing instruments, such as: techniques of public relations (e.i: the media promotion, press advertisements, publishing promotional materials, organization of cultural events, participation in tourist fairs and competitions), as well as using Internet and municipality website as means of promotion. The process of building the brand of Uniejów is based on its main advantage – a function of the thermal spa. Moreover, it is underlined that municipality is situated in the very



centre of Poland. In the promotion process the city uses its official coat of arms with the underlying statement "Uniejów Thermal Spa". Concept of Uniejów of the Thermal Spa assumes establishing the promotional strategy of the "spa young at heart" aiming mainly at prophylaxis and the active recreation. This centre is supposed to perform functions of a "capsules of the health, youths and vitalities". The main promotion emblem of the city sounds as: "Thermal SPA Uniejów - here you will be born again". Another promoting Uniejów emblem states "Uniejów – City of Water, American Indians and Knights". It is combining three equally significant strong points of Uniejów: geothermal water, the Company of Friends of American Indians of North America and the Knight's Brotherhood "Signum Temporis". Around each of these elements action promoting the cities are organized, mainly through the organization of cultural events (all-Polish annual thematic festivals: the Great Knights' Tournament, the Medieval Fair, the All-Polish Festival of Music and the Dance of North America POW-WOW, American Indians' Summer named of Sat-Okha, All-Polish Run "to hot springs - Sanus per Aquam", All-Polish Days of Water). Moreover, a motive from the coat of arms of the city - lilies also served the promotion of the city through the organization of the festival tied thematically to the motive of the lily - Festival "Kingdom of the Lily", as well as decorating with flowers the most important places of the city with lilies and using the motive for the heraldic lily in the decor of the insides of the castle.

"Thermal SPA Uniejów" was recognized at many provincial and nationwide competitions for efficient linking of the spa tourism, recreation and history and it was recognized as regional brand-name product of the Spa Tourism. In the framework of the project implementation "Thermal SPA Uniejów" the community acquired grants from EU and domestic centers for the creation and the expansion of the tourist and technical infrastructure of the city, as well as for conducting promotion activities. The promotional strategy includes the organization of mass parties among others - of light events in cooperation with all-Polish media, e.g. with Program 1 of polish radio - "Summer with radio"(June 2012), with Radio ZET and TVP 2 "Summer ZET" and "Radio Dwójka" (August 2012), as well as participation in international market events of the tourist trade.

As part of the realization of the promotional strategy they are located: media and press promotion, publication of the printed sales literature, promotion with the Internet and community portals. System components of tourist information office are also performing the promotional function like e.g. notices board with photo codes and System of the Self-government SMS Informer.

In order to improve identified weak sides, municipal authorities are cooperating with the Smartlink company, dealing with promoting EU projects, and are taking initiatives aiming at creating the image of the brand "Eco Uniejów". Project is designed to highlight natural elements in the brand of the Thermal Spa Uniejów and promotion of the concept the sustainable development. Within this a particular attention is focuses on the improvement of quality of life of inhabitants and the increase of tourist attractiveness of the city. Also promoting the healthier lifestyle through the active recreation is playing an important role. Project "Eco Uniejów" included such actions as: thematic workshops for experts, examining tourist movements, studio departure, organization of a conference "Brand-Region-Promotion", issuing the promotional folder about Uniejów and educational booklet for young people about using geothermal water.

As the response to the stated low level of the environmental awareness amongst the local community in 2013, another project was conducted, under the name "environmental Education in the Municipality of Uniejów" funded partially the the Regional Fund of the Environmental Protection and Water Management in Łódź. It aimed at introducing residents of the community of the subject of using thermal waters and the protection of nature.

An important element of the promotional & educational activities in Uniejów is also the small city architecture (mini-graduation brine towers, thermal fountains, air intakes of thermal water). They are enhancing the city attractiveness and are pointing at its spa advantages.

Self-government authorities of the municipality of Uniejów are open for the partnership cooperation with other cities in the country (Turek, Szczyrk) and with cities in foreign countries (Hungary, Ukraine, Belarus, Latvia, Georgia and Finland), as well as with colleges (e.g. ASP in Łódź, Łódź University, Łódź technical university, Medical University in Łódź, WAT in Warsaw).

One can clearly see that the municipal authorities do follow some of the principles of the marketing approach in their strategic documents and activities resulting from them. However, the author suggests to take a wider use of results of social research.

RECOMENDATIONS FROM THE AUTHOR'S RESEARCH

Based on the SWOT analysis and findings of the public opinion survey, it is possible to work out the directions and objectives of the promotion strategy that would answer the needs and expectations of the society even better than nowadays. With results presented in the paper it is possible to suggest decision-makers in the municipality of Uniejów what should they pay attention to, while planning further promotional measures. Certainly a course for potential local entrepreneurs on the internal promotion in order to stimulate them for undertaking own activity within tourist services (e.g. agro-farm tourism, manufacturing products and regional dishes) and in order to build feeling of the identity with the place of living and pleasure from it.

It would be advisable to introduce a so-called "promotional card of the municipality", with the benefit to tourists and inhabitants (Kuśmierski 2003) enabling to connect many tourist attractions within the municipality, and perhaps of the wider region, and to ensure preferential financial conditions for users of the card. It would bring financial benefits for users, while the municipality would gain the simultaneous promotion of many tourist attractions. An introduction of an analogous idea "of promotional card of the inhabitant of the municipality of Uniejów" would guarantee the local community members use of the tourist attractions in fair prices. It would be a direct response to the needs identified in social research conducted by the author, concerning ensuring better accesses to tourist attractions of Uniejów by introducing price reductions for inhabitants. That would contribute to lowering a feeling of isolation of the group of inhabitants from the group of tourists.

From presented results of the research on social expectations connected with the promotion of Uniejów it is possible to draw conclusion that both inhabitants of the community and tourists attach significant importance to the financial and physical accessibility of the services offered. One should also include in the promotional strategy the expectation for improvement of the system of tourist information and the educational offer (guides in the city, promotional materials, promotion on the Internet, network of points of tourist information office, information boards and teaching paths, field classes). It would be possible to include all presented suggestions into the process of implementation of the promotional strategy for the municipality, which would greatly contribute to satisfying expectation of inhabitants and tourists.

CONCLUSIONS

The assumed purpose of this paper was to describe the nature of the marketing approach to management of local development on the example of the municipality of Uniejów. The purpose was achieved by presenting theoretical basis of the territorial marketing, and in this context the promotional strategy of the Thermal Spa Uniejów, and activities aiming at its implementation, along with taking into account the social-economic situation of this municipality.

The confirmation of the effectiveness of undertaken promotional measures and of the marketing management in the municipality of Uniejów are the numerous cases of granting to the municipality, to the mayor and to the "Thermal SPA Uniejów" of awards on the regional and all-Polish forums. These honorable mentions are attesting the effective and dynamic promotional strategy.

Among the most important honorable mentions are: award of the Ministry of the regional development (2008), award in the competition "Poland is growing lovely - 7 Wonders of European Funds" (2009), awards in rankings of self-government bodies of "Rzeczpospolita" (in years: 2006, 2007, 2009-2012), certificates of the Regional and Polish Tourist Organization (in years: 2009, 2011, 2012), award in the opinion poll of the National Geographic Traveler Magazine of "7 New Miracles of Poland of 2012".

In order to implement the further effective promotional strategy one should systematically monitor the social-economic situation of the community and surroundings. On that account conducting widened social research is recommended, for example such ones as introduced in the paper which have had only a pilot character. Deepened recognition of expectations of inhabitants and tourists towards self-government authorities of the municipality of Uniejów can be valuable source of information necessary for implementation of the marketing approach to municipal management.

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FINANCIAL SITUATION OF SOCIAL INSURANCE FUND IN YEARS 1999-2012

Abstract: The analysis of the revenues and expenses of the Social Insurance Fund was conducted in the paper. The revenues sources and their determinants, including number of the insured, were presented. While discussing the expenses, special attention was paid to the number of beneficiaries and the level of benefits. Between 1999 and 2012, the growth of revenues was higher than the growth of expenses. The proceeds of the SIF mostly came from the contributions, and the funds were generally allocated to the payment of benefits. In the analysed period, contribution revenues did not fully cover the SIF expenses.

Key words: pension system, old-age pensions, disability pensions, the insured

INTRODUCTION

Pension systems were initiated at the turn of the nineteenth and twentieth century. Since the beginning, they had been significantly changed in the area of their subjective and objective range, moreover, benefits level had been growing and some function of the systems had been modified as well. Simultaneously changing socio-economic conditions (among others, ageing of society, increase of unemployment, changes in family pattern) led to the need for reform of pension systems. Growing expenditure on public pension systems as well as difficult demographic situation were the main reasons for introduction of changes.

New and increasing demographic problem is the ageing of society, which leads to a number of social and economic consequences verifying former approach to pension systems. Acceleration of ageing process caused increase in interest in its economic and social results. For that reason, these problems have become the main subject of a number of public debates directed towards searching for optimal solutions and correction of former social policy. Therefore, in the nineties of the twentieth century, reforms of pension systems were conducted in many countries. The introduced changes were supposed to cause increment in activity of people in about retirement age and their further retirement.

In 1999, the reform of social insurance system was also conducted in Poland. It was dictated by the necessity of stopping of negative phenomena such as increase of pension expenditures, high share of state budget in benefits financing, high burdens of employers with labour costs and low level of benefits. The new pension system was supposed to limit public expenses on pensions, and simultaneously financial burdens related to ageing of society.

The aim of the paper is to analyze the revenues and expenses of the Social Insurance Fund between 1999 and 2012. This period covers the first two years of functioning of the reformed social insurance system and the moment, in which many changes influencing functioning of the system were introduced.

SIF REVENUES

The revenues of the SIF come from the contributions for social security, which are not transferred to the OPF (Open Pension Funds), funds compensating the amount of contributions transferred to the OPF accounts, payments from the state budget and other institutions, transferred for benefits, which payment was commissioned to the SII (Social Insurance Institution), from the interest on bank accounts, interest on the overdue obligations to the SIF, from return on unduly

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taken benefits, from the additional charge and prolongation charge, from the subsidy of state budget and from the DRF.

Between 1999 and 2012 the SIF revenues grew from 73.7 billion to 174.1 billion PLN (tab.1). The subsidy¹¹ is a significant source of the SIF revenues. It grew from 9.5 billion to 39.5 billion PLN and it had 13-23% share in general revenues, 6.8% to 12.5% in state budget expenses and 2%-3% in GDP. Changes in total subsidy level resulted from introduction of modification of the refund method of the SII contributions to the OPF (2004), lack of benefits valorization (2005 and 2007), valorization and liquidation of the old portfolio, i.e. increasing of the base amount (2006) and payment of a one-time grant for beneficiaries (2007).

Apart from subsidy, cash for refund of contributions to the OPF is transferred from the state budget. In the first years of the investigated period, this amount increased the subsidy from the state budget. In turn, since 2004 the change of contributions refund method was introduced, i.e. loss of part of pension contributions paid to the OPF is accounted as budget expenditures, and not as so far as budget expenses as subsidy from the budget to the SIF (Government, 2005). In the analyzed period, from 2.3 billion in 1999 to 8.2 billion PLN in 2012 was transferred for this purpose, but the highest level of 22.3 of was reached in 2010.

The change of the contribution transfers amount results from regulations. The division of the contribution for pension insurance between the SII and OPF covers persons, who were born after December 31, 1968 and persons, who were born after December 31, 1948 and before January 1, 1969. The membership in the OPF is obligatory for the first group and for the second – voluntary. In 2011 changes in rate of contribution transferred to the OPF was introduced, i.e. since 01.05.2011 to 31.12.2012 it has been at the level of 2.3% of the contribution basis.

The amount of contribution outflow to the OPF depends on number of the transferred contributions, which in the investigated period grew from 23 to 163 million PLN. The number of the transferred contributions is related to the number of the OPF members, as well as the period of pension insurance. Between 1999 and 2012, the number of the OPF members grew by 64%. The number of the insured has direct influence on the number of OPF members. In turn, the number of the insured depends on demographic structure of society and situation on labour market. The amount of contribution loss also depends on level of pension insurance contribution and its basis and simultaneously on the level of pay. In the analyzed period, the average OPF contribution basis grew by 48%, i.e. from 1327.63 PLN to 1966.97 PLN and constituted 60% of the average pay. In turn, average contribution transferred to the OPF fell by over 50% (from 96.92 to 46.50 PLN). The drop in contribution level resulted from reduction of the OPF contribution rate. Since 01.05.2011, instead of 7.3% of the basis the SII transferred 2.3% and 5% were recorded in the special sub-account in the SII. The moment of the contribution transfer the specific accounts influences the level of contribution outflow as well. The transfer of the contributions to the OPF should occur within 15 workdays. This period starts, when contribution payer transfers contributions and social insurance statement at the same time. If the SII does not transfer contributions to the OPF and the reason is on their side, they pay interest. In the last fourteen years, the interests transferred by the SII to the OPF amounted to over 3 billion PLN.

Between 1999 and 2012, the proceeds from contributions for social insurance had the highest share in the SIF revenues (70% on average). In the analyzed period, the proceeds from contributions grew from 63.7 to 122.1 billion PLN. The dynamics of contribution proceeds is strictly connected to dynamics of pays. Higher inflation and higher pay increase as well as employment growth influence higher level of the accumulated SII contributions.

¹¹ The subsidy consists of an earmarked and supplementary subsidy. The earmarked subsidy is destined for financing cash benefits different from the ones from the social insurance commissioned to the SII as payment based on separate regulation, benefits of non-insurance character. The supplementary subsidy covers deficits of funds for benefits payment.



Table 1. Revenues and expenses of the SII in 1999-2012 (in billion PLN)

Specification	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Revenues														
Total	73,7	81,0	91,6	95,4	98,6	107,7	110,9	120,8	129,6	136,0	138,4	157,6	162,0	174,1
Social insurance contributions	63,7	65,1	69,7	67,7	69,7	73,4	77,4	80,5	88,4	81,6	85,3	89,0	103,4	122,1
Subsidies	9,5	15,4	21,1	27,0	28,3	23,0	20,1	24,5	23,9	33,2	30,5	38,1	37,5	39,5
Other revenues	0,5	0,5	0,8	0,7	0,6	0,7	0,8	0,9	1,1	1,3	1,5	0,7	1,7	1,4
Refund of the contributions for transfer of the contributions to the OPF	-	-	-	-	-	10,6	12,6	14,9	16,2	19,9	21,1	22,3	15,4	8,2
Funds from the DRF	-	-	-	-	-	-	-	-	-	-	-	7,5	4,0	2,9
Expenses														
Total	95,6	89,9	99,5	101,4	104,4	108,7	111,2	119,8	123,8	136,1	153,4	170,8	167,7	176,4
Transfers to population including:	77,7	81,7	92,1	95,4	100,1	104,4	107,4	115,9	118,0	132,2	147,9	156,9	162,7	170,9
old-age pensions and disability pensions	69,6	74,6	84,1	87,3	91,8	96,3	99,0	107,2	110,0	122,3	135,3	143,4	149,3	156,2
other benefits	8,1	7,1	8,0	8,1	8,3	8,1	8,4	8,7	8,0	9,9	12,6	134,6	13,4	14,7
Current expenses	15,3	4,4	3,4	0,3	0,3	0,2	3,7	3,3	3,8	3,6	3,6	4,0	3,9	3,9
Deduction for the SII functioning	2,3	2,7	2,8	2,8	1,8	2,8	3,3	3,0	3,1	3,3	3,4	3,7	3,7	3,7
Cost of credits and loans	0,3	1,0	1,0	0,5	0,2	0,2	0,2	0,2	0,1	-	0,05	0,09	0,06	0,09
Reserves	-	-	-	-	-	1,0	0,09	0,5	1,9	-	-	-	-	-
Other reductions	-	-	-	-	-	-	-	-	-	0,4	1,8	9,9	1,1	1,6
Deduction revaluating receivables	-	-	-	2,4	2,0	-	-	-	-	-	-	-	-	-

Source: authors' own elaboration based on Report on the implementation of the budget between 2000-2012.

