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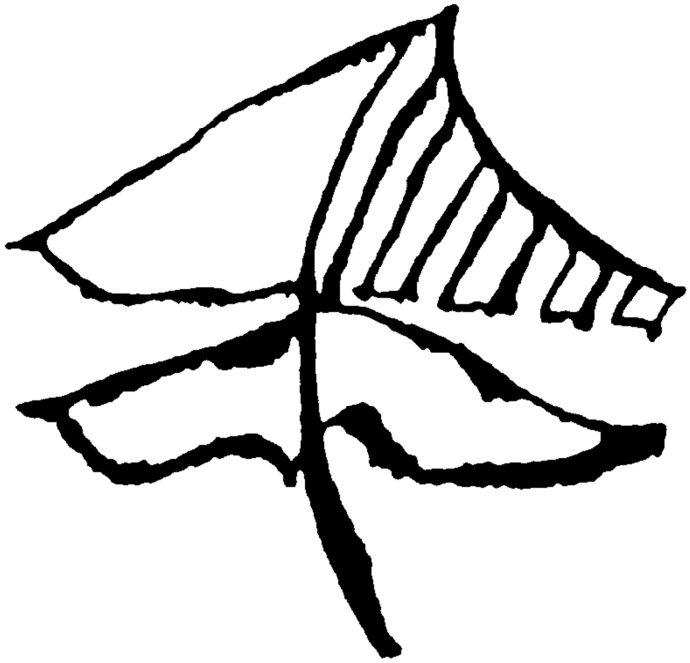

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CONTENTS

Ladies and Gentlemen!

This edition of *Intercathedra 2011* which publishes a range of scientific papers from universities resulted from co-operation of Central European academic research centers. Those papers primarily relate to economic issues in the following areas: economy, management and marketing, especially but not exclusively, in the forest and wood products industry as well as other related fields.

In response to a significant interest in our scientific journal, Members of Editorial Committee decided that starting from 2011 – The **INTERCATHEDRA** – a Scientific Bulletin of the Economics Departments of the European Universities, will be published regularly as a Quarterly.

International scientific collaboration presented in *Intercathedra 2011* links a number of cities: Poznań, Zvolen, Warszawa, Kraków, Tarnow, Trnava, Žilina, Košice, Zagreb, Brno, Presov and other Polish and foreign scientific centers.

The *Intercathedra* 2011 includes, inter alia, papers presented at the "Economic Forum 2010", held in Laski near Kępno (14 - 16th September 2010), which concerned the *"New Challenges in management of supply chains in wood industry enterprises"*. The main contents of the 27th edition of *Intercathedra* covers however scientific articles that will be discussed at this year's Economic Forum 2011 in Laski, near Kępno (the conference center of Poznan University of Life Sciences) on 13 - 15th September 2011. This time the topics will refer to "The conditions and development perspectives of wood industry enterprises in the situation of recovering from the economic crisis in Europe and the World" .

Academic conferences known as "Economic Forum" are taking place annually - since the early nineties of the 20th century. According to the tradition, Economic Forum 2011 is organized by the Department of Economics and Wood Industry Management in Poznan University of Life Sciences, in cooperation with:

- IATM - International Association for Technology Management,
- Forest Experimental Station in Siemianice,
- SITLID - Wood Section of the Association of Engineers and Technicians of Forestry and Wood Industry in Warszawa,
- Institute of Wood Technology in Poznań.

Economic Forum 2011 is the 27th international scientific meeting of the university staff conducting scientific work in common and related areas of research. This meeting gathers engineers, specialists in particular sectors, as well as young scientists and entrepreneurs. These initiatives are supported by IATM - International Association for Technology Management – an international scientific organization, which brings together universities of Central Europe that are conducting research in the field of economics and management in industry, in particular in the forest and wood industry.

In this *Intercathedra* published for the first time as a quarterly, we also publish articles resulting from the joint research undertaken by scientists from universities in Poznań and Zvolen, implemented within the EU program: "*Survey of Consumer Attitudes Towards Wood Products*".

Intercathedra 2011 is issued under the auspices of IATM, whose members have provided materials for the volume, were responsible for its review, and prepared both mentioned scientific conferences. They deserve our deep gratitude.

Wojciech Lis

Ján Dobrovič[1]

MANAGEMENT TRENDS IN SLOVAKIA'S TAX REVENUE ADMINISTRATION AND ITS PROCESS MODEL FOR SLOVAKIA'S ECONOMIC PERFORMANCE

Abstract: Within the frame of the research on this matter, we came out form the existing functional organizational structures and tax administration systems not only in Slovakia but also in Hungary, Poland, Czech Republic and Slovenia, whereas the fundamental prerequisite of investigation was increasing efficiency of the system globally. On the basis of trend analysis we assume that upcoming reform of Tax and Customs administration will significantly contribute to the increasing efficiency of the system and in the end to the positive perception of taxes as a socially unpopular obligations.