Between 1999 and 2012, the indicator of employment of people in working age grew from 61.3 to 65.7%. In the analyzed period, both average and minimum pay grew. The average pay increased from 1706.74 to 3521.61 PLN, i.e. by 106% and the minimum from 650 to 1500 PLN, i.e. 130%. The proceeds from the contribution were continuously increasing, excluding 2002 and 2008. At the same time, inflation fell nearly by 4 percentage points. In the investigated period, both average and minimum pay grew. The average pay increased from 1706.74 to 3521.57 PLN, i.e. by 106% and minimum from 650 to 1500 PLN, i.e. by 130%. The proceeds from contribution were continuously growing, except 2002 and 2008. In 2002 the reason for the fall of the proceeds was relatively low growth of the average pay (by 3.5%), stable level of minimum pay as well as drop in average employment (by 3.5%), which was accompanied by the increase of unemployment.. At that time the number of the insured in the SII slightly fell, which was caused by the drop in the level of employment (the rate of the employment in the 4th quarter of 2002 decreased by 1.4 p.p. comparing to the 4th quarter of 2001). In turn, in 2008 despite the growth of the employment and pays, the proceeds from the contribution fell by 7.6%, which resulted from decrease of the disability insurance.

The moment of the contribution transfer the specific accounts influence the level of contribution outflow as well. The transfer of the contributions to the OPF should occur within 15 workdays. This period starts, when contribution payer transfers contributions and social insurance statement at the same time. If the SII does not transfer contributions to the OPF and the reason is on their side, they pay interest. In the last fourteen years, the interests transferred by the SII to the OPF amounted to over 3 billion PLN.

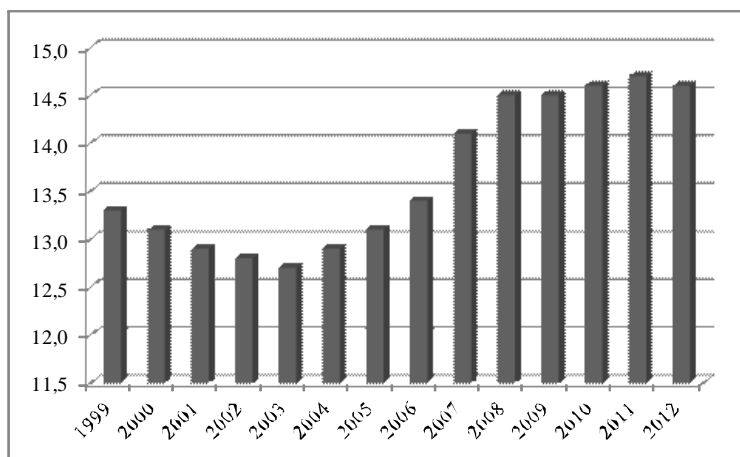


Figure 1. The number of the insured (in millions)

Source: author's own elaboration based on the SII data

The SII revenues are also influenced by collectibility of contributions for social insurance. In the investigated years, indicator of collectibility amounted from 96.8% in 1999 to 99% in 2012. The collectibility of contributions depends on regulations in this area. Between 1999 and 2012, they were frequently modified. For failure to pay contributions on time, the SII imposes varied sanctions on debtors, mainly interests for late payment. The collectibility of contributions depends also on economic situation, which influences timely payment of contribution and payment of liabilities (contribution debts) by payers or failure to pay contributions and creating debt.

The level of revenues of pension system is influenced by many factors, including number of the insured and level of paid contributions as well as period of social insurance. Between 1999 and 2012 the number of the insured person grew from 13.3 to 14.6 million (fig. 1). The number of the insured results from regulations, because they define object range of insurance and simultaneously influence its growth or decrease.

In the investigated period, the subject range of the general social insurance system was frequently changed. Some groups of the insured were included into the pension insurance (Customs officers), in turn other were excluded (police officers, Office for State Protection, Border Guard) [Łuczka-Bakuła, Jabłońska-Porzuczek, 2012]. The number of the insured is also influenced by the situation on labour market, particularly number of people in working age, level of professional activity, retirement age, unemployment, length of education period and length of insurance required for obtaining benefits [Czajka, 2003].

The level of proceeds from social insurance contributions also depends on their establishing rules, particularly on contribution rate and its basis. Between 1999 and 2012 the rate was stable, only the basis was changed. In the analysed period changes in regulations concerning including different elements of pay to the pension contribution basis. Generally, the basis is for the majority of the insured is the gained revenue. According to the regulation of the Minister of Labour and Social Policy of December 18, 1998 on detailed establishing rules for the pension contribution basis, the basis does not include revenues named in the regulation. The regulation has been frequently changed. Therefore, some types of revenues have been included to the basis, some excluded and in case of other the terms of application have been modified. It should be underlined that for some groups of the insured the basis has been defined in detail, but it was changed (e.g. persons on parental leave).

The incomes of the SII, and particularly incomes of pension fund and amount of the refund depends on annual pension contribution basis as well. The amount of reduction depends on many factors, including level of predicted average monthly pay in national economy for the given year. The loss of contributions related with 30 times average pay is influenced by the economic situation of the state. Economic growth causes increase of pays. In terms of good economic situation growth of pays causes increase of the average pay and growth of pays of the better-paid persons, who relatively fast reach the level of the basis limit, which unfavourably influences the SII revenues. It should be underlined that the existence of the limit for pension insurance has positive influence on the pension system and state budget. Due to the limit for persons receiving higher incomes, saving-insurance system does not convert into tax system. The limit, by reducing proceeds to pension system, causes increase of tax basis, which affects growth of tax proceeds.

The proceed from contribution depend also on the length of the period of the social insurance, which is related to the length of the professional activity of the insured. The object range of the new system is wide and diverse social groups are covered by the insurance. Nevertheless, contributions of part of the insured are financed by the state budget (e.g. persons on parental leave). Therefore, on one hand the SIF proceeds are growing but on the other, the budgetary expenses are also increasing. In order to limit them, the basis of contributions was set on the minimum level (e.g. minimum wage, provision of care). Although the increase of the pension capital are small, for persons belonging to those groups of the insured, this situation is favourable, because in the old system those periods were considered as non-contributory.

SII EXPENSES

The resources of the SII are allocated to payment of pension, disability, benefits, sickness and accident insurance benefits, expenses for disability prevention, credits and loans' repayments, interests for unduly paid benefits, receivables for contribution payers for tasks related to

establishing entitlement to benefits, their level and payment, expenses connected with payment of benefits commissioned by the SII, deductions constituting the SII revenues.

Between 1999 and 2012 the SIF expenses increased by 84% (from about 95 to 176.4 billion PLN). The expenses did not grow only in 2000, when payments for sickness, maternal, care, compensatory allowance and rehabilitation benefit fell. The decrease of expenses for other benefits resulted from legal changes in the area of short-term benefits. The new regulations were supposed to counteract against unjustified sickness absence. In 2000, it resulted in decrease in number of days of absence and payments of sickness allowances from the SII respectively by 40 and 31%. Among the SII expenses, transfers for population had the highest share from 81% in 1999 to 97% in 2012. They were at the level of 77.7 to 170.9 billion PLN. In the analyzed period, these transfers were mainly old-age and disability pensions (90% of all transfers). Other benefits¹² had only 10% share. It should be mentioned that expenses for pension benefits grew by over 120%.

In the investigated years, the average share of the old-age pensions amounted to 58%, disability pensions – 25% and survivors' pensions – 17% (fig. 2). The number of old-age pensions grew by 48% and survivors pensions by 4%. In turn, the number of the disability pensions was reduced by 60%. Changes in number of persons receiving old-age pensions result from legislation in this area (change in regulations concerning suspension entitlement to benefits, granting pension ex officio to persons born before January 1 1949, who had been receiving disability pension so far and had reached retirement age and had been covered by social insurance or pension insurance, ending period of granting early retirement pensions).

The number of issued medical judgments influences the number of disability pensions. The organisation of the medical judgment system has been significantly changed. It has been becoming stricter and stricter, which has resulted in decrease in number of re-granting entitlement to disability pensions. The number of the issued judgments was influenced by changing regulations, mainly limitation of judgments granting entitlement to disability pension for more than five years and two stages in judgment proceedings (the SII medical officer and SII medical commission).

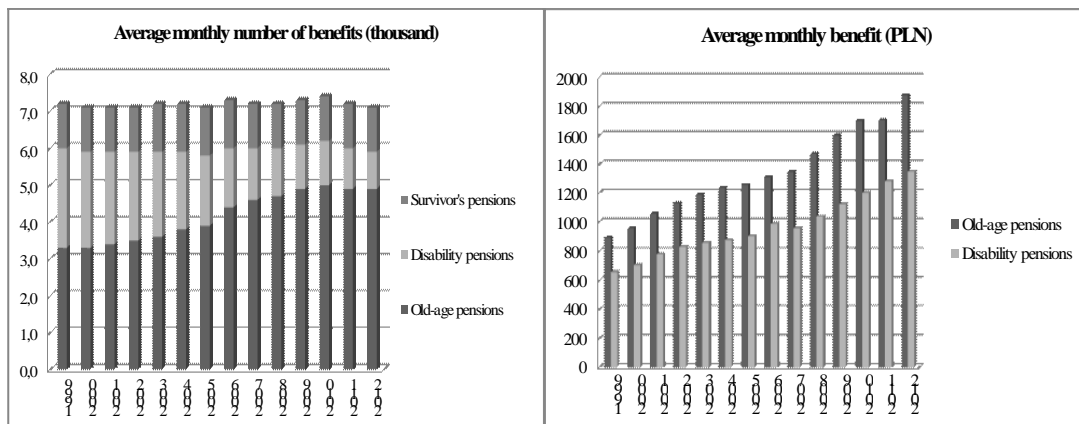


Figure 2. Structure and level of the SIF benefits

Source: authors' own elaboration based on SII data.

¹² Those expenses were sickness, care, maternal and funeral allowances, electricity lump sums, veterans additions, one-time accident compensations.

The number of beneficiaries is strictly related age of persons, to whom the pension benefits were granted. In spite of gradual increase of age of persons obtaining benefits entitlement, it is still relatively low comparing to the majority of the EU countries. In 2001 the average age of a person, who retired was 59.9 years and in 2008 – 61.4 (EU-27). In 2006, the Irish retired the latest (at the age of 64.1). According to European Commission [2010] in 2008, the Swedes (over 63.8 years), the Britons (63.1) and the Cyprians (63.7 in 2007) retired relatively late.

In the investigated period, the system dependency ratio¹³ in Poland was reduced from 54.5 % in 1999 to 48.6% in 2010 (fig. 3).

In spite of gradual improvement in relation of the number of the insured and beneficiaries, the situation of the system is disquieting. However, the number of persons paying contributions grew by 10.5%, contributions of particular groups of the insured are financed by the state budget. In turn, the number of beneficiaries grew by 1%. Nevertheless, growth of the beneficiaries would be lower and the increase in the insured number higher, if the benefits were not received by large part of persons in working age. Relatively early retirement is related to regulations, which often encourage resigning from professional activity. While introducing the reform of the social insurance system it was assumed that the entitlement to early retirement pension would be possible to obtain until the end of 2006. However, this term was elongated for 2 years, which generated growth of budget expenses.

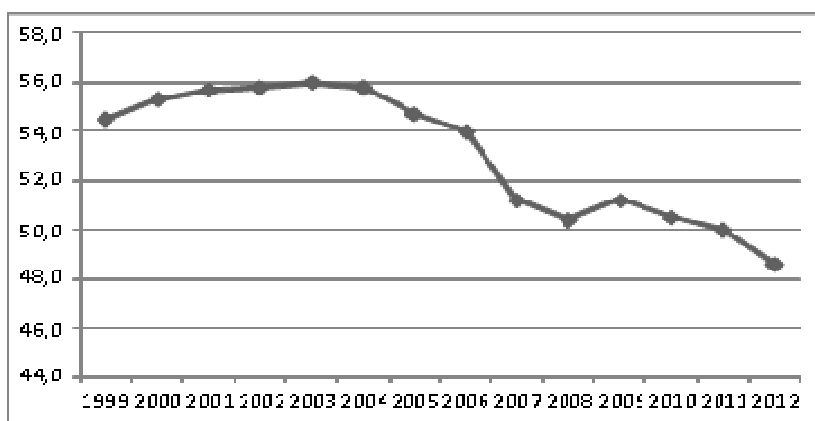


Figure 3. System dependency ratio

Source: authors' own elaboration based on SII data

The expenses of the pension system depend on the level of the paid pensions. Between 1999 and 2010, average monthly benefit paid by the SIF grew by over 120%, the old-age pension grew by 109% and disability pension by 106% (fig. 2). The share of the average old-age pension in the average pay and minimum pay respectively amounted to 52 % and 138% and disability pension 38% and 99%. The level of the paid benefits depends on many factors, such as length of professional activity (contributory and non-contributory periods) and valorisation rate.

The average length of service of persons receiving old-age pension was at the level of 34 years (34.6 in 1999, 34.4 in 2012) and persons receiving old-age pension – 22 years (21.8 in 1999, 22.5 in 2012). In the analysed period the valorisation ratio fell from 108.7 in 1999 to 103.1 in 2011, while

¹³ Relation of all beneficiaries to persons paying contributions.

the highest was in 2001 (112.7%). In 2012, the quota valorisation took effect and average quota of valorisation was to amount to 71 PLN. However, comparing to particular benefits the quota of valorisation was set in adequate proportion to the 71 PLN (e.g. disability pension – 75% of 71 PLN).

CONCLUSIONS

However, since the introduction of the new system a few years have passed, still from the perspective of functioning of the pension system this period is relatively short. Between 1999 and 2012 internal and external factors influencing the system changed. The most important external factors are demographic conditions, significant economic **fluctuations influencing labour and financial market**. In turn, the internal factors are regulations defining object and subject range of the system, level of contributions and benefits.

In the discussed period, the growth of the SIF revenues was higher than the growth of expenses. The revenues increased by 136% and the expenses by 85%. The proceeds came mainly from the paid contributions; in turn, the funds were mostly destined for payment of benefits. In the analysed period proceeds from contributions did not fully cover the SIF expenses, and deficits were financed from the state budget with subsidies and refunds of the contributions transferred to the OPF, loans from the state budget, bank credits (2000, 2011, 2012) as well as funds originating from the DRF (2010-2012).

After a dozen or so years of functioning of the reformed pension system one may state that the main goal of the reform, which was limitation of subsidy from the state budget, was not achieved. During the introduction of the reform, the subsidies were supposed to increase because of transferring of a part of the SIF contributions to the open pension funds and the deficit was supposed to be complemented with partial proceeds from privatization of the State Treasury, which were supposed to be transferred for covering of the reform costs. This is obviously equivalent to the state budget subsidy. However, lower than expected proceeds from the privatisation caused that the SIF was reinforced with the funds from the sale of the state bonds. Public pension funds invested cash from contributions paid to the open pension funds in state bonds. Therefore, the contributions transferred to the open pension funds by the SIF, return to the fund in form of state budget subsidy [Jędrasik-Jankowska, 2008].

The unfavourable financial situation of the SIF was caused by the derogation from the principles of the reform. Since 1999, the general pension system covered all employees besides farmers, judges and public prosecutors. However, in 2003 the professional soldiers, police, Office of State Protection, Border Guards, State Firefighters, Prison Service and Government Protection Agency officers, which were not in service on the day, when the act on social insurance system came in force, were excluded from the insurance. Initially it was assumed that that starting from 2007 the early retirement would be liquidated and bridging pensions would be introduced in their place. In 2008 the act on bridging pensions was passed and the possibility to early retire was liquidated in 2009.

The reform of the social insurance system caused positive changes in revenues and expenses of the SIF. Among the positive changes one should name the increase of the number of the insured, which affected the growth of the SIF revenues. The next important change was introduction of the new judging procedure (disability pensions), which resulted in fell of the number of paid disability pensions and in a consequence, decrease of the expenses for disability pensions benefits. The third change was growth of the average retirement age.

The introduced in 1999 reform was an alternative solution to parametric changes of pension system (level of contributions, retirement age and benefits). Under the reform assumptions, the economic incentives for individual savings were supposed to be sufficient to balance proceeds and

expenses and the working demonstrate longer professional activity and delay the retirement. However, the adopted solutions did not influence the change of the average moment of retirement. Therefore, further changes of the pension system concerning gradual increment of the retirement age became necessary.

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Andrea Sujová¹⁴

MEASUREMENT OF BUSINESS PROCESSES IN A PRODUCTION COMPANY

Abstract: Business processes are object of process approach to management based on enterprise search and analysis from the view of business activities and activities performed by managing staff. The paper deals with issue of measurement of internal processes in a production company which is the second part of process management. The attention is paid to methodology of process measurement and indicators for process measurement.

Key words: business process, process indicators, production company

INTRODUCTION

Process management presents systems, procedures, methods and tools for sustainable securing maximal performance and continual improvement of business processes with aim to fulfil determined strategic goals. From the view of managing processes it is recommended to classify internal processes in three main groups: main or core processes bringing added value to customer, supporting management processes securing an effective management of core processes and supporting service processes enabling smooth running of core processes. The contents of process management includes three main phases: process identification, process measurement and process improvement. The first and the most important step by implementation of process management principles the process identification and understanding are. The base for business process measurement and valuation is an identification of parameters, internal structures in each internal business process and the most important attributes: customer, inputs, outputs and borders of process. In the next part of this paper we will focus on the second phase of process management in a production company

METHODOLOGY OF BUSINESS PROCESS MEASUREMENT

After identified parameters and internal structure of processes a measurement of each process follows with aim to find out achieved parameters in process. Data collection about processes and its following evaluation brings integrated view on company behaviour.

Process measurement presents activities towards serving objective and exact information about workflow of particular processes needed for continual and operative management of processes in purpose to fulfill required conditions.

In discussions about process measurement used to appear a question regarding process dimension for measurement and relationships between process performance, effectivity, efficiency, productivity, quality, capability and adaptability.

According to several authors there exist four main areas of process measurement: [1, 6, 7]

- Effectivity or performance: rate of ability of process output to fulfill customer needs and expectations.
- Efficiency or productivity: rate of inputs minimalisation by effort to reach high effectivity; effective inputs utilization.
- Quality and capability: ability of process to fulfill customer requirements.
- Adaptability: ability of flexible reactions to satisfy changing customer requirements.

The procedure by implementation of process measurement includes several steps. The first step is a choice of processes which should be measured. The second step is determination of dimension and range for measurement. The final step is definition of process parameters and indicators for

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measurement. Process indicators are known as key performance indicators (KPIs). To determine correct KPIs with informative value is the most important task for effective measurement and management of business processes.

By process measurement following conditions should be kept: [4, 6, 11]

- Measurement validity: state of trust to information gained by process owners by process measurement; credibility is conditional also thus presentation of annoying findings of measurement authors.
- Measurement integrity: process measurement must include all important aspects and factors of process workflow and realization. Only in this case it is possible to identify further process improvement objectively.
- Sufficient measurement detail: by suggestion of process measurement system should be kept the rule that measurement of process output is insufficient; process inputs and process workflow should be measured too.
- Sufficient measurement frequency: to determine the right measurement frequency the knowledge about process capability, its labour intensity and time stability is needed.
- Required measurement accuracy: it is needed to realize that not only absolute accuracy in particular measurements is important but also knowledge of real trends in monitored indicators development is important.
- Possibility to uncover variations: process measurement must be projected in way to enable at least 80% variation from planned values uncovering.
- Correct measurement timing: by process measurement except data gaining it is important to keep right speed by transport of gained and analyzed data to process owner. Required data from process measurement are important mostly for operative process management and if they are late they have no value for process owner.
- Stability of gained data over time: process indicators must be independent from seasonal factors as for example assortment changes and production volume change.
- Information intelligibility: all information gained from process measurement must be clear, intelligible and easy interpreted for all employees using these information by their work.
- Responsibility for measurement results: by process measurements must be stated exact responsibility for measurement course and result onto concrete employee.

BUSINESS PROCESS INDICATORS

One of the most difficult tasks by process measurement is to propose suitable indicators. We can characterize following typology of process indicators: [1, 9, 11]

Universal process indicators have universal character and they can be used by different measurements. They are usually connected with categories as time, flexibility, influence to environment and costs:

- process continuous time: time from moment of inputs adoption till moment of output distribution,
- an effective utilization of process time: rate of the first processing and total process time,
- total process costs by using Activity Based Costing method,
- an effective costs utilization: rate of compliance costs to total process costs.

Table 1. Processes in a production company

Main processes	Supporting management processes	Supporting service processes
Supply process	Quality management	Material-technical supply
Production process	Management of information systems	Technical maintenance
Sale process	Management of health safety and protection	Facility management



Table 2. Indicators of supporting management processes in a slovak company

Process name	Indication	Responsibility	Priority of process
<i>Production Management</i>	PM	Production manager	1
Process indicators			Unit
Labour productivity			pc / EUR
Machine productivity			pc / EUR
Capital productivity			pc / EUR
Average profitability per employee			EUR
Average costs per product			EUR
Fulfilment of labour output norms			%
Fulfilment of machine output norms			%
Number of days of stocks remaining in production			day
Total effectivity			%
Value of semi-finished production			EUR
Number of defective products			pc / EUR
Share of defective products on total production			%
Inputs utilization			%
Numbers of hours worked to outputs			hour
Ratio of hours worked to outputs			%
Number of proposals for innovations and improvement			pc
Effectivity of transformation inputs to outputs			%
Process name	Indication	Responsibility	Priority of process
<i>Quality Management</i>	QM	Manager of quality	2
Process indicators			Unit
Rate of claims on production			%
Customer satisfaction			%
Fulfilling customer requirements			%
Keeping qualitative standards			%
Employees qualification increasing			hour
Process name	Indication	Responsibility	Priority of process
<i>Management of Information systems</i>	MIS	Network administrator	2
Process indicators			Unit
Average investments to IS			EUR
Automatization rate in production			%
Time of IS barred access			minute
Effectivity of IS running			%
Process name	Indication	Responsibility	Priority of process
<i>Management of health safety and protection</i>	MHSP	Coordinator MHSP	2
Process indicators			Unit
Average investments to protection aids			EUR
MHSP trainings			hour
Value of compensations paid to employees			EUR
Number of work accidents			pc

Indicators for measurement of production processes are indicators needed for operative production management as labour productivity, capital productivity, total effectivity of equipment, fulfilling of standards of machines and workers, material turnaround, rate of working hours to performance.

Indicators for measurement of unproduction processes. Unproduction processes are all processes realized before production (product development and innovation, marketing process), during production (machine maintenance and repair)and after production (servis, sale). Indicators of unproduction processes can be characterized as follows:

- process of product design and development: share of new product sale on total revenues, investment return;
- maintenance process: average time of maintenance activity, average time from failure finding out till repair start, maintenance effectivity index;
- purchase process: output volume per one employee, average tying supplies, stock turnover;
- service process: employee capacity utilization; rate of fulfilled commitments of customers.

Indicators of process recovery present rate of compliant units to entering units into process. These indicators describe process running only perfunctorily and it is not possible to determine their influence on lower process performance. Total capacity recovery presents probability to produce compliant outputs.

As an example we present determination of process indicators in chosen slovak production company. In a chosen slovak company following business processes have been identified (table 1).

For each process we have determined indicators for process measurement. In the table 2 the indicators for supporting management processes are presented.

CONCLUSIONS

Successful process measurement has to measure only facts important for process management and it should be focused on customer satisfaction measurement. Managers should be interested in designing the process measurement system. The latest approach to process evaluation is a balanced scorecard which comes out from defining strategic goals in four perspective among a perspective of internal processes. [2] Managers have to find critical business processes where excellent results are desired. These processes enable the enterprise to serve value advantages interesting for customers which can keep them. Indicators of internal processes should be determined with regard to customer satisfaction and influence on financial goals.

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FORMS OF PRESENTATIONS FOR MATERIAL STRUCTURE OF COMPLEX PRODUCTS

Abstract: Selected forms of graphic and analytical presentation were discussed for multiple-level explosions of material structure of complex products. In order to characterise the product structure a method was proposed to identify the degree of its complexity and the number of the structure level, using which the position of components is identified in graphic presentations. Four forms of graphic presentation were distinguished and identified for the product structure, i.e. imploded, exploded, vertical and horizontal. Algorithms for their development are proposed in this paper. Examples of furniture items were used to illustrate the discussed problems.

Key words: degree of complexity products, forms of graphic and analytical presentation structure of complex products

INTRODUCTION

Most products manufactured by enterprises in the machine-building or furniture sectors are complex products. The term complex product¹⁶ refers to a product¹⁷, which at a specific stage of the production process was manufactured using at least two components. A complex product has a structure¹⁸, which is documented using explosions¹⁹ and implusions in view of the information needs, to be dealt with e.g. when controlling manufacturing processes. Explosions are analytical divisions of products into components and they yield top-down lists. Implusions are synthetic divisions of products, providing bottom-up lists. Explosions and implusions of the product structure are presented in various graphic and analytical forms. The aim of this study was to discuss selected forms for the presentation of structure of complex products and to propose algorithms for the establishment of forms presenting the structure of a product. The construction of graphic forms for the structure of a complex product using specific procedures has not been discussed to date in literature on the subject. Problems presented in this paper are illustrated with examples of furniture products.

Three basic types of components are distinguished: amorphous, uniform and unit complex products. Amorphous components (products) have no distinct shape and are non-structural components of products. These include e.g. adhesives, lacquers and stains. Uniform components (products) are solid-form products and they are characterised by uniform (homogeneous) physico-chemical properties along at least one dimensional direction (e.g. particleboards, fibreboards, plywoods). Unit components (unit products) are characterised by varied properties (physico-

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¹⁶ Compare: "A complex product (conventionally called an assembly or a purposefully produced a set of assemblies) is a product composed of at least two elements, constituting simple products, joined together". Organizacja systemów produkcyjnych. Access 29.11.2013. Available on the Internet:

http://zsw.zut.edu.pl/download/AB/Organizacja_systemow_produkcyjnych_materialy_do_wyk.pdf

¹⁷ Compare: Fertsch M. (red.), (2006): *Słownik terminologii logistycznej*, Instytut Logistyki i Magazynowania, Poznań, s. 189.

¹⁸ *Structure (Latin structura) - the layout and the interaction elements (parts) as a whole*. Wielki słownik wyrazów obcych PWN (2013): *Praca zbiorowa pod redakcją naukową M. Bońko*, Państwowe Wydawnictwo Naukowe, Warszawa. ISBN: 978-83-01-14455-5.

¹⁹ Tabert M. (2012): *Explosion Bills of Materials of Products in Information of a Production Enterprises*. *J. of Agribus. and Rural Dev.* No 4 (26), ISSN 1899-5241, Poznań, s. 115-128.

chemical, dimensions and shapes) in all three dimensional directions and they are always found as separate items (e.g. shelves, doors, drawers). They are made from uniform components as a result of one or several operations of division or division and joining performed on them. Upon assembly unit components become structural components, constituting the engineering bill of materials²⁰ of complex products.

THE DEGREE OF COMPLEXITY OF THE PRODUCT STRUCTURE

Amorphous, uniform and unit components are referred to using a common name – material components (in short: materials). In complex final products (e.g. furniture) they form, together with their joints, a hierarchical system, i.e. a material structure. The term material structure of a product is a broader term than the engineering structure of a product. The engineering structure is composed only of unit components, while the material structure comprises all types of components. Complex products may be manufactured from many different components, from several to several hundred or even several thousand. The greatest number of products has a medium degree of complexity of the material structure. Based on the material structure a bill of components is prepared and their quantities required for the realisation of manufacturing processes are established²¹.

The material structure of a complex product or component (e.g. a furniture assembly or sub-assembly) may be described by two values. The first value refers to the **degree of structural complexity - s**, which characterises the analysed product or component. It presents the maximum number of levels in the material structure (engineering or assembly structure) that a given product or component has. The degree of complexity generally corresponds to the number of assembly operations, which form the longest series in the planned or performed technological process of a component or product. The other value is the **number of the structural level – p**. It identifies a level, on which the analysed component or product is found in the analytical or graphic forms of presentation of structure applied for complex products.

In literature on the subject denotations are used only for the degree of complexity of structure for a component or product, written as W_0, \dots, W_n . It corresponds to the terms: zero degree product, ..., n-th degree product. In this study it was proposed additionally to indicate the number of the level in the structure, on which the analysed component is found in graphic or analytical presentations and subscripts were introduced for denotations s and superscripts for p, respectively. Indication of the number of the level (p), at which a specific component is found may be indispensable when it is necessary to unambiguously identify its position in the structure. Individual forms of graphic or tabular presentation of the material structure apply various principles for the distribution of slave components of a complex product on the levels of its structure. If a specific level of the material structure was presented as a set of all immediate slave components, belonging to the master complex component or a final product, then the number of the level may differ from the degree of structural complexity. This pertains e.g. to the material structure presented in the form of a graph in the imploded version. Graphs of such a form are applied e.g. in diagrams produced using computer programmes.

The degree of complexity (s) and the number of the structural level (p) is symbolically denoted in the form of W_s^p - for: $0 \leq p \leq n$ and $0 \leq s \leq n$, where **n** denotes the highest level or degree of complexity of the material structure of a component or a final product. In this denotation **W** is an identifier of the analysed final product or its component. Identifiers are descriptors, which

²⁰ Construction (Latin construction) - means an arrangement of elements of some whole. Wielki słownik wyrazów obcych PWN (2013): Praca zbiorowa pod redakcją naukową M. Bońko, Państwowe Wydawnictwo Naukowe, Warszawa. ISBN: 978-83-01-14455-5.

²¹ Mleczko J. (2011): Przepływ danych w zarządzaniu operacyjnym wyrobów wielowariantowych. Wyd.: Polskie Towarzystwo Zarządzania Produkcją. Zarządzanie Przedsiębiorstwem, nr 1/2011 s. 17-26.

unambiguously characterise individual products or their components. Identifiers include a complete name, an abbreviated name, a symbol composed of alphabetic and numeric characters (alphanumeric) or a numeric code.

The final product or its component, which structure was mapped, is found on level p and has the degree of complexity $s = n$. The next level $p = n - 1$ is formed by all its immediate slave components. In a similar manner (recurrently) we distinguish further levels, which are ascribed successive numbers in a decreasing order up to zero.

A component of the zero degree of complexity (element), i.e. one, for which $s = 0$, found on level p , is denoted by the symbol W_0^p . In turn, the final product or the component with the highest level of complexity in the analysed structure, i.e. one for which $s = n$, found on level p , is denoted by the symbol W_n^p .

GRAPHIC FORMS PRESENTING MATERIAL STRUCTURE OF A PRODUCT

Material structure of a complex product may be expressed in a **graphic** or **analytical form**. In the former case it is presented as a graph – a **tree diagram for the material structure** constructed in four versions - imploded, exploded, vertical and horizontal. Most frequently the basis for the graph construction is provided by single-level explosions (assembly lists) and multi-level²² (structural lists) of the material structure of a complex product or component. The graph is constructed based on a complex structural drawing, an assembly (structural) diagrams or analytical records of its material structure, e.g. based on the contingency tables of components, lists of components or tables of components.

In the horizontal (vertical) form of a graph the axis of the drawing is horizontal (vertical). Levels of the material structure in all the four graph versions are distributed perpendicular to the adopted drawing axis. The imploded and exploded versions of the graph are constructed according to the algorithms given in Tables 1 and 2. Both algorithms may be applied to construct a graph in the vertical or horizontal version, arranging elements of the drawing along the vertical or horizontal axis, respectively (compare Figs. 1 and 3).