Key words: taxes, tax reform, tax administration, efficiency, process management

INTRODUCTION

The examination of Slovakia's tax revenue administration should be perceived in a wider context. In order to it, it is necessary to start from the existing functional organisational structures and tax revenue administration systems in Slovakia, but also in the neighbouring countries, e.g. Hungary, Poland, the Czech Republic and Slovenia, while we think there is an objective need to change the organisational structure and to do its process-orientated optimisation, as well as to introduce marketing principles in the area of orientation on the customer in order to achieve a positive image of the tax revenue administration in the eyes of the public. We assume that the reform of the tax revenue and customs administration currently being prepared will significantly contribute to an increase in the effectiveness of the system and, eventually, also to the positive perception of taxes as socially unpopular obligations.

1. DEVELOPMENT OF THE ORGANISATIONAL STRUCTURES OF TAX SYSTEMS

Structuring by type of tax

The basic criterion for the start of the oldest type of organisational structure of tax revenue administration was the structuring of executive bodies by individual existing types of tax. That type determined the creation of separate multifunctional departments for each type of tax, while such units functioned separately and mutually independently. The organisational structure divided in such a way fulfilled its purpose, but, despite that, it had its own functional shortcomings. It created space for the duplicity of functions, which caused ineffectiveness. If a taxpayer was subject of multiple types of taxes, the so adjusted system became complicated for him, with excessive amount of bureaucracy on the one hand and, on the other had, it was too complicated to manage the performance by taxpayers, separate control and debt collection. The ineffectiveness of the structure made around the type of tax is also underlined by the fact that there is an increased probability of unequal treatment of taxpayers and a decreased flexibility of the use of workers specialised in a certain type of tax. That eventually makes the planning and coordination of activities in the tax revenue administration managerially unsustainable.

Structuring by functional groups

This approach to the organisation of the tax revenue administration's work was made with the objective to improve the standardisation of work processes, to simplify the information flow and

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procedures concerning taxpayers, and to improve the operational effectiveness in general. Such an organisational structure places workers into functional groups (e.g. registration, accounting, information processing, control, collection, appeals, etc.), but, in general, works along a type of tax. When compared with the structure described in the previous chapter, created around types of tax, the application of the organisational structure based on groups increased the performance of the tax revenue administration (e.g. provided individual access points for tax enquiries, simplified the system of taxpayer registration, access to tax payments and accounting, etc.), and also increased the effectiveness of the tax control and debt collection. The modern theories of management, however, criticise such organisation of work for the division by functions, leading to the provision of poor, insufficient services and standardisation that does not bring effectiveness to the tax revenue administration due to taxpayers' varied and differing behaviours in the fulfilment of their obligations.

Structuring by individual types of taxpayers

The latest development in some developed countries has brought a model of organising services and law enforcement based on the principle of taxpayer segmentation (e.g. big taxpayers, small/medium-size taxpayers, employers, etc.). In this case the rationalisation in organising such functions by taxpayer types is in the fact that each group of taxpayers has different characteristics and behaviour and consequently represents a different level of risk in relation to the tax revenues. In order to manage those risks effectively, the tax revenue administration needs to develop and implement strategies (e.g. interpretation of the law, education of taxpayers, improving of the quality of services, focused tax inspections) that are suitable for the unique characteristics and ways of the fulfilment of tax obligations in the cases of individual types of taxpayers. From the management perspective, such a type of organisational structure creates space for the delegation of tasks and a vertical expansion of management, copying the needs of taxpayers, through the centralisation of key functional activities within a single management structure, which, consequently, improves the level of performance. Despite a multitude of advantages and its modern management approach, the application of such an organisational structure is, for the present, in its initial phase. In some countries, departments and divisions for big taxpayers are being introduced into the tax revenue administration system.

2. TRENDS IN THE MANAGEMENT OF THE TAX REVENUE ADMINISTRATION IN SLOVAKIA AND IN NEIGHBOURING COUNTRIES

Each of the monitored V4 countries and Slovenia declare the orientation of their tax revenue administrations that corresponds with the decisive parameters of the effective tax revenue administration of the European Union countries. The upcoming trends in the management of the tax revenue administration (TRA), in relation with the mentioned facts concerning the TRA management in the individual V4 countries and Slovenia, irrespective of the advancement of their economies, can be summarised into the following several points:

a) effort to increase the voluntary fulfilment of tax and health and social welfare insurance obligations, professionalism, partnership and correctness in the relations with the tax revenue administration clients;
b) continual activities supporting the decreasing of tax arrears and tax evasion;
c) building an organisation communicating with its employees and clients professionally, openly, intelligibly and timely;
d) effort to use human resources more effectively, to be an employer offering a job perspective and the growth of the employees' professional level;
e) the utilisation of the information technology in the TRA with the objective to get closer to the taxpayer and to speed up the tax offices' work processes in the area of administration;
f) To constantly look for new opportunities for the improvement, increasing of the quality and making services more effective without major modifications of the legislation;

g) education and training of workers in order to create a more versatile work potential;
h) effort to implement an effective system for the measurement of the quantity and quality of work at all levels of the tax revenue administration, set for each critical factor of success and representing a measurable value.