Table 1. Algorithm for the construction of the graph for the material structure of the final product (a complex component) - the imploded version

Step number	Description of action
1	The highest ($p = n$) level of the material structure is established and on this level the final product is placed (or its complex component), for which the structure is presented.
2	Immediate slave components in relation to the analysed product or component, located on the previously adopted level, are placed on the next (lower) level. Components of both levels are accordingly linked with lines – in accordance with the inclusion relationship occurring between them. On a given level the sequence of slave components is determined so that their position does not result in the crossing of lines linking immediate slave components with the immediate master component (master components).
3	The procedure following step 2 is continued accordingly for each complex component until the list of components of the analysed product is exhausted.

Source: own study.

²² Tabert M. (2012a): *Explosion Bills of Materials of Products in Information of a Production Enterprises. J. of Agribus. and Rural Dev. No 4 (26), ISSN 1899-5241, Poznań, s. 115-128.*

Table 2. Algorithm of the graph construction for the material structure of the final product (a complex component) - the exploded version

Step number	Description of action
1	The lowest level of the material structure is established and all components of the analysed final product, with the zero degree of complexity, are placed there. On a given level the sequence of components is arbitrary, assuming that lines linking immediate slave components with immediate master components do not cross.
2	The next (higher) level comprises these among immediate master components (or the final product on the highest level) in relation to the components of the previous level, which apart from them contain no other components. Components of both levels are linked accordingly with lines – following the inclusion relationship found between them. On a given level the sequence of master components is arbitrary, while maintaining the principle as in step 1.
3	The procedure according to step 2 is continued until the list of components of the analysed final product (a complex component) is exhausted.

Source: own study.

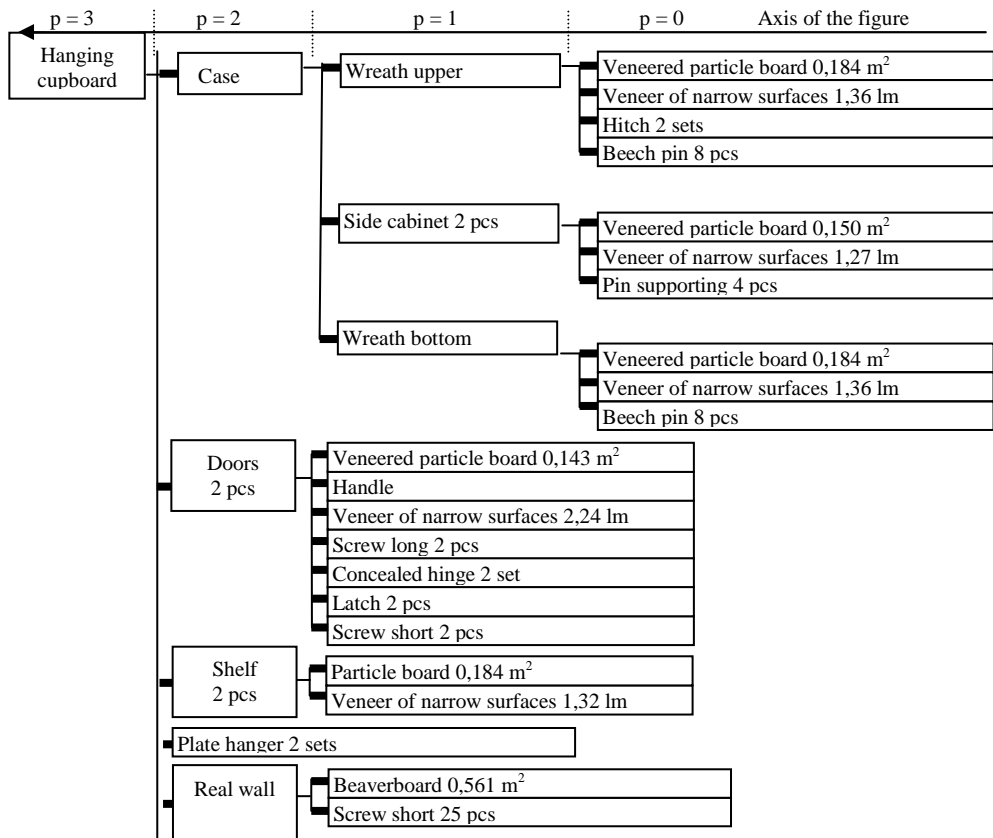


Figure 1. A diagram of material structure of a hanging cupboard – an imploded, horizontal version, where: p - level of material structure, ml – linear metre, pcs – pieces

Source: own study.

Figure 1 presents a diagram for the material structure of a furniture product in the imploded horizontal form based on a hanging cupboard. The imploded form of the diagram is characterised by slave components of a furniture item differing in the degrees of their complexity (s), being simultaneously found on the same level.

For example (compare Fig. 1), on the second level of structure ($p = 2$) a cabinet hanger wall plate is found, which is a zero degree product ($s = 0$), next the door, which is a subassembly of the furniture item (a first degree product), for which $s = 1$, and the frame of the cupboard being a furniture assembly, for which $s = 2$ (a second degree product).

The construction of the graph in the imploded horizontal form (Fig. 1) starts with the identification of columns according to the number of levels of the material structure of the exploded product.

Next, the exploded final product or complex component with the highest degree of complexity is placed in the first column on the left in its upper part. Figure 1 presents a hanging cupboard. All its immediate slave components are arranged in the next column. This procedure is continued analogously in the further columns until the list of components is exhausted. In Fig. 1 connections between components are presented using horizontal bold sections. The right-hand ends of these sections contain labels with the component identifier (name, symbol or code) and the quantity or amount of its occurrence in the immediate master component. In the case of components, which quantity amounts to one (piece, set or pair), information one, the number of its occurrences was omitted.

A graph of material structure in the imploded vertical version is created along the vertical axis of the drawing and it is started with its upper part, on which the highest level of material structure is placed (compare Fig. 1). On this level the exploded final product is presented. Its immediate slave components are placed on the next level. The further procedure is continued analogously until all components of the exploded final product are exhausted. If the diagram concerns the explosion of material structure of a complex component, then this component is placed on the highest level. The procedure is followed analogously as in the case of the final product.

The graph of material structure of the final product in the exploded, horizontal version is presented based on a corner desk (Fig. 2). The construction of a graph is started similarly as for the imploded horizontal version, i.e. from the establishment of columns. They reflect the number of levels in the material structure of the analysed furniture product. All furniture components with the degree of complexity $s = 0$, belonging to the analysed corner desk, are placed in the first column on the right side of the drawing. Immediate master components of the furniture item in relation to the zero degree components are placed in the next column. Further steps in the procedure on the successive levels are analogous, until all components of the presented furniture product are exhausted. In a given column the sequence of furniture components is determined only by the principle that sections linking corresponding immediate master and immediate slave furniture components cannot cross.

In the diagram of material structure of the corner desk in the exploded version presented in Fig. 2 the level and the degree of material structure are identical for a specific component of the analysed furniture product. Thus, if a furniture component (e.g. the frame of cabinet D) is found on the second level of the structure ($p = 2$), then it also has the second degree of complexity ($s = 2$). Also the other components (the frame of a cupboard with drawers and a drawer) found on this level ($p = 2$) have the same degree of complexity ($s = 2$).

In the material structure of a corner desk (Fig. 2) five levels were distinguished ($p = 0 \div 4$). The analysed final product, i.e. the corner desk, is found on the highest level ($p = 4$). Two sets of furniture were placed on the next level ($p = 3$), i.e. cabinet D and cupboard with drawers S. The next level ($p = 2$) comprised three furniture subsets – the frame of cabinet D, the frame pf cupboard S

and drawer (3 pieces). Furniture elements (e.g. a horizontal partition, a low side, a top panel), i.e. unit products, are given on level $p = 1$. The lowest level ($p = 0$) represents materials (particleboard, plywood), i.e. uniform products, and furniture hardware (concealed hinges, handles, screws), i.e. unit products.

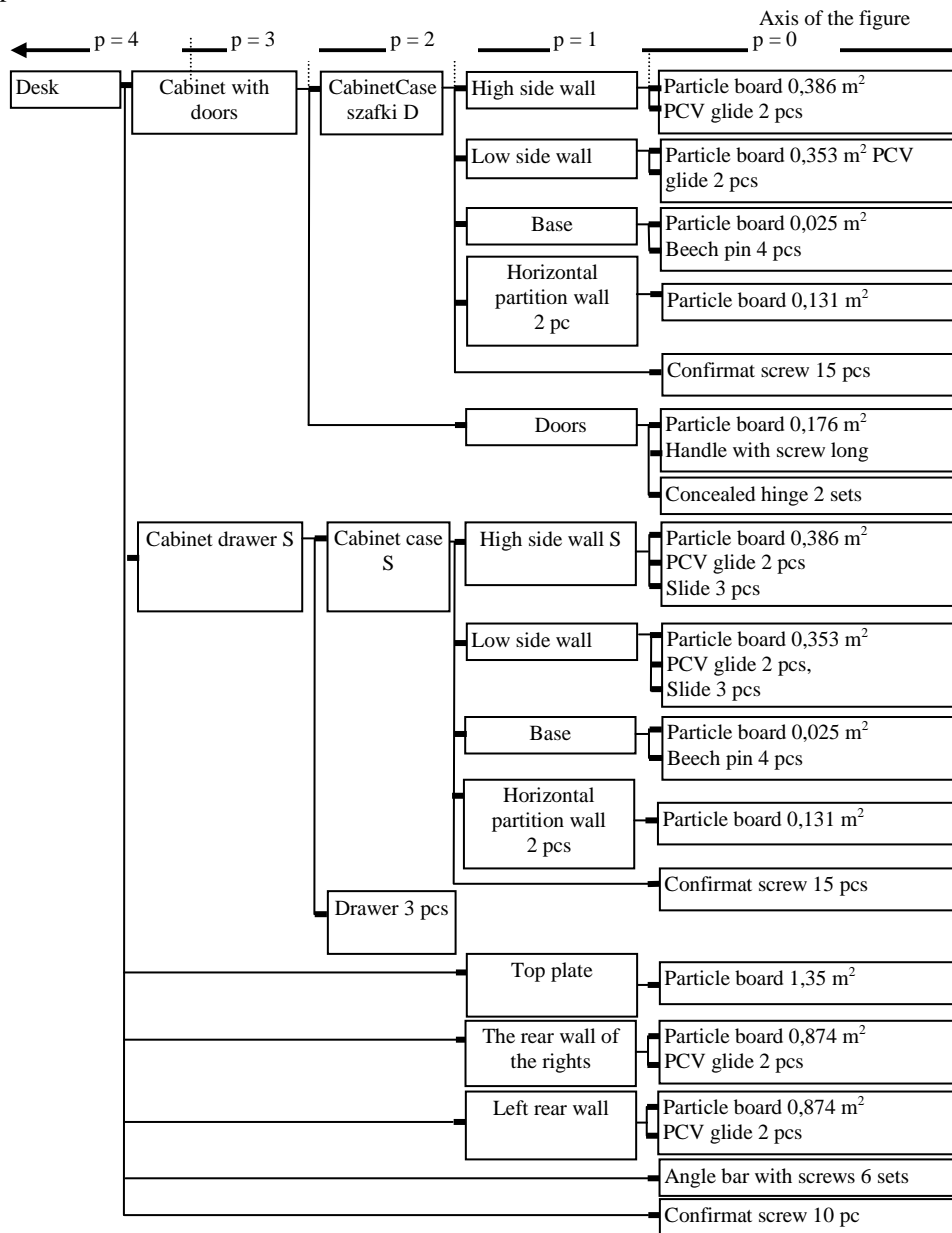


Figure 2. A diagram of material structure of a corner desk – the exploded horizontal version, where: p – denotes the number of the level in material structure, pcs – pieces

Source: own study.

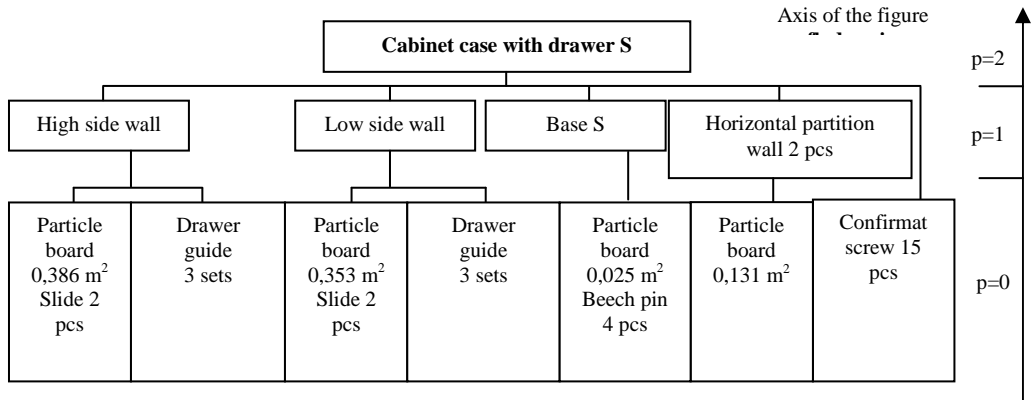


Figure 3. A diagram of material structure of the frame of a cupboard with drawers S of a desk – exploded vertical version, where: p – denotes the number of the level of material structure, pcs – pieces

Source: own study.

Each furniture component was described on the diagram with a label containing its name (identifier) and quantity or amount, in which it is found in the immediate master component. The quantities amounting to one piece or one set were omitted.

Particleboard and plywood are used here as uniform components and thus their amount is given in respective units of measure - m². In turn, some hardware items (concealed hinges, drawer runners) are given in sets, analogously as unit components. In Fig. 2 some components from the category of amorphous products contained in the desk were omitted (e.g. urea-formaldehyde resin) to enhance legibility of the diagrams.

Figure 3 presents material structure of a furniture subassembly in the exploded vertical version based on the frame of cupboard with drawers S, constituting an element of the corner desk (compare Fig. 2). Figure 3 was prepared so that the lowest level (p = 0) comprises all zero degree components of the analysed furniture subassembly. All immediate master components in relation to zero degree components are placed on the next level. The last level comprises the furniture component with the greatest degree of complexity, i.e. the frame of cupboard with drawers S. On a specific level the ordering of furniture components is determined by the principle of non-crossing of lines linking immediate master components and immediate slave components. Each furniture component is represented by a label containing its identifier (name, symbol or code) and quantity (or amount), in which it is found in the immediate master component.

ANALYTICAL FORMS PRESENTING MATERIAL STRUCTURE OF PRODUCT

Material structure of products may be described analytically – in the form of a **contingency table of components**. In such a table the names (identifiers) of master components form headings of columns, while names (identifiers) of slave components are headings of rows. In headings of columns names of zero degree components are not used, while names of the final product or a complex component, which structure is exploded in the table, are not used in headings of rows.

Table 3 presents the explosion of material structure of a furniture product, given in the form of a contingency table, based on the frame of cupboard with drawers S. The provided example concerns a subassembly (the frame of cupboard with drawers S) being an element of a corner desk, which material structure in the form of a graph is presented in Fig. 3.

Table 3. Contingency table of subassembly components – frame of cupboard with drawers S

Immediate slave component of furniture	Immediate master component of furniture				
	Cabinet case with drawer S	High side wall S	Low side wall S	Base	Horizontal partition wall
High side wall S	1 pc.	0	0	0	0
Low side wall S	1 pc.	0	0	0	0
Base	1 pc.	0	0	0	0
Horizontal partition wall	1 pc.	0	0	0	0
Drawer guide	0	3 pcs	3 pcs	0	0
Conformat screw	15 pcs	0	0	0	0
Veneered particle board	0	0,385 m ²	0,353 m ²	0,025 m ²	0,131 m ²
Beech pin	0	0	0	4 pcs	0
PCV slide	0	2 pcs	2 pcs	0	0

Where: pc – piece, pcs – pieces

Source: own study.

Cells of table 3, which were formed at the crossing of columns and rows, give amounts (or quantities), in which a specific immediate slave component of a furniture item is found in the immediate master component. For example, a master component, the plinth, is composed of veneered particleboard at 0.025 m² and four pegs. In Table 3 the value of zero denotes a lack of a direct relationship between a specific slave component of a furniture item and the master component.

The other, analytical form presenting material structure of a complex product is a **specification of components**. The construction of the specification consists in the creation - for each master component belonging to the analysed furniture product – of a list of names (identifiers) of its all immediate slave components. Lists are arranged in the order from the most complex master component to subassemblies of lowest complexity.

Table 4. Specification of components of frame for cupboard with drawers S

Master component of furniture	List of immediate slave components of furniture
Case of cupboard with drawers S	High side wall S, Low side wall S, Base, Horizontal partition wall, Conformat screw (15 pcs)
High side wall S	Veneered particle board (0,386 m ²), PCV slide (2 pc), Drawer guide (3 pc)
Low side wall S	Veneered particle board (0,353 m ²), Slide (2 pc), Drawer guide (3 pc)
Base	Veneered particle board (0,025 m ²), Beech pin (4 pc)
Horizontal partition wall	Veneered particle board (0,131 m ²)

Where: pc – piece, pcs - pieces

Source: own study.

On a specific level the ordering of components with identical degrees of complexity is arbitrary. In the first column of Table 4 we do not distinguish components with degree of complexity $s = 0$. Table 4 presents material structure in the form of a list of components, based on the frame of cupboard with drawers S.

According to the data contained in Table 4, low side S is composed of veneered particleboard at 0.353 m^2 , two PCV slide bars and three drawer guides. Amounts (or quantities), in which a slave furniture component is found in the immediate master component, are given in parentheses. If the quantity is one, this data is omitted (e.g. for the vertical partition contained in the cupboard frame). Zero degree components are found only in lists contained in the column of slave components, while the most complex component, i.e. the exploded furniture subassembly, is found only in the column of master components. Complex furniture components are found in dual roles – once as slaves on a lower level, while in another case as master components – on a higher level (e.g. horizontal partition).

CONCLUSIONS

With an increasing frequency lot production is replaced by piece production as a result of customisation, i.e. adaptation of functions and properties of a product to individual needs of the customer, as specified in the order. Such a method of product manufacture is a response of producers to growing expectations of consumers and pressure of the competition. A characteristic effect of customisation is the manufacture of multi-variant products, which components are selected when configuring the product, in accordance with the expectations of the customer placing the order.

Manufacture of multi-variant products results in a great increase in the demand for specifications of components of complex products and for different types of these lists. Meeting such demand, at the acceptable level of costs connected with the creation of such specifications, has been facilitated as a consequence of far-reaching development of IT tools for manufacturing processes, in particular, as a result of applied ERP (Enterprises resources planning) software. The ERP systems used in production control contain, among other things, records of material structure in the form of multi-variant Bill of Materials (BOM). Forms of presentation of material structure, presented in this paper for complex products as well as procedures for their creation, may supplement such computer programmes.

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DUST CREATION IN MILLING THE SELF-LOCKING LONGITUDINAL JOINTS IN PINE WOOD

Abstract: The particle-size analysis of wood dust created in the process of milling self-locking longitudinal joints was conducted in this research. High risk of dust particles harmful to the health is present on the wood machining positions. This threat occurs in the abandonment of the proper procedures for selection of dust collection equipment. There is a need for continued research on the quality of wood machining and its relationship to the threat to the health of workers due to the processing parameters and the type of material being processed.

Key words: pine wood, productivity, milling, dust creation

INTRODUCTION

Exposure to airborne wood dust is one of the occupational hazards of the wood industry workers. This type of long lasting exposure can cause nasal and paranasal sinuses cancers and respiratory system cancers [Barcenas et al. 2005, Demers et al. 1995]. The relationship between exposure to wood dust and the presence of other diseases was also reported in many studies. These non-malignant diseases among wood industry workers include: allergic alveolitis, asthma, chronic bronchitis, chronic rhinitis, allergic dermatitis, allergic conjunctivitis, organic dust toxic syndrome (ODTS), cough symptoms, nose and eye irritation and other [Douwes et al. 2001, Dutkiewicz and Prazmo 2008, Jacobsen et al. 2010].

The main sources of wood dust emission in the woodworking industry are technological operations associated with the creation of small waste particles - chips. The operations of particular importance for air dustiness because of the dimensional structure of waste are sanding (very fine particles - wood dust) and the working of wood materials and composites (secondary cutting of wood during the working) [Kos et al. 2004, Palmqvist and Gustafsson 1999]. A large amount of waste generated during wood processing is also the situation in this respect very unfavorable. The reason is that sometimes the smallest dust particles constitute a slight fraction of the total volume of waste and can be dispersed in the air in quantities hazardous to health. Technology of milling the self-locking longitudinal joints is the operation with a relatively large amount of chips [Wieruszewski et al. 2009]. According to the observation of this process carried out by the authors it was estimated that the average amount of chips produced during milling is 0,024 m³ per each cubic meter of worked material. It gives about 0,09 m³ of chips at the processing of 3.7m³ of wood per working shift.

Preventive measures leading to dustiness reduction should be based among others on the use of new technologies and working methods characterized by small dust emissions.

Estimation of the emission rate in specific industrial conditions taking into account the tools used, machining parameters and the kind and properties of processed wood is necessary when technologies are evaluated in terms of occupational risk. In this respect, the study aiming to determine the content of ultrafine dust particles in the particulate matter generated during milling the self-locking longitudinal joints in pine wood was especially reasoned and required. Particularly

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important are particles with a size so small that, when dispersed in the air, it enables penetrating the human respiratory system - respirable particles.

METHODOLOGY

Tested dust was obtained from the position of milling the self-locking longitudinal joints equipped with the machine GOMA TYPE FC- 10MLKT. A tool used at the machining was the cutter head WY -620 -02 (Fig. 1) with dimensions: $D = 250$ mm , $d = 35$ mm , width SB = 30.4 mm and a maximum rotational speed $n = 6000 \text{ min}^{-1}$ with four blades 25 PF. Pine wood scantlings with dimensions: thickness 22 mm , width 60 mm and an average length of 450 mm were machined by these tools. The length of the self-locking longitudinal joints was 12 mm.

Dust created during the machining process was isokinetically extracted from the machine by an individual dust extractor. The dust collected in the storage bag of this device was taken for the particle-size analysis.

The purpose of the estimation of general particle-size distribution of dust created during the milling of the self-locking longitudinal joints and the estimation of the smallest fractions in this dust required two different analytical methods. These were sieve analysis and laser diffraction analysis.

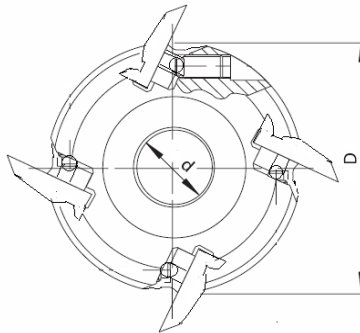


Figure . 1 Cutter head WY - 620 - 02 – scheme

Measurement process of particle size distribution included several consecutive steps. In the first step three samples weighing approximately 100 g were taken from the total mass of collected dust. Then the samples were subjected to the sieve analysis using an electromagnetic sieving machine AS 200 digit equipped with a set of sieves with the size of mesh of 1000, 500, 250, 125, 63 and 32 microns. The sieves were arranged in such a way that the sieve with the largest mesh size was placed at the top and there was the bottom collector under the sieve with the smallest mesh. The particle-size distribution was determined by weighing the dust remaining on each sieve. The mean of three measurements was accepted as a result of the sieve analysis. At the end of each of the three analyses the dust collected in the bottom collector was carefully secured to continue further measurement procedure.

The results of the sieve analysis provide only general information on the particle-size distribution of the tested dust, because this method can not determine the content of particles, which when dispersed in the air can penetrate the human respiratory tract. The content of such particles, including dimensional fractions less than 10 microns, was determined by the laser diffraction particle sizer Analysette 22 MicroTec plus. The dust previously collected in the bottom collector below the sieve with the mesh of 32 microns was used for this purpose. This dust was analysed by the laser particle sizer. Measuring procedure and further data analysis run automatically by

computer control (the MaScontrol software) using a predetermined SOP (standard operating procedure) and theoretical assumptions.

The results obtained were processed using the MaScontrol software in order to generate the particle size distribution curves of the tested dust samples and then based on these distributions to obtain the fractions of dust in the ranges < 1 micron , 1 - 2 microns and further to 10 mm every 1 micron. The mass of the dust particles collected in the bottom collector under the sieve with the smallest mesh had to be taken in the subsequent calculations to determine the content of particles with these dimensions in the total mass of dust generated during the machining due to the fact that these fractions referred to the samples separated by the sieve analysis. Therefore, the final result of the particle-size measurements of the smallest particles in the dust is the product of the fraction < 32 um and the fractions calculated in applied ranges.

RESULTS

The results of the particle-size distribution obtained by the sieve analysis (Fig. 2) indicate that the dust is relatively small. The content of particles with the equivalent diameter less than 125 microns amounts to 10.5%. Most of these particles can be dispersed in the air and form aerosol. However, the smallest fraction (with the size < 32 microns) included in subsequent tests is up to 1.15 %. The specific shape of the cutting edge of the tool and the high cutting speed are the reasons of such significant degree of fragmentation of wood matter into dust. This statement applies to the analysed technological data only, because there is no comparative data obtained with different machining parameters and other kinds of wood in the literature. Therefore, it is necessary to undertake similar studies to determine the occupational hazard caused by wood dust in woodworking plants processing timber into pre-fabricated elements including all the possible working parameters and kinds of wood used.

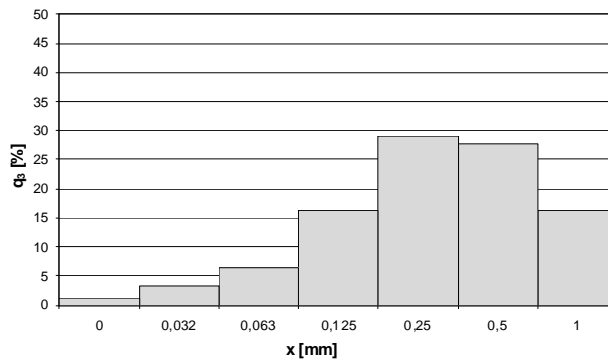


Figure . 2. Particle-size distribution - sieve analysis

Figure 3 shows the result of the analysis of dust taken from the bottom collector of the sieving machine made using the laser diffraction method. It can be seen that the particles with size below 32 microns constitute only about 50% of the total analysed material. This demonstrates the inaccuracy of both methods in relation to the wood dust. It is not their disadvantage, but this inaccuracy is due to the specific shape of wood dust particles. They are generally of irregular shapes and their length is usually larger than the other dimensions. As a result, the wood dust particles pass through the sieve mesh size smaller than their length. The laser particle sizer identifies them as larger than they

really are also for this reason. Comparisons of particle-size distributions obtained only in the same methods should be done and this inaccuracy should be taken into account at the evaluation of the results of particle size analysis.

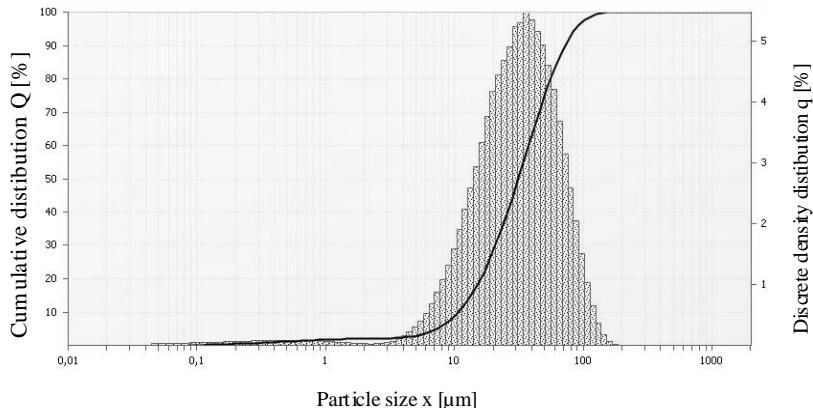


Figure 3. Particle size distributions of dust - laser diffraction analysis

Table 1. Mass rate of the smallest particles

Upper limit	Mass rate in the smallest fraction from the sieving*	Mass rate in the total dust*
µm	%	%
1,00	1,71	0,020
2,00	2,02	0,023
3,00	2,14	0,025
4,00	2,40	0,028
5,00	2,89	0,033
6,00	3,64	0,042
7,00	4,62	0,053
8,00	5,84	0,067
9,00	7,24	0,083
10,00	8,79	0,101

*the result of its own research

The level of the occupational hazard on a given machining station caused by wood dust can be estimated on the basis of the calculated rates of the smallest particles (Table 1). Although the content of particles with the size < 10 microns is only 0.1% and the total mass of the dust in this fraction estimated based on this content and the shift production job (3.7 m^3) is about 40 g/8h . However, it is a large amount of dust which might pollute a huge volume of the air at the acceptable limit of dust concentration of 5 mg/m^3 .

CONCLUSIONS

A seemingly insignificant, constituting only 0.101%, rate of dust of the size of 10 microns and smaller was found based on tests carried out concerning the particle-size analysis of wood dust created in the process of milling self-locking longitudinal joints. However, the possibility of

dispersion of this dust in the air is the assumption to hypothesis that in the process of machining dry timber occurs a high risk of dust particles harmful to the health of workers employed on woodwork stations as well as to electronic components of control systems in modern machines. In case of failure of the correct procedures to select and design dust extraction devices in the woodworking machines local points of high dust concentration can appear, which is a significant hazard to woodworkers' health. Special attention should be paid to the need of continuous testing of machining quality and monitoring workstations in which the level of occupational hazard associated with wood dust may be too high. It is important to keep the monitoring procedures of these changing indications concerning processing parameters and the kind of wood processed.

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STUDY OF THE SMALL FARMS DIVERSIFICATION IN BRITTANY AND WIELKOPOLSKA

Abstract: The study was carried out in 2010 by students on the basis of the joint project of Agrocampus Ouest in Rennes and Poznań University of Life Sciences. The aim of the study was to compare the small farms diversification in Wielkopolska (Poland) and Brittany (France) and also to compare an influence of this diversification on the viability of the production. The results revealed, that diversified business activity of the small farms, increases their incomes. In Wielkopolska most of the small farms run the agrotourist business combined with a direct sale of resources. Wielkopolska is also a region, where agrotourism is a dominant form of business at small farms. On the other hand in Brittany most of the small farms make the additional profits on a direct sale of resources and the manufactured regional products.

Keywords: diversification, direct sale, small farm, income

INTRODUCTION

Agriculture is a part of human activity, changing in the late decades under the influence of various factors: economic, technological, social, natural, and political. After World War II, in many European countries, including Poland, traditional and multifunctional agriculture was limited by the typical phenomenon for economic development, especially the commercialization of the production.

Today, the European Union is represented by a diversified society, in many ways, in 25 countries. However, from the start the main idea of economic integration was and still is the Single European Market. This means that producers have to face the competition and meet the consumer needs. Hence, small farms have been forced to seek the alternative sources of income.

The Common Agricultural Policy, particularly since 1992 (the Maastricht Treaty), has focused on the multifunctional role of agriculture. This means that the agriculture is associated with the tasks, that are supposed to be performed in relation to natural and social environment and with the responsibility of the agriculture for the high-quality food production as well [1].

The multifunctional rural development reflects the adaptation of the farms to the conditions and requirements of the modern market economy. The changes introduced in the CAP rewarded and still reward a model of an efficient, competitive agriculture based on the family farms, taking care of both the quality and the level of production, and of the environmental protection and preservation of cultural heritage [2].

By adopting the regulation rewarding the high-quality food related to the environment and tradition, the European Union has created an opportunity for the diversification of the agricultural activity in rural areas, especially among the small family farms.

In this way, the specific, niche products were ensured to be focused on and by including quality control procedures, the systems for the protection of the high-quality products were created. The

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regional and traditional products have become an essential part of the social market economy and a basis of the EU regional policy. By provoking the self-organization of producers and the co-operation in the promotion and sales – the opportunities, especially, for the equalization of life and economic development level in the rural areas were created.