As a starting point of the upcoming trends in Slovakia' tax revenue administration we take the Government's Programme Declaration[2] of 4.11.2002, which, in the part "Economic Policy", sets out the following objectives in the tax revenue administration: simplify the tax legislation, update the parts of the tax laws that allow ambiguous interpretation, simplify the sanction system in the area of tax revenue, decrease direct taxes, shift the tax burden from direct taxes to indirect taxes, reassess the application of property tax rates, unify income tax rates, analyse the possibility to introduce a flat tax, strengthen the tax revenues of municipalities, specify own tax revenues of higher territorial units, secure strict, direct, fair and effective collection of taxes, decrease tax rates, restrict tax evasion, and create a new system of horizontal financial balancing.

„Slovakia is the eighth most attractive European country from the perspective of tax systems. In the KPMG International's ranking, compiled on the basis of a survey of European company representatives' views on the attractiveness of domestic tax regimes, Cyprus was placed at the top, followed by Switzerland. Both countries obtained high ranking thanks to a unified interpretation of the tax legislation, minimum changes in tax laws and relatively low tax rates."[3]

The survey[4] was carried out by KPMG International[5] and its results reflect the views of more than 400 tax specialists in multinational companies in Europe. The evaluation criteria included the attractiveness, administrative demands, consistency, long-term stability, extent of legislation, tax rates and relations with tax offices. At the European level, according to the survey results, the least attractive area is the extent of the tax legislation. The order of the countries is specified on the basis of "absolute attractiveness", which was calculated as a difference between the percentage of the respondents according to whom the key aspects of their domestic taxation systems were attractive, and the percentage of not satisfied respondents.

Slovakia, and not just by the last tax revenue administration reform of 2007 or by the introduction of a flat tax rate, joined the progressive countries of the European Union and significantly boosted its attractiveness and competitiveness.

From the perspective of tax management levels within Slovakia, the current state can be defined as an officially two-level management, but by the transfer of some competences of the Slovak Tax Revenue Directorate (DR SR) to its detached offices (DO), it is, in fact, a three-level management, whose justification is based on the need to manage 102 tax offices, which is not possible to do from a single centre. Such organisation of the tax revenue administration is not optimal due to the following reasons:

- the performance of the main processes is fragmented by the territorial principle, while each tax office (TO) (small, medium as well as large) runs all processes related with the administration and control of taxes and tax execution, so it is not possible to achieve the optimisation of the performance of such processes or of costs of their performance from the perspective of the tax revenue administration as a whole;[6]
- the system of the deployment of tax offices is little flexible, as it does not allow to adapt the deployment of the basic organisational units to the needs of taxpayers;

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[2] *www-8.vlada.gov.sk/index.php?ID=918 – Programme Declaration of the Government 2002.*
[3] *http://ekonomika.sme.sk/c/3685557/Slovensko-ma-osmy-najpritazlivejsi-danovy-system-v-Europe.html*
[4] *www.kpmg.com/SiteCollectionDocuments/2007CorporateandIndirectTaxRateSurvey.pdf*
[5] *KPMG is a global network of companies providing services in the field of auditing, taxes and consulting. Its member companies operate in 145 countries and employ more than 123,000 workers.*
[6] *Rašner J., Rajnoha R.: Nástroje riadenia efektívnosti podnikových procesov (Tools for Managing the Effectiveness of Enterprise Processes). Zvolen . TU 2007.*

- in the current system of management, DOs represent an administrative level of management, while there has been a long-term need in their work to concentrate the performance of some processes (e.g. accounting, payroll) that are unnecessarily split between the tax revenue directorate (DR SR) and the DOs and increase the administrative and communication demands;
- in the work of DOs' employees, there are problems that are characteristic for organisations that, along the line management, also apply other types of management (e.g. project, specialised-methodological, etc.). It is, for example, the case of the assignment of tasks by specialised managers of DR SR, which can collide in timing with tasks assigned by line DOs' managers.

On the basis of the above-mentioned, the concept of the reform being prepared takes into consideration the principle of justice, neutrality, simplicity, unambiguousness, efficiency and the exclusion of double taxation. The Financial Policy Institute's analyses dated to 2001 – 2004 show the reasons for the clear need of a reform:

- complexity of the tax law – lack of clarity;
- a lot of exemptions, liberations and reliefs, leading to social ineffectiveness, when the production and consumption is not influenced by the supply and demand, but also by tax advantages;
- variability of the specification of the tax base, which allows the optimisation by the taxpayer, which increases administrative costs and decreases the possibility to control.

From the perspective of the management and organisation of the tax revenue administration, as further reasons we can consider:

- complexity of the organisational structure – duplicity of functions and powers at the central and regional levels;
- a costly administrative tax revenue administration apparatus;
- non-transparent project management, decreased possibility to control processes;
- the taxpayers' unwillingness to pay taxes;

The Slovak government's intention, declared in the mentioned Slovak Government's Programme Declaration, is to carry out the reform of the tax revenue administration in a way that makes it more effective, with the objective to methodologically help the taxpayers with a good taxpaying discipline and to uncover taxpayers that avoid the payment of taxes. The objective is to create conditions for an effective co-ordination of public administration bodies, to guarantee the access by citizens via the Internet, and to secure the interconnection of information systems of public administration bodies. The reform of the customs administration, with the vision of uniting the tax, duty and health and social welfare insurance premium collection processes, is also a priority task of the Slovak Ministry of Finance. The reform should take place in two phases: the first one will unite the tax revenue and customs administrations; in the second one, the tax, duty and health and social welfare insurance premium collection will be united.

The first phase has the name UNITAS I and part of it is a reform of the tax revenue and customs administration. For that phase it is proposed to examine the possibilities of process synergies in the tax revenue and customs administrations, to adopt legislative changes resulting from both audits and to subsequently coordinate the implementation of changes in both institutions. That determines the subsequent decision whether the optimization process will result in the uniting of the tax revenue and customs administrations or whether they will keep existing separately. It is proposed to develop a feasibility study, which would comprehensively assess the essential preconditions, possible benefits, and risks of uniting the tax, duty and health and social welfare insurance premium collection.

The second phase of the reform being prepared, also called UNITAS II, and its launch, will be influenced by the successful realisation of the benefits of the UNITAS I phase. In the UNITAS II phase, after the development of process models in the institutions concerned, a process model of the united collection should be developed, with a subsequent change in the legislation and the adaptation of the information technology (IT) support of the affected organisations.

The optimisation of the processes in line with the above-mentioned intentions focuses in particular on:

- centralisation of the tax revenue and customs methodology at the Financial Directorate (FR SR);
- centralisation of services for the public at the FR SR;
- centralisation of the payment contact and of the accounting of taxes, fees and duties at the FR SR;
- concentration of the execution process at Financial Offices (FOs);
- concentration of the control process at the FOs;
- concentration of taxes;
- splitting of tax administrators' tasks by the character of activities and the uniting of tax administrators' registration and administrative activities;
- centralisation of support processes at the FR SR;
- unification and simplifying of forms for obliged taxpayers;
- Introduction of a unified identifier for natural persons and legal entities;
- development of electronic services and elimination of paper-based communication;
- development of electronic communication with other public administration bodies and with other bodies and institutions;
- reduction of bureaucracy through the introduction of e-government, electronic communication and digitising of files;
- reduction of the taxpayer's loading by the removal of the duplicity of the provision of information to public administration bodies.

Through that process, Slovakia is getting closer to an effective taxation system, which will mean an increased effectiveness and competitiveness of our country within EU countries. The impacts of the proposed changes can be split into two basic categories. The first one includes the benefits of the reform of the tax revenue and customs administration that have in particular the character of cost and time savings, of increased added value and work efficiency, etc. The second category is represented by the expenditures made to achieve the individual objectives on the reform of the tax revenue and customs administration. Both of the mentioned categories are further split into the impacts on the taxpayer, i.e. the user, and the impacts on the public administration. The expenditures and benefits of the reform either have a one-off, time-limited, or permanent character. From the financial perspective, the impacts with a permanent or repeating effect are of the greatest significance.

CONCLUSION

In the research of the issue, we started from the existing functional organisational structures and tax revenue administration systems not just in Slovakia, but also in Hungary, Poland, the Czech Republic and Slovenia, while the basic assumption of the examination was an increase in the effectiveness of the system as a whole, through a change in the organisational structure and its optimisation, as well as through the introduction of marketing principles in the area of orientation on the customer in order to achieve a positive image in the eyes of the public.

The introduction of the reform in Slovakia's tax revenue administration (TRA) that is being prepared lies in the optimisation of the number of tax offices (TOs) and in the change of the organisational structure, which will bring significant savings in their budgets. In the next phase, the uniting of the tax revenue and customs administrations is being planed with the objective to subsequently unify the collection of taxes, duties and health and social welfare insurance premiums.

From the managerial perspective, the following expectations of the benefits of the reform are significant:

- better administration of the state's receivables with the possibility of their mutual compensation and a stronger position in receiverships;
- optimisation of the number of employees by the elimination of the performance of duplicate activities and by the reduction of management positions;

- decreased costs of the running of a united organisation.