JUSTIFICATION OF TOPIC

The small farms have always been the basis of agriculture in Europe. They played an important role in agricultural production and in maintaining vitality of the rural areas, passing the tradition from generation to generation, keeping the local rural communities and providing many social, cultural and environmental services. They formed the added value, especially in the form of the unique regional products. This kind of awareness has been evaluated over many generations and was observed, in spite of the ongoing changes in agricultural policy, especially in the southern countries of the European Union. France is an excellent example of an economic activity of the family farms. Even after World War I, to protect the cheese produced on farm and as a remedy for the mass production, the AOC (Appellation d'Origine fr. Contrôlée) indications were introduced. In 1935, the National Institute for Origin and Quality INAQ (Institut National de l'Origine et de la Qualite) was established and as a model for the European system of protecting the quality of products related to the geographical origin. The system was derived from cooperation of institutions at the public, private and social level [3]. The involvement of many professional organizations, chambers, co-operative society, as well as consumer associations responsible for the promotion, distribution and sale of high-quality products has resulted in almost 90% of the recognizability of the products in the systems of the French consumers.

In France, the value of sale of products included in the European system of indications of agricultural products increased from 2.5 billion euros in 2000 to 3.15 billion euros in 2003 [4].

The European Union, by making use of the experience in France to distinguish the high-quality products associated with the region or tradition, established the European system of indication, which on the one hand informs the consumer about the uniqueness of the product, on the other hand protects producers against imitation. The system of protection which in a way rewards a high-quality products in EU was established in 1992. Moving away from the typical agricultural production and looking for the other sources of income through the direct sales, the development of agrotourism, rural tourism perfectly filled the program of the multifunctional development of the rural areas. The multifunctional agriculture produces, in addition to food products and raw materials for the processing industry, other products, goods and services for which there is a consumer demand [1].

Usually, this diversification results from the need to make better use of the resources of the production factors (land, labor and capital) or the need to reduce the risk of the agricultural production and the agricultural income fluctuations [5].

Why were Brittany and Wielkopolska selected to carry out this study? Both regions have much in common. They have a similar surface area, population size, but most of all they are typically agricultural regions, that cooperate. During the study many ideas of diversification in small farms were proposed, such as: the meat factory in Bukowiec, making sausages from breed pigs “Złotnicka pstra” or Mr. Michel David’s farm specializing in agrotourism and production of kiwi fruit.

A chance for small farmers is to diversify, that means the differentiation of the range of products or services in order to reduce the risk factor in their business. The diversification reduces the potential risk of loss and also increases the probability of gaining the highest possible profit. Many years of experience in France and in Poland as well, show that the methods of diversification in small farms are similar. They can be run in the form of tourism, direct sales of agricultural

products, manufacture and sale of regional products, or even as a combination of the above-mentioned options.

In 2010, students from Agrocampus Ouest - Rennes proposed to students from the University of Life Sciences in Poznań the joint project, which aim was to investigate the situation of small farms in Brittany and Wielkopolska. The contact between Poznań University of Life Sciences and Agrocampus Ouest - Rennes has been established thanks to the cooperation with WODR (Wielkopolski Ośrodek Doradztwa Rolniczego) and the International Agricultural Association ADEVIA.

THE AIM AND METHODS OF RESEARCH

The aim of the study is to compare the small farms diversification in Wielkopolska (Poland) and Brittany (France), particularly to know the types of diversification or to specify which part of the income derived from them. The range of research included 17 farms in Wielkopolska and 17 farms in Brittany. A two-part interview survey – with the owners of the farms was carried out. The small farms in Wielkopolska and Brittany were chosen in assistance with WORD (Poznań) and ADEVIA (Brittany).

The following hypothesis was established for the study: small farms diversify their forms of the activity to increase their income.

RESULTS AND DISCUSSION

The definition of the economic viability of the farm can be made on the basis of economic size of the holding, which is defined as the sum of the margins of all agricultural activities calculated on the basis of the Standard Gross Margins (SGM), designated for the different types of agricultural production and regions [6]. The economic viability of the farms is the economic size specified in the ESU (European Size Unit) - a unit, that measures the economic class of the farm, corresponding to a standard direct surplus equal to 1,200 euros [7].

In Poland, the small holdings with an area of 5 hectares determine the majority (72.5% of the total number of households), which use about 18.3% of total agricultural land [7]. By the separation of the standard gross margin, as well as the economic size, the number of farms by economic size classes can be specified. The determination of the holdings size by economic size unit allows to be observed the significant fragmentation of Polish agriculture. The fact is that in 2005 68% of farms running the agricultural industry/business was characterized by a very low economic class sizes - up to 2 ESU [6].

This led to the resignation of running small farms and taking up a job outside the agricultural sector or to starting a business diversification. In relation to farms, the diversification stands for "diversification of the production structure, capital and the structure of the farms to run a business other than farming," [8]. Undoubtedly, to the entrepreneurial behavior of farmers may belong: the making of activities related to the farm, that means the use of its resources. Among more than 3 million businesses in Poland, about 700 thousand were located in the rural areas [9]. According to Bański [10], it should be noted that the number of businesses in the country is low, especially when the fact that rural areas cover more than 90% of the country area and are inhabited by almost 40% of the population is considered.

All of the interviewed farms showed the extra activity associated with the use of household resources (Table 1).

The most frequently chosen direction of diversification in the Breton farms is a direct sales of crops and the agricultural products. Among the products sold by the farmers in the western France, usually cheese, wine, juices or cidr are found. In Brittany producer groups offer a very wide range of products (meat, vegetable, fruit, cheese) and also run an activity associated with an agrotourism.



As an extra source of income in the farms, most of Bretons choose agrotourism, which is complemented by direct sales of the agricultural products and their processing or by educational activities concerning agricultural production dedicated for children and youth.

Among the small farms that decided to diversify their activities, the organic farming are found as well.

Table 1. Description of the visited farms

Bretagne					
No	Location	Major activity	Surface	Type	Diversification
1	Dol de Bretagne	cattle breeding	50 ha	conventional	sale of wine + extra job
2	Cherrueix	cereals	150 ha	conventional	-
3	Dol de Bretagne	fruits and vegetables	2 ha	organic	direct sales
4	Melesse	meat cattle	40 ha	conventional	kiwi productions, sels of marmalade, agrotourism
5	La Bosauc	milking cows	16 ha	organic	sale of chesse
6	Corps Nuds	crops, meat cattle	44 ha	biodynamic	Sale of cider, breeding, agrotourism
7	St Gondran	caterring cottage horse ridding	40 ha	conventional	horse riding lessons, agrotourism
8	Plèlo	meat cattle, pork production and poneys	50 ha	conventional	agrotourism
9	St Servant sur Oust	Swine	40 ha	conventional	agrotourism, education farms
10	Coatascorn	milking cows, milking robots	45 ha	conventional	milk sale
11	Andrè	milking cows	50 ha	conventional	Sale of cheese in short circuit production grotourism breeding, meat ruits and jeams
12	Lanouè	milking cows	20 ha	organic	
13	Pleucadeuc	milking cows	170 ha	conventional	
14	Bovel	breeding production	16 ha	organic	
15	La Chapelle Bouexic	cereals and fruits	50 ha	organic	
16	Gèvèzè	milking cows	60 ha	conventional	cheese production
17	Acie	milking cows	63 ha	organic	breeding, milk
Great Poland					
1	Łubowo	organic boat breeding	12 ha	organic	agrotourism and transformation
2	Nowy Tomyśl	agrotourism	5,1 ha	conventional	agrotourism
3	Bukowiec	pork production	20 ha	conventional	transformation
4	Pawłowo	Mini Zoo	5 ha	conventional	agrotourism, education
5	Sławno	fish farming	40 ha	conventional	agrotourism
6	Wieleń	button mashrooms	2 ha	conventional	mashrooms sale
7	Jablonka Stara	cereals, potatos	7 ha	conventional	agrotourism
8	Kleczew	milk cows, eggs	12 ha	conventional	agrotourism, sale chesse, sale eggs
9	Kościelec	fruits	9 ha	conventional	fruits sale
10	Kościelec	pork production	6,5 ha	conventional	transformation,
11	Kramsk	agrotourism	5,5 ha	conventional	agrotourism
12	Ślesin	cereals, agrotourism	9,5 ha	conventional	agrotourism
13	Wilczyn	cereals	8 ha	conventional	agrotourism
14	Grzegorzew	cereals	3,8 ha	conventional	agrotourism
15	Konin	cereals	10,5 ha	conventional	agrotourism
16	Krzymów	cereals, vegetables	7,2 ha	conventional	agrotourism
17	Rzgów	cereals	6,2 ha	conventional	direct sales

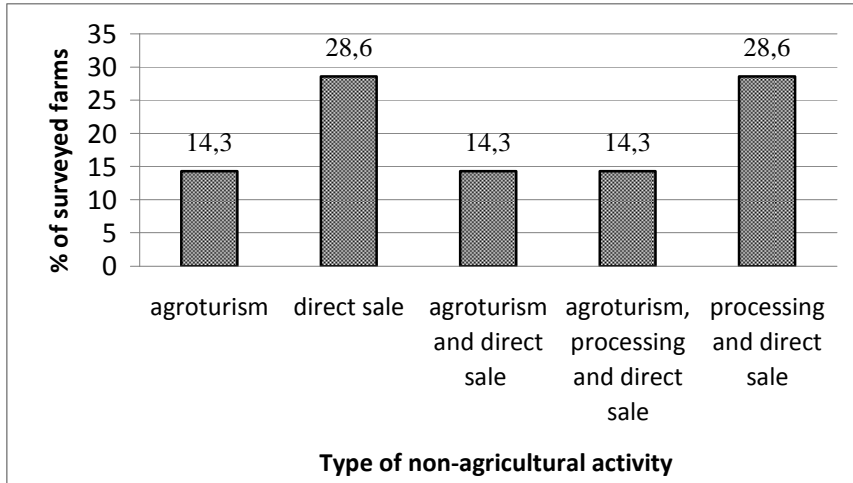


Figure 1. The percentage distribution of households using various forms of diversification in Brittany

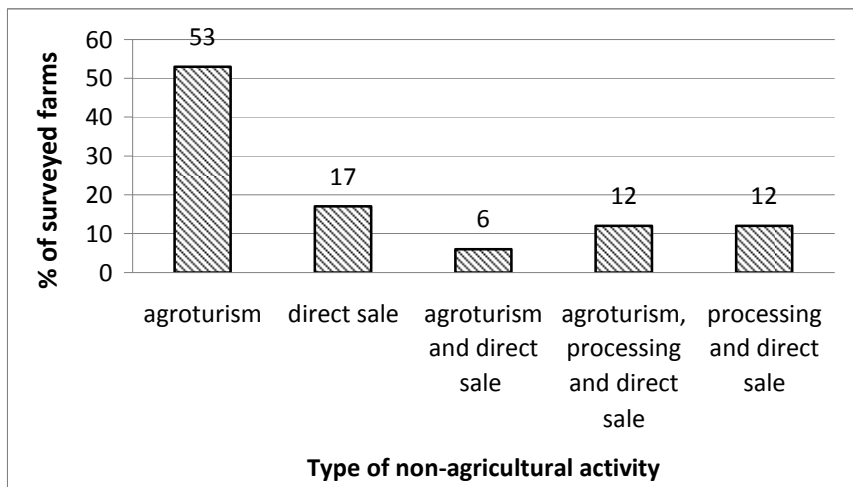


Figure 2. The percentage distribution of households using various forms of diversification in Wielkopolska

Among the surveyed farms in Wielkopolska the reversed trend is observed. Farmers from this region mostly use the household resources in the form of the agrotourism services. Over 50% of households receive the visitors. However, far less number of Polish farmers than Bretons sell directly from the farm. Polish farmers in comparison to western colleagues process their resources into products very rarely, only 12% of the surveyed households produce regional products.

The non-agricultural activity is a positive phenomenon. According to Kołodziejczyk [11] the non-agricultural economic activities should be viewed in the context of the individual farm, the use of its resources: capital, as well as labor and land. In her opinion, the non-agricultural activity is essential for the deteriorating economic situation of farms, because it allows to obtain the extra income [12].

Table 2. The percentage of farm income from diversification activity in Wielkopolska

No	Location	Surface	Income from diversification [%]				
			Agrotourism	Direct sale	Manufacturing	Educational activities	Crop and livestock production
1	Łubowo	12 ha	100	-	-	-	-
2	Nowy Tomyśl	5.1 ha	-	100	-	-	-
3	Bukowiec	20 ha	10	90	-	-	-
4	Pawłowo	5 ha	10	10	60	30	-
5	Sławno	40 ha	60	-	-	-	40
6	Wieleń	2 ha	50	-	-	-	50
7	Jabłonka Stara	7 ha	40	-	-	60	-
8	Kleczew	12 ha	40	-	-	-	60
9	Kościelec	9 ha	-	90	-	-	10
10	Kościelec	6.5 ha	-	80	-	-	20
11	Kramsk	5.5 ha	100	-	-	-	-
12	Ślesin	9.5 ha	80	20	-	-	-
13	Wilczyn	8 ha	70	-	-	-	30
14	Grzegorzew	3.8 ha	70	-	-	-	30
15	Konin	10.5 ha	30	-	-	-	70
16	Krzymów	7.2 ha	30	60	-	-	10
17	Rzgów	6.2 ha	-	100	-	-	-

The agrotourism is a kind of tourist service offered by farms as a result of systemic economic transformation. The progressive impoverishment of a large part of the population as a result of the difficult situation of Polish agriculture, reduced the demand for agricultural products and caused difficulties in selling. The prices of agricultural products and farmers' incomes relatively declined. These difficulties have been further elevated by people returning from cities to the rural areas, because of job losses in other sectors of economy. Therefore, agrotourism is considered as one of the possible ways of the multifunctional rural development and as an opportunity for alternative sources of income for the inhabitants [13].

The broader concept of the agrotourism is a rural tourism as a particular type of tourism, in the opinion of experts, it is one of the 5 polish tourism priority areas.

According to Bański [15] the alternative sources of income are required by farms in all regions of the country, including these regions, where agriculture is characterized by a relatively high level of development.

It should be noticed that 57.2% (in Brittany) and 39% (in Wielkopolska) surveyed farms diversified their agricultural activities through the sale and processing. By analyzing the statistics from the Agricultural and Food Quality Inspection and the legislation concerning a freedom of establishment it can be assumed, that this 39% (in Wielkopolska) may consist of products produced

on the organic farms, the system of financial support for the organic farms and processing plants since the 90s has been a significant criterion for the conversion of farms into organic production.

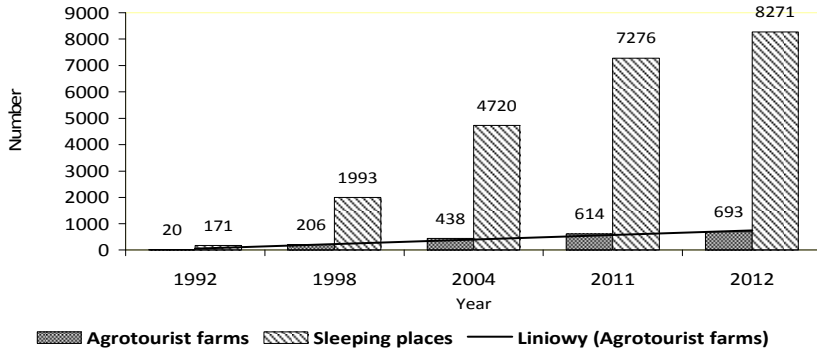


Figure 3. The development of rural tourism in Wielkopolska in the years 1992 to 2012 [14]

Table 3. The development of the organic farms in Wielkopolska in the years 1999-2011

Year	Number of farms with a certificate or those during the conversion into organic production	Surface of organic production areas in [ha]
1999	20	248
2000	31	291
2003	40	4357
2004	70	4815
2007	415	21095
2008	516	20416
2010	791	32513
2011	959	38434

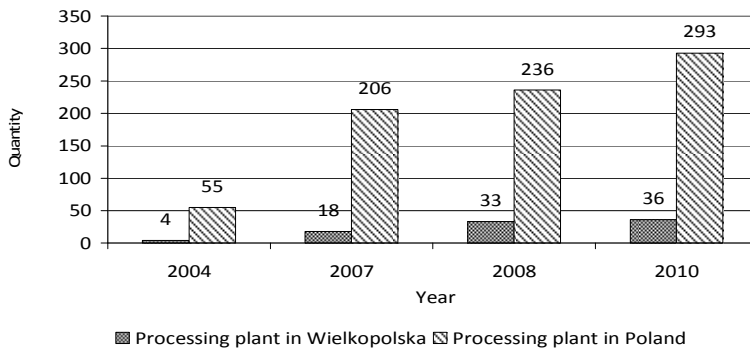


Fig. 4. Number of organic processing entities/factory plants in Wielkopolska

In France, this type of support, since the 60s, concerned the idea of highlighting products related to the geographical area – the regional products (PDO, PGI), traditional (TSG) and organic. In Poland, the first programs to promote a high-quality, traditional and regional food appeared in 2004, but since 2007 the increase of interest in traditional and regional products has been observed. Then the national systems of high-quality products are formed and they affect the development of the traditional products. The financial regulations rewarding the systems of high-quality food as an instrument of Common Agricultural Policy foster the diversification of the agricultural activity in the rural areas.

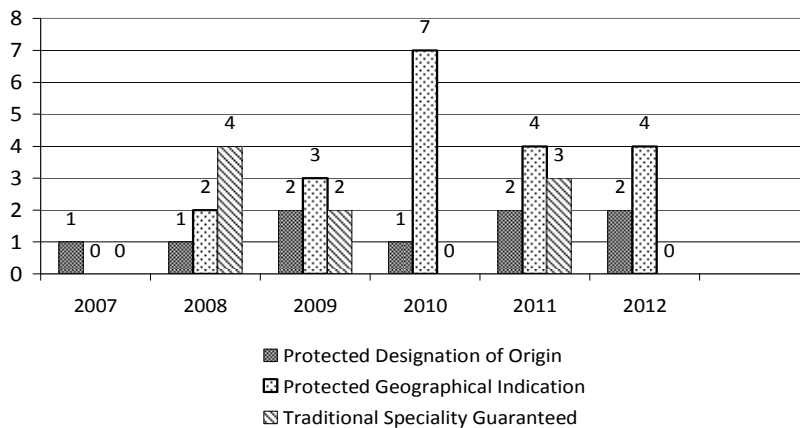


Figure 5. Number of Polish products in the EU system of marking traditional and regional products in 2007-2012

Table 4. Number of products registered in the EU system of marking regional and traditional products in the period from 01.05.2004 to 14.03.2012

No	Country	PDO	PGI	GTS	Total
1	Poland	9	16	9	34
2	France	32	37	0	69 (191)*

*The number of registered products since 1992.

Source: Own calculations [19]

CONCLUSIONS

1. The varied activity of small farms increases their income.
2. In Wielkopolska most of the small farms run agrotourism combined with the direct sales of resources.
3. In Wielkopolska agrotourism is a dominant form of farm diversification of small farms.

4. In Brittany, most of the small farms derive additional benefits from the direct sale of their resources and the regional products.
5. The average age of the surveyed farm owners are the same in Brittany and in Wielkopolska.
6. The forms of diversification of agricultural activity depends on the systems rewarding the non-agricultural activity in the countries of the EU.

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THE VISION OF CITY DEVELOPMENT AS A MARKETING TOOL USED BY POLISH LOCAL LEADERS

Abstract: To convince the followers to express the political support, the leaders apply some specific marketing strategies. In this paper I try to show, taking into account the cases of the leaders of the largest Polish cities, whether their public declarations were more symbolic (“imitating leaders’ behavior”) or more visionary (“promising that the leader can achieve the long-term goals with his/her followers”). I am focused on the three selected issues: a) the leaders’ attempts to create the community’s identity; b) the determinants of leadership efficiency (viewed by the leaders); c) the leaders’ ability to create a pattern of leadership. The main research method used in this work is the critical discourse analysis.

Key words: marketing, city development, local leadership, local governance

INTRODUCTION

The processes of globalization, regionalization and growing importance of the cities in the contemporary world confront the leaders and their followers with the new challenges. Today we can observe the creation of the effective networks of cooperation rather than the hierarchical systems of management. Today the leaders are at the centre of the communities rather than in the front of them. And today the supporters tend to find some creative solutions to the problems and to participate in the process of leadership rather than to execute the leaders’ instructions.

Such observed phenomena lead some researchers to conclude that the previous leaders are replaced by the modern managers; that the classical political leadership theory is in the deep crisis; that in the system of liberal democracy, which favors equality, there is no places for the leadership processes. I do not share such ideas. The hypothesis, which I try to prove in this paper, is the assumption that even though the leadership circumstances are changing, the essence of this process remains unchanged: it still consists of the three elements – leader, her/his followers and support.

THE THEORETICAL FRAMES

In many countries of the world the local governments were treated until recently as institutions playing only a subsidiary role in respect to the central administration [see: Babajanian, 2008, p. 375–376]. Very often they were perceived either as a rival of central government or through the prism of the risks that could arise because of the broaden range of the local authorities independence. Therefore, in the process of local leadership the leaders often played a role of “transmission line” between the abstract state (or the real state administration) and the citizens.

At present, thanks to the process of implementation of administration reforms – that initially was to enable marketization of the local services in the frames of the New Public Management (NPM) project, and then to enable popularization of the network governance practices – the efficiency of the local leadership is seen as a condition sine qua non for the good local governance. The implementation of the theoretical assumptions of the new management style was based on the reformulation of the leaders’ function as well as on the stimulation of the citizens’ activity.

Nowadays the local political leadership seems to be a social process in which community members provide voluntarily the political support to another member of this community, because they consider her/him as a person who perfectly mirrors their expectations of the local leader’s ideal and who has the best chance to achieve the goals shared by both parts of the process [Żukiewicz,

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2011, p. 48]. In such theoretical frames the most important dimensions of the local leadership should be as follows:

- teleological dimension – the main reason of its activation is to enable the leaders and their supporters to influence the decision-making process [Blondel, 1987, p. 16–17], so that the created law could reflect their interests;
- educational dimension – the followers and the leaders teach each other; the former demand to identify their own needs and keep the leaders' promises, the latter – encourages to political participation and to take the responsibility for the local community development;
- pragmatic dimension – which includes representing by the leader the interests of the social group in the representative offices which determine the legislation process, and being a spokesperson for his/her followers;
- psychological dimension – which enables strengthening the local identity and the feeling of being a part of the community (social capital strengthening), and is to meet the needs of belonging (felt by supporters) and the needs of dominance (felt by leaders) [Messick, 2005].

It is noteworthy that the authors of many popular political leadership theories tend to ignore the importance of the four dimensions described above, focusing only on the economic aspect of the process, and think that it is possible only under the condition of the economic and social development of the community [Luke, 1988]. In contrast, it is easy to see that for many communities the ideal leader not necessarily has to be a good administrator or an excellent manager.

The attempts to define the term of leadership or modeling the process anew, in relation to the changing external circumstances, also seem to be incorrect. It is true that regional and local authorities play an increasingly important role in the European Union, that the geopolitical strategies of the countries have changed and that the development of science and technology led to the communication revolution. But it does not mean that the nature of political leadership has changed – the process still needs the activation of the three main components: the leader, the followers and the support [Kellerman, 2008]. Therefore, in this paper I return to the theory of political leadership foundations and I clearly distinguish the leaders from the managers.

The main task of the leaders is to achieve the goals of their social groups. It has to be done without using any form of the coercion – when the followers support their leader because of the fear of penalties or because of the hope of benefits, they do not take part in the symmetrical leadership process. In contrary, they create the asymmetrical relationship of power in which the leader becomes a ruler, and his followers become subordinates. We can see the difference between the terms of “power” and “leadership” if we find that the leadership process lasts as long as the leader receives the support from their followers, and the relations of power continues until it is formally legitimized [Żukiewicz 2011, p. 49].

The power in business is the domain of the managers or administrators. They usually exercise it under a formal delegation. But it is not a real leadership process because they can take their managerial position with the support of the principal (or owner), and without the support of the current or potential subordinates. Even if the effect of these decisions is having an influence on the behaviour of the colleagues and subordinates, it will not to initiate the process of leadership. The real leadership is activated if and only if the collaborators or subordinates find that the director/manager/administrator mirrors their ideas about the effective leader and if they decide to give him the official support [Bass, Avolio, 1993].

To meet the pattern of a local leader, the contenders for this social role use varied methods, which – in their opinion – can allow them to be credible and convince the potential supporters to give them the idiosyncrasy credit (Hollander, 1993). They use mainly some classic pre-election marketing strategies, such as the creation and the promotion of political advertising, the direct meetings with voters, the debates with competitors, etc. In each of those strategies the candidates for



the mayor office try to advance the arguments for their proficiency (mainly through reference to their professional experience and past successes, which they achieved as leaders), or to toady to the audience through the techniques of ingratiation (mainly by emphasizing the unique identity of the local community), but also – or above all – try to arouse the emotional aspects of political leadership [Goleman, Boyatzis, McKee, 2002].

Especially only the myths and symbols are able to generate a strong emotional attitude towards the object and then activate the particular behaviour (in this case the expected behaviour of the followers is to vote for the politician). The most frequently myths and symbols created in this emotional context are as follows:

- the distinction between our group and the other groups,
- the identification of the political leaders as the saviour of the community,
- the myth of a new beginning.

Furthermore, every contender for the mayor has to try to come closer to the pattern of a great local leader through the repeated declarations of the respect for the values of the community, if she/he really wants to lead. But not all candidates are able to activate this symbolic background of leadership and this is the reason why they decide to imitate some leadership behaviours.

It means that the process of political leadership can be dominated by its – as Bohdan Szklarski said – declarative and procedural (in other word: symbolic) aspect: “The president has many addresses, promises to solve the problem, appoints some committees, consults with the experts, organizes press conferences, meets with the advocacy groups, certificates his achievements – all is done through the media becoming the substitute for achievement” [Szklarski, 2006, p. 21]. The other aspect of political leadership named by Szklarski is a cultural and psychological aspect. The author writes: “The role of the symbolic leader is at least to meet the need for belief that the future is in safe hands” [Szklarski, 2006, p. 22].

STRENGTHENING THE SOCIAL IDENTITY

For the processes of political leadership at the local level it is very important to strengthen the social identity of the followers as well as their leader. By this term we understand all the results of categorizing the world made by an individual. The categorization is the process of distinguishing between his/her social group and any other group, and then defining the attributes in order to be able to rate the people as members of these groups. There are three main components of the social identity:

- categorization – which means the assignment of the perceived subject (an object or a person) to the existed cognitive category;
- identification – which consists of assigning oneself to the group of other people seen as similar (even persons defining themselves as individuals recognize that there is a group of “individuals”);
- comparison – which means the assessment of the person’s values and behaviour in relation to the other people [Tajfel, Turner, 1986].

In order to effectively participate in the process of leadership at the local level leaders try through their activities to create a local identity under taking into account all three of its components.

Hence, the categorization of reality is the association of the city with entrenched mental schemes. This process has to be done in two ways: on the one hand, the inhabitants of the city or region should be able to identify easily with the association (that is they should agree with the statement: “Yes. It’s a good term for my city”), on the other hand – this association should also communicate the non-residents that the city or region has got some peculiarity [Żukiewicz, 2011, p. 318]. Categorization can also be seen in the graphic symbols of the cities. Where the promotional

slogan is an important and well-established mark (Poznań, Wrocław), or where the mayors are trying to promote it (Łódź, Gdańsk, Szczecin), it shows in the logos. Where there is no original catchword (Warsaw, Cracow), the mayors tend to refer to the entrenched symbols.

The mayors' activity for the local identity creation is focusing on the presentation of these social characteristics of the city inhabitants, which can confirm that the local community is a specific group differing from the inhabitants of the other municipalities or regions. The popular methods of inhabitants' identification strengthening are as follows: the references to the tradition (for example when local leader wears a traditional folk costumes) and culture (when leader organizes some cultural events – concerts, plein-air paintings, meetings with authors – donates the books about the history of the city, or writes such a book). In order to identification strengthening the leaders use also the symbols in public spaces (for example flags, anthems, logos), the main points of urban spaces (memorials, monuments, rivers, hills) and the elements of entertainments (music bands, sports clubs).

In order to create the group identity the leaders often use the method of comparison. It allows not only to enhance their own merits, but also to diminish the achievements of the others mayors. The legendary are conflicts between inhabitants of: Bydgoszcz and Toruń, Zielona Góra and Gorzów Wielkopolski, Cracow and Warsaw. It is important to underline that the rivalry for primacy among the similar cities (in terms of socio-demographic factors) is based not only on maintaining distance and watching how fast the rivals are developing. The important projects, such as sports competition, trade exhibition, foreign investment, are the objects of efforts of many local leaders. The successes are treated as the argument for the effectiveness of leadership as well as a base for the pride to live in a dynamic and admired region. Every top position in the external ratings of the cities is used by the leaders as the evidence that they can lead better than others and therefore their followers can feel better than others.

In recent years, the biggest Polish cities competed for organizing two main prestigious events. The first was the UEFA European Football Championships, the second – the cultural events in the EU project “European Capital of Culture”. The mayors engaged many of specialists, whose crucial task was to prepare attractive applications and city presentations. Those rivalry activated also the energy of many volunteers who worked hard for their cities. After the final decision of the proper committees there was a lot of controversy. The mayors of the cities that lost the competition accused the winner of using the unfair methods (for example they pointed that Gdańsk was preferred as a host city during “Euro 2012” because it was the place of birth of Prime Minister Donald Tusk who is a football fan; they pointed also that Wrocław was preferred as a candidate for “ECC 2016” because of the informal support of Minister of Culture, Bogdan Zdrojewski, who until 1998 was the mayor of the city). The importance of those objections and the emotional arguments used in the dispute (made by politicians, media and local celebrities) showed clearly that the citizens identified strongly with the place they lived in.

DETERMINANTS OF LEADERSHIP EFFICIENCY AT THE LOCAL LEVEL

One of the most important aspects of support, as David Easton highlighted, is general satisfaction of the followers with the style of governing adopted by their representatives [Easton, 1975]. Easton had no doubt that no one can clearly indicate which policy leads to founding the positive or negative attitudes towards the authorities. He supposed that for any follower there will be other issues. Therefore, one can be assumed that every inhabitant of the city or region sees the community's interests through the prism of their own needs and expectations. And how the local leaders understand the citizens' needs, can be seen clearly in electoral campaign materials.

In those materials many incumbents present the results of their previous work to the potential voters. There are investments in infrastructure on the top of the lists of their successes: new



buildings, roads, bridges and viaducts, restored monuments and revitalized squares. Everything that can be presented visually as opposed to the past is for the leaders the certificate of their efficacy and potency. One of the Polish scientists researching the marketing aspect of the electoral campaigns, noted that “the symbol of mayors (...) are excavators, bulldozers, workers with road breakers, concrete mixers, rollers, and excavations in the ground” [Gajdka, 2008, p. 203]. A similar conclusion can be drawn on the basis of the photographic *topoi* analyzes – the mayors often presented themselves as the hosts of the cities who inspect the important investments.

The catchwords “to be attractive for the investments” or “to focus on economy” are also very important for the local leader’s image. Those slogans have many of positive connotations – they refer to: care about citizens, creating new places of employment, negotiating skills (which enabled to raise the capital from the investors), and effectiveness of city promotion (by which the investors paid their attention to a specific location). In the context of economy the local leaders often use the words which are associated with modernity and modernization.