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NEED OF DEVELOPMENT OF INNOVATIVE METHODS OF CYANOBACTERIA DISPOSAL IN STAGNANT WATERS IN CUSTODY ON WATER MANAGEMENT DEVELOPMENT IN SLOVAK REPUBLIC

Abstract: Contribution is focused on problem of eutrophication of stagnant water, current situation in specified area and existing legislation in water management in Slovak Republic. It describes consequences of eutrophication, current state of natural swimming pools water quality in Slovakia, comprehensively evaluates summer tourist season, natural swimming pools in 2010 and stresses the need of developing new, economically less demanding and environmentally friendly methods that will be effective in fight against excessive growth of cyanobacteria water blooms.

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Key words: cyanophyta, pollution, impact, eutrophication, experimental electrolytic methods.

INTRODUCTION

Human society produces large amounts of substances that affect their quality of all parts of environment. As plant growth is influenced by presence of nutrients in soil, as well as aquatic plants depend on nutrients in water. Currently major effort is made to uncover specific causes of cyanobacteria creation not only in backwaters.

Development of a mass of water cyanobacteria bloom is a direct consequence of eutrophication. Occurs primarily in summer months when there is enough sunlight and heat. Development of water bloom forming cyanobacteria, according to [1] [3], the primary result of increased nutrient inputs, eutrophication, which occurs in warm and sunny summer months. Prokaryotic, gram-negative group of bacteria that are simple and phototrophic organisms called cyanobacteria.

Situation in Slovakia in this area is not flattering, given the large number of water areas affected by high degree of eutrophication. Biological, physical - chemical, mechanical, electrolytic, or other methods exist used to reduce the occurrence of cyanobacteria in stagnant waters, more in 3 3 3 3, which are not the subject of this contribution. However, these methods carry a number of disadvantages, so it is still necessary to develop new ones that are will be more efficient in fight against excessive development of cyanobacteria. Implementation and modification of technology to reduce the occurrence of cyanobacteria in stagnant waters project goal, which research team consists of staff of the Mechanical Engineering Faculty in Kosice is to contribute to development of innovated experimental facility based on electrolytic methods to revitalize stagnant eutrophied waters, which will be less challenging and economically friendly to environment

EUTROPHICATION IMPLICATIONS

As a result of eutrophication in the disruption of the ecosystem a depletion of biodiversity occurs in the aquatic environment. Side phenomenon occur here: excessive growth of water blooms, decreased self-cleaning ability of water, disruption of water oxygen, production of cyanobacteria toxins, changing of species composition and lack of light, lack of drinking water, aggravated by water treatment, water supply problems in operations 1. Table 1 provides an overview of adverse events and effects of eutrophication in aquatic environment.

Tab. 1. Overview of adverse events and effects of eutrophication 1

Adverse event	Effect
distortion of oxygen regime	- increase of water pH, - in morning hours unacceptable anoxic environment for other organisms, - death of organisms - microbial decomposition of large amount of dead algae and cyanobacteria,
cyanobacteria toxins	- a threat to humans and animals in contact with higher concentrations,
change in species composition	- excess of nutrients favors rapid plant growth, - water tank overgrowing - impeding light penetration into the lower water levels, - secondary structural changes in organisms sensitive to light,
lack of drinking water	- deterioration of drinking water, - reduction in recreational use of water, - costly treatment of drinking water,
deterioration in water treatment	- increased concentration of phosphates in water, - high cyanobacteria concentration in drinking water sources,
problems in water supply plants	- clogged filters - deterioration of organoleptic characteristics of treated water, - emergence of secondary microbial contamination during decomposition of organisms in distribution networks, - hygienically unacceptable release of substances into water.

APPLICABLE LAW IN SLOVAKIA

Appropriate measures to prevent risks are taken immediately when signs of proliferation of cyanobacteria and occurrence or suspect of health hazards. About these measures also public is informed. Appropriate regional office for public health must use appropriate media and technology including Internet for active and rapid dissemination of information to inform the public 7.

CURRENT STATUS OF WATER QUALITY OF NATURAL SWIMMING POOLS IN SLOVAKIA

During summer season 2010 was into water quality assessment included 77 natural sites. This is bare ground area (gravels) and water reservoir (WR), used by public for recreational purposes. Regional office for public health allowed operation of 18 locations, which run organized recreation. About partially organized recreation is possible to talk in some locations. Organization of such sites is carried out by municipalities and operators on surrounding beaches, treatment of surface water and beach equipment if necessary were operated by the beach itself. The frequency of water quality monitoring was dependent on site and was about two weeks. In case of operation of swimming pools water quality monitoring was ensured by operator. Regional office for public health ensures regular monitoring of natural pools with unorganized recreation which had the highest attendance during season, eventually are included in the monitoring of EC. Monitoring of minor recreation sites with weekend recreation was due to financial possibilities of Regional office for public health only about 1 to 2 times per season 8. During summer season 2010 were on natural swimming pools collected a total of 531 water samples. There have been 7755 physical-chemical examinations, microbiological and biological indicators of quality. In tab. 2 is a summary evaluation of summer tourist season on Slovak natural pools in 2010.

Tab. 2. Evaluation of summer tourist season on Slovak natural pools in 2010 8

Region	Samples			Indicators				
	Total	Exceeded limit value (LV)	Non-exceeded LV	Total	Exceeded limit value	micro-biological	biological	physical-chemical
Banskobystrický	82	31	37,8	1 340	46	4	2	40
Bratislavský	120	59	49,17	1 210	66	16	-	50
Košický	127	61	48,03	1 979	99	14	19	66
Nitriansky	37	36	97,3	651	87	3	1	83
Prešovský	64	18	28,13	1 132	24	3	4	17
Trenčiansky	32	16	50	502	27	3	2	22
Trnavský	49	13	26,53	649	15	-	-	15
Žilinský	20	7	35	292	9	-	2	7
Total	531	241	46,39	7 755	373	43	30	300

Indicator limit value (LV) was exceeded in 241 samples and 373 variables, which is 45.39% of total number of samples (compared to 2009, when 38.54% were non-compliant samples. This is an increase by about 7%). From the unsatisfactory microbiological characteristics, intestinal enterococci represented the largest number, less Escherichia coli (E. coli) and coliform bacteria occasionally. In most cases repeated sampling confirmed the persistence of contamination and it was a short-term contamination, which could be affected by rainfall. The site on which they were recorded problems also in the past with the occurrence of cyanobacteria, also confirmed their occurrences in 2010. At these sites is necessary in 2011 to increase the frequency of monitoring, although it was not always needed given to their number and, if necessary end of season to join a bathing prohibition 8.

In next table, chosen limit values of water quality concerning cyanobacteria are presented.

Tab. 3. Chosen limit values of water quality indicators concerning cyanobacteria 7

N.	Indicator	Symbol	Unit	Limit value	Monitoring frequency
1.	Cyanobacteria with the ability to form a water bloom	CB	cells/ml	100 000	Before season start and during bathing season 1 x 14 days
2.	Chlorophyll and the dominance of cyanobacteria in the plankton	Cl-a	µg/l	50	
3.	Transparency	PR	m	1,0	

Pool operator ordered measures to eliminate, or issued a ban, if bathing water quality unfit for swimming or other defects were detected in operation of resort. If unsatisfactory water quality was found in natural bodies of water without an operator, municipalities on whose territory water area was were awarded of obligation to designate the area boards about the unsuitability of bathing water for health reasons. During summer tourist season 2010 were not recorded in most pools serious deficiencies in quality of water that would endanger the health of bathers and vacationers. Most of shortcomings identified by the measures imposed by public health authorities were immediately removed by operators. Complaints about operation of public swimming pools were recorded sporadically. By local doctors and specialist were not reported diseases that would be incurred in direct connection with bathing or swimming pools during the season. In relation to season it can be concluded that natural swimming pools (SP) unstable weather has affected mainly launch and operation of season in second half of season. Consequent reduction in traffic on the SP in recent years is the reason for their lack of interest by operators. According to reports of regional office for public attendance on all SP decreases and focuses on weekends 8.

NECESSARY PRECAUTIONS WHEN SOLVING EUTROPHIED WATER AREA

Aquatic ecosystems affected by excessive input of nutrients, particularly nitrogen and phosphorus, causes problems. Existing techniques have not been in combat against eutrophication and subsequent excessive growth of cyanobacteria effectives. It is necessary to constantly develop new efficient and effective ways to minimize already occurred eutrophication. Equally it is important and necessary to eliminate or minimize further eutrophication of these waters.

Research institutes are trying to improve techniques, methods and equipment and develop new ways, which would become effective for the disposal of cyanobacteria. Project Implementation and modification of technology to reduce the occurrence of cyanobacteria in stagnant waters implemented at the Technical University in Kosice aims at extending existing technologies of removal of cyanobacteria, which was successfully used to reduce eutrophication of stagnant water on electrolysis-based methods at small water bodies and modified and used for large bodies of water. It focuses on further development and application of existing patented technology to improve the quality of stagnant water and need to implement technology into practice. The base of solution is to patent solution of the Industrial Property Office (Gazette) no. 282797/2002. Planned duration of project activities is 30 months, starting from 2010.

Aims of this project are:

- development and application of patented technology for improving the EU environment for needs of implementation into practice,
- modernization and streamlining of support for research, development and improving the infrastructure of higher education,
- increasing of economy competitiveness,
- reduction of regional disparities,
- new innovative SMEs creation,
- new jobs creation,
- improvement of educational process at universities.

Other specific objectives of project may include:

- adaptation of existing facilities for revitalization of stagnant water,
- extend their use to large lakes,
- testing and verification of proposed technology,
- measuring water parameters before and after treatment.