Unfortunately, as far as it is possible to identify in the leaders’ economic programs the long-term strategy (so called “vision of development”), it is impracticable to do it in relation to the transport policy. In this field of leaders’ activity there are no original projects and the policy goals are only operational. One can attempt to create the pattern of election promises relating to transport policy given by the mayors.

As regards to the road transport the leaders proposed constructing of several (two or three) strategic roads and the reparation of the existing routes requiring urgent repair. It was understandable that because of the range of the problem no one focused on the local roads. An important issue for the mayors was the need to exclude the transit traffic from the city center. That was the reason why they emphasized so much lobbying in the central administration to construct more of the ring roads and highways. The most of mayors also promised to install the so called intelligent traffic control system which results in that traffic lights would not operate in the constant light cycle, but are adaptable to the driving conditions. The leaders in their electoral programs treated often these control systems as the only one solution of the city problem with traffic jams.

In the field of public transport the mayors’ ideas have not been original or visionary. All of them promised the replacement of the old buses and trams by new ones and most of them stressed the need to use the rail to bring the inhabitants to the city centre. They often emphasized the need to integrate various forms of public transport by constructing shared hubs, park & ride car parks or by putting on the market the integrated tickets and cards for travel by bus, tram and rail.

CREATION OF IDEAL LEADER PATTERNS – DOES IT MEET WITH FOLLOWERS’ FEEDBACK?

Because of the importance of the symbolic dimension of political leadership, which one can call as mirroring of the ideal local leader by the mayors, the significant marketing strategies for local leaders are references to the tradition of playing the leader’s role in the community. Inhabitants – throughout the cultural adaptation and socialization – did not only remember those leaders whose activities they rated high, but they also keep in their memory transmitted from generation to generation knowledge about the past leaders.

The importance of this factor can be seen in some analyzes of the local leadership phenomenon in American cities. On the top of the United States mayors’ rank there is the mayor of Chicago, Richard Joseph Daley (Democratic Party), who held the office from 1955 to 1976. He was one of the first leaders, who preferred the “innovative” approach to the political leadership process at the local level [Pawłowska, 2008, p. 117].

Interestingly, the patterns of local leadership are not ascribed to the one place or context. The Rudolph Giuliani’s pattern is the example of the archetype used by candidates in many electoral

campaigns. Giuliani was famous as an implacable foe of the common criminals, but also as a leader who was able to face the challenge of the terrorist attacks of September 11, 2001 [see Polner, 2005, Siegel, 2005]. The image of Giuliani – more precisely: his picture on the book’s cover – was, for example, one of the leitmotives of the Siemianowice’s mayor spot presented in local TV and via YouTube before the 2010 local election.

In many Polish cities we can observe the process of clarifying such an archetype of an ideal local leader. Since 2002 – when the law of the direct election of the city mayors entered into force – the local political scenes became more and more closed. The cases of Paweł Adamowicz and Rafał Dutkiewicz are the most symptomatic, although it is worth noting that in the third (2010) direct election in Gdańsk as well as in Wrocław one could observe “the boredom effect” – the support for those two mayors is not as spectacular as four years earlier.

There is still strong support for two other Polish local leaders: Jacek Majchrowski in Cracow and Ryszard Grobelny in Poznań. Both of them, however, had to face in each election the competitors in two rounds – but they always won this competition. On the right way to establish the pattern of leadership in the Polish capital is Hanna Gronkiewicz-Waltz who won the 2010 election in the first round obtaining more than a half of all the votes. But one should keep in mind that the local election in Warsaw is not the same as in other big cities: it is heavily dependant on the party competition at the national level. There is also a good prospect for leadership of Piotr Krzystek in Szczecin who fought for continuing in office twice in the two rounds of voting. His vision of Szczecin Floating Garden 2050 – if it will be consistently implemented – can be a huge chance for him.

The only city in which the pattern of leadership did not arise is Łódź. This fact confirms the hypothesis from the previous subsections that the lack of a strong active leader makes it difficult to create the community’s identity. The first in the history of Łódź directly elected mayor, Jerzy Kropiwnicki, was removed in 2009 from office by the citizens who voted of no confidence towards him in the referendum. Hanna Zdanowska who won the 2010 election has not proposed any immediate projects as well as any long-term strategy, which could improve the image of the city.

CONCLUSIONS

The aim of the analysis was to answer the question: do the Polish cities’ mayors tend rather to create a certain vision for their cities development or just focus on managing them? There is a lot of evidence that the main reason for the political successes of analyzed mayors was their ability to activate the symbolic dimension of the leadership process. Therefore, the two main conclusions may be drawn from the analysis. First, the mayors’ strategies for their own cities development were formed for the short-term period rather than for the long-term one. Second, most of the mayors’ attention was usually paid to the explanations of the decisions they had already made rather than to convincing their followers-to-be to support their political programme. This may testify to the crisis of the leadership process in Polish cities: although the most of the mayors, whose pronouncements were taken into account in the paper, held their offices for 2 or more tenures, and as local leaders they did not focus on the vision of their city development.

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FINANCIAL CONDITION OF WOODWORKING ENTERPRISES IN POLAND IN YEARS 2009-2013

Abstract: The article analyses the results of financial operations of enterprises dealing with wooden and wood-based goods within the period between 2009 and 2013. Despite a difficult domestic economic situation the enterprises of wood sector due to active export onto the European market reached a growth in sales. In the subsequent years of the period under analysis an improvement in enterprises financial results was observed, especially their profitability and financial liquidity.

Key words: production of wooden and wood-based goods, profitability, financial liquidity

INTRODUCTION

Wood industry in Poland constitutes a significant element of Polish economy and plays an important role in generating national income. Enterprises from that sector of national economy generate almost 6% of the value of sold domestic production of the whole industry sector and employ 5.6% of all industrial.

Financial and economic situation of industrial enterprises depends not only on the results obtained at both domestic and foreign market, but also on the situation at the supply market. In this respect the development of enterprises dealing with wood processing is a consequence of an adequate cooperation with the State Forests National Forest Holding – a domineering wood supplier on the domestic market. The State Forests holds approximately 94% of wood material in Poland and as a dominant wood supplier in Poland it influences wood market both due to determining the supply level as well as determining its sales prices.

One of the key factors determining enterprises financial results is the cost of purchasing the raw material. Increasing price of that material in the recent years significantly reduced the enterprises income because due to the structure of costs in companies dealing with wood processing about 60% of it constitutes the cost of raw material.

Limited wood supply on the domestic market intensifies the competition between various sectors of industry which operations are based on the same raw material. Especially recently a fierce competition for raw material is observed between pulp industry and sawmills specializing in the production of garden elements and pallets and between wood and energy sector [5].

In the recent years the position of many Polish enterprises processing wood for wood supply market becomes ever more difficult. The current system of wood sales makes Polish wood widely accessible for foreign buyers.

Significantly better financial situation of foreign companies dealing with wood processing in a substantial way influences the price of wood on the domestic market, which has its negative consequences on the development of Polish companies from wood sector.

ECONOMIC AND FINANCIAL RESULTS

The world economy crises including the recession on the European market, which constitutes the main direction for export of Polish wood products, directly influences economic and financial results of enterprises from wood sector. At the beginning of the crisis the effects of the operations of wood sector enterprises declined. Insufficient own capital, high costs of bank loans and tighter

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violations related to obtaining them, the decrease in the domestic demand from both the construction and furniture sectors significantly decreased economic and financial efficiency of wood enterprises. Despite that between 2009 and 2013 a better economic situation on the European market as well as changing the direction of the operations of wood sector enterprises towards export along with a favourable domestic currency exchange rate to European currency allowed them to achieve better results in their economic activity.

The volume of sold production in wood industry and its dynamics between 2009 and 2013 are illustrated in figure 1.

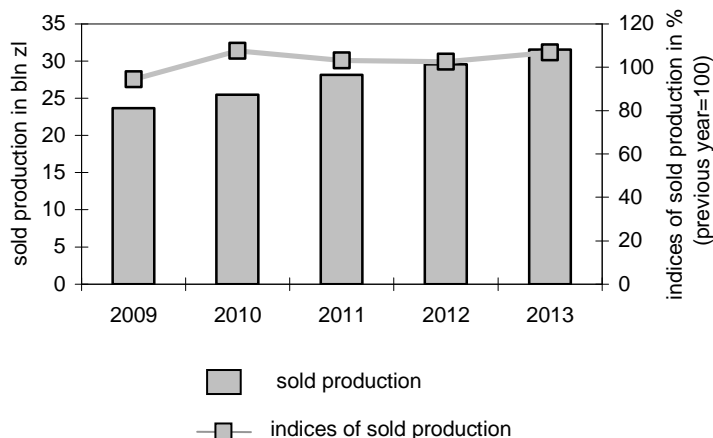


Figure 1. Value and indices of sold production of wood working industry in the years 2009-2013

Source: own evaluation on the basis of Central Statistical Office[2]

Between 2008 and 2009 a decrease in the production sold was recorded. In 2009 the value of sales reached approximately 23.7 billion zł, which constituted only 94,5% of the production sold in the previous year. Declining sales results of the enterprises from wood sector along with ever increasing costs of production, especially the costs of raw material and transport significantly limited their financial results.

In the subsequent years of the period under study the results of wood industry enterprises improved due to a moderate increase in the activity of domestic economy following the recession period in 2009 with a substantial increase in foreign demand.

A slow reconstruction of the demand level from furniture, construction and packaging industries as well as improving economic situation on the European market boosting export activity stimulated a substantial growth in sales of wood products. The value of production sold by wood sector grew systematically from the level of 25.45 billion zł in 2010 to 31.5 billion zł in 2013.

The increase of the income from sales on the domestic market as well as developing export had a positive impact on the profitability of the enterprises from wood sector. The level of profitability in wood sector is illustrated in figure 2.

Following weaker results between 2008 and 2009, within the period between 2009 and 2013 an improvement in the economic results of enterprises from the sector has been observed. A slightly better dynamics of income growth in relation to the dynamics of costs in those years allowed for a systematic increase in the financial result of those enterprises. It had its impact on the level of sales profitability of the enterprises from wood sector, which grew systematically in the subsequent years.

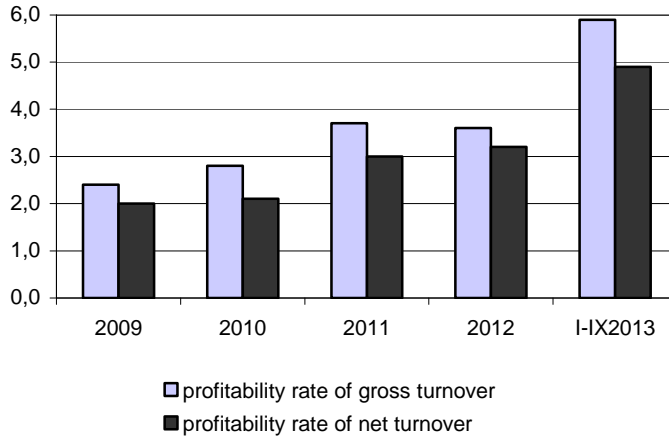


Figure 2. Profitability rate of turnover of wood working industry in the years 2009-2013

Source: own evaluation on the basis of Central Statistical Office [1]

The gross yield sales in wood industry grew from 2.4% in 2009 to 5.9 in 2013. Only in 2012 the yield on sales in wood sector slightly decreased in comparison with the previous year. It then amounted to 3.6% as compared to 3.7% in 2011. Net yield on sales in this period grew in the same period from 2% in 2009 to 4.9% in 2013.

Together with a growth in sales also positive changes in the structure of financing of activity were observed that related to a bigger share of internal source of finance and the increase in current assets turnover ratio. It has a positive impact on the enterprises ability to settle its short term obligations using its own current assets.

Among the basic parameters describing the level of enterprises financial safety there is financial liquidity ratio. The level of financial liquidity ratio of enterprises dealing with wood processing is show in figure 3.

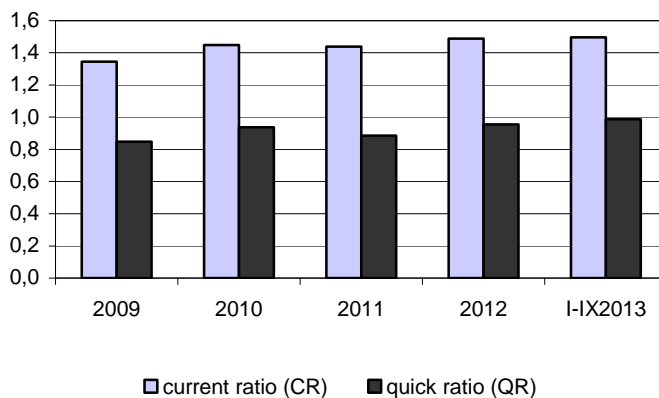


Figure 3. Financial liquidity of wood working industry in the years 2009-2013

Source: own evaluation on the basis of Central Statistical Office[1]

In the subsequent years of the period under study in the sector of wood and wood-based goods the increase in the level of financial liquidity was observed. The decrease in the level of short-term credits and a simultaneous increase in the value of current assets stimulated an increase of the ratio of current financial liquidity (CR) from the level of 1.34 in 2009 to the level of 1.5 at the end of the third quarter of 2013. Only in 2011 in comparison with the previous year there was a slight decrease in that ratio to the level of 1.44. Bearing in mind the generally accepted level of that ratio determining financial stability of an enterprises it needs to be stated that the ratio of financial liquidity at the end of the period under study stayed at a standard level guaranteeing the security of financial balance[3].

In order to keep the continuity of its operations an enterprise should also control the level of its liquidity disregarding the least liquid part of its current assets which includes the supplies. The situation in respect to that is illustrated by quick ratio (QR), which value should oscillate around the level close to 1.

Between 2009 and 2010 the quick ratio grew from 0.85 to 0.94, hence it was still below the accepted level. The worst result in respect to that was obtained in 2011. Then the quick ratio declined to the level of 0.88. Between 2012 and 2013 an improvement in the quick ratio was observed, and towards the end of the period under study the ratio reached the optimum level of 0.99.

The stock level had a significant impact on the span of the quick ratio. Between 2009 and 2010 the share of stock in the overall value of current assets declined from 37% to 35%. The worst result in this respect was recorded in 2011 when the share of supply reached the highest level constituting 38%. The high level of supply that year determined the lowest level of quick ratio.

Further improvement in the economic situation on the European market, as well as the stimulation of domestic demand from the most significant recipients of wood production that is furniture and construction industries may constitute the future stable development of wooden enterprises. The weak side of this sector is its raw material-dependant character which brings along a constant risk of periodical increase in the prices of raw material. Among the persistent problems there is obtaining the raw material at its limited supply on the domestic market[4].

The sector's pro-export orientation is its asset but at the same time it poses a threat due to a risk of high level of fluctuations in currency exchange rate that is used for payments. Euro exchange rate, apart from the accessibility of wood and its prices are the main problems of wooden sector and the factors determining enterprises economic and financial situation. The decrease in currency rate limits capital accumulation by wooden plants and practically eliminates the possibility of investing using its own resources for company development.

CONCLUSIONS

In the initial phase of economic crisis the results of enterprises from wooden sector were determined by the decrease in the demand for wooden goods on the domestic market as well as the economic stagnation in Europe. Stimulation of demand on the European market as well as pro-export orientation of Polish enterprises dealing with wood processing in the subsequent years allowed the companies to improve their financial condition.

Within the period between 2009 and 2013 a systematic growth in the production sold was observed accompanied by the improvement of companies financial results. In 2013 the profitability of net turnover in the sector was reaching the level of about 5%. Also liquidity of that sector of industry is not threatened, as towards the end of the period under analysis it reached an optimal level.

Development of export activity stimulating the increase in enterprise income level of the companies specializing in wood processing was determined by four basic factors:

- Slow but systematic increase in demand for the goods produced

- Steep increase in prices of raw materials,
- Increase in the cost of transport
- Substantial fluctuations in domestic currency exchange rate.

Further development in the activity of enterprises from wooden sector will still be determined by the growing demand on the European market and the expected stimulation of demand on the domestic market, especially in construction industry.

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