Experimental equipment will be tested on lakes in the vicinity of Kosice. Disposal of cyanobacteria will be conducted in following stages:
- radical electrolytic action of depth electrodes,
- surface collection of cyanobacteria floated levels,
- installation of floatation with separate power supply.

These devices can be installed on long-term water surface. With photovoltaic cells are energy self-sufficient and thereby reduce energy consumption. These simple devices and their applicability will have a positive impact on aquatic ecosystems, human health and improving the hygienic condition of water bodies.

CONCLUSION

Minimizing the impacts of eutrophication of surface waters is a complex problem not only in Slovakia which solution is not easy, but it is necessary to take steps that could contribute to minimizing the impact of these water bodies. It is necessary to constantly develop new efficient and effective methods for their disposal. Equally important is a need to build wastewater treatment plants with increased removal of nutrients, expand and reconstruct public sewerage systems, sludge treatments, clean rain waters and building rainwater reservoirs. Use friendly agricultural products, not overfeed fish in ponds, and use eco-friendly phosphate-free detergents and reduce emissions of nitrogen emissions from car traffic 1.

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Pavol Gejdoš[8]

INCREASING THE EFFICIENCY OF BUSINESS PROCESSES IN FURNITURE COMPANY IN SLOVAKIA

Abstract: The paper deals about process management FMEA method and its impact on economic performance and the results of the organization. Through process management and FMEA method could be detected in organizations all non-productive cost which increases overall costs of the organization without a positive effect on creating value and satisfying customer needs.

Key words: Process, quality management, costs, FMEA

INTRODUCTION

The term quality is still more and more used in professional practice and also in usual life because it is becoming the criterion according to which is decided about surviving or extinction of companies. Area of quality is one of the substantive components in the company because without quality goods and services, which firms offer or should offer, company cannot exist. Only expressive increasing of quality can guarantee the efficiency of production and competitiveness of the company.

All organizations and companies we can feel like aggregate of processes which are create from activities. The way how we can manage processes in organization have impact of total efficiency of organization. The inference of negative attitude of process management can be increasing costs and times of performance processes or decreasing quality outputs or not satisfied customer.

1. PROCESSES AND QUALITY MANAGEMENT

Process is a set of interrelated or affecting the activities (Figure 1) to transform material and information inputs (from internal or external suppliers) to the physical and information outputs (products of the process for a customer) in certain controlled conditions (of the regulators) for the consumption of material , human and energy resources (these are converted into outputs).

Regulators are inputs that define and regulate the same time affecting the course of the process. These include the use of methods, standards, plans, directives and legislation also used for repeating the identical or similar process

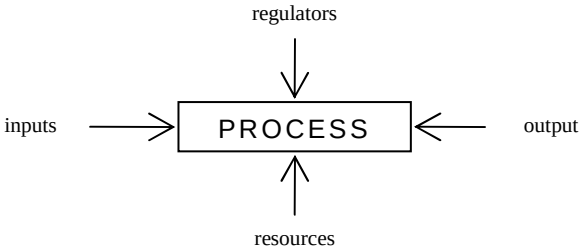

Figure 1. Basic model of process [2]

2. INCREASING QUALITY AND EFFICIENCY OF COMPANY TROUGH APPLICATION PROCESS FMEA METHOD

An FMEA is a systematic method of identifying and preventing products and process problems before they occur. FMEAs are focused on preventing defects, enhancing safety, and increasing customer satisfaction. Ideally FMEAs are conducted in the product design or process development stages although conducting FMEA on existing products and processes may also yield huge benefit.

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Preventing process and product problems before they occur is the purpose of Failure Mode and Effect Analysis or FMEAs. Used in both design and manufacturing process, they substantially reduce costs by identifying product and process improvements early in the development process when relatively ease and inexpensive changes can be made. The result is robust process and reduction or eliminations of the need for after-the fact corrective action and late changes crises. [4]

In addition to the basic nature of the precautionary and prevention of errors is essential objectives of FMEA can be expressed as follows:

- identification of critical components and potential weaknesses,
- early recognition and locate possible errors,
- estimates and quantification of risk,
- reduce development time, reduce development costs and reduce the cost of removing errors, reducing warranty and service costs,
- increasing the safety features and reliability of products,
- better compliance with the planned dates,
- efficient manufacturing,
- better service and others.

3. APPLICATION PROCESS FMEA METHOD INTO FURNITURE COMPANY IN SLOVAKIA

The subject of our analysis have become key business processes. The first step when you want to analyzed processes in a company you must made map of processes. In the analysis we decided to use a process FMEA, which was analyzed during the entire process from sales through business planning, production to packaging itself with the dispatch of products to the customer. The map of processes in furniture company illustrated the figure 2.

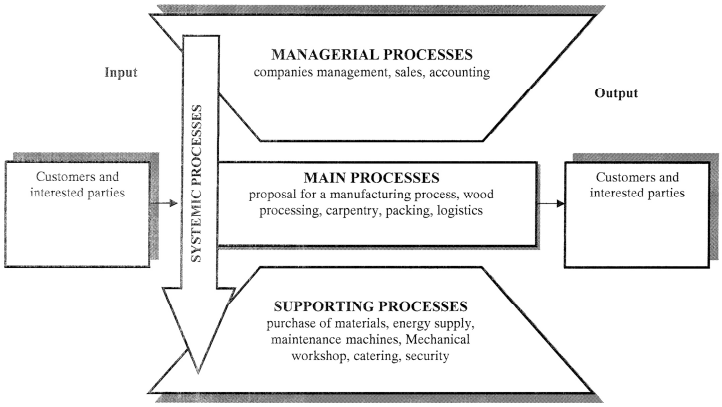

Figure 2. The map of processes in furniture company

After the determining of process map is the next step the evaluation of potential errors and calculation of RPN . Table 1 shows example of this assessment. RPN play an important part in the choice of an action against failure modes. They are threshold values in the evaluation of these actions. After ranking the severity, occurrence and detectability the RPN can be easily calculated by multiplying these three numbers: $RPN = S \times O \times D$

This has to be done for the entire process. Once this is done it is easy to determine the areas of greatest concern. The failure modes that have the highest RPN should be given the highest priority for corrective action. This means it is not always the failure modes with the highest severity numbers that should be treated first. There could be less severe failures, but which occur more often and are less detectable.

After these values are allocated, recommended actions with targets, responsibility and dates of implementation are noted. These actions can include specific inspection, testing or quality procedures, redesign (such as selection of new components), adding more redundancy and limiting environmental stresses or operating range. Once the actions have been implemented in the design/process, the new RPN should be checked, to confirm the improvements. These tests are often put in graphs, for easy visualization. Whenever a design or a process changes, an FMEA should be updated. [5]

Table 1 Example of assessment of potential errors by FMEA method [3]

Indicator	VV					PV					PO					RPN
Assembly components																
Insufficient number of fasteners	7	6	7	7	7	5	6	5	5	5	8	8	9	9	9	315
Using the wrong fasteners on the product	7	7	8	7	7	3	3	4	3	3	7	7	8	9	8	168
Grinding																
Late replacement sandpaper	6	5	7	6	6	4	3	4	4	4	5	6	5	5	5	120
Incorrect grit sandpaper chosen for the product	6	6	7	6	6	3	2	2	3	3	6	6	7	6	6	108
Packing																
Not enough shrink-wrap	5	5	5	6	5	6	5	6	6	6	7	6	6	5	6	180
Instability pallet cages for the package	6	7	7	6	7	4	4	5	4	4	6	7	6	6	6	168
Expedition																
Incorrect handling of packages in a vehicle	3	3	2	2	3	6	7	7	8	7	3	3	4	3	3	63
Fall package from forklift	6	5	5	5	5	5	5	6	4	5	7	7	7	7	7	175

After converting the risk priority number (RPN) was set limit where it is necessary to proposed corrective measures. The limit was set by FMEA team to 90 points. Table 2 illustrated proposed corrective measures.

Table 2. Proposed corrective measures [3]

Causes of errors	RPN	Kum. %	Proposed corrective measures
Insufficient number of fasteners	315	7,88%	Prescribed number of fasteners for the type of product
Not enough shrink-wrap	180	12,38%	Identification responsible person for packaging
Fall package from forklift	175	16,75%	Training forklift driver, help load and unload packages
Using the wrong fasteners on the product	168	20,95%	Check fasteners for output of manufacturing
Instability pallet cages for the package	168	25,15%	Strengthening of the main structure pallet cages
Inappropriate material humidity	150	28,90%	Input material control
Incorrect dimensional material properties	144	32,50%	Increased control of the dimensions of the material in each stage of production
Underestimating the field of working tools	120	35,50%	Regular inspection of work equipment
Misalignments width lumber	120	38,50%	Checking the width of the timber
Late replacement sandpaper	120	41,50%	Regular monitoring of the employee
Planning an insufficient volume of production of these products	112	44,30%	Daily update product reservations, inventory control
Inappropriate material qualities	108	47,00%	Ensure 100% control of the processing material
Incorrect grit sandpaper chosen for the product	108	49,70%	Written determination of grain sandpaper for the types of products
Application of insufficient quantity of glue	96	52,10%	Control of bond strength, the employee responsible for deposition
Improper adjustment of milling and planning heads	90	54,35%	Check setting heads, checking the dimensions of the first element
Incorrect setting slotting size	90	56,60%	Rechecking groove dimensions
Failure to cut uniformity	90	58,85%	More regular monitoring section
Improper adjustment tools	90	61,10%	Check settings

CONCLUSION

Through process management and application of FMEA method can be achieved improving the quality parameters of products and reducing total cost by the prevention of errors in company. These are very important parameters for the development of the organization. The high quality, low price are customer's requirements, which limit its satisfaction. Process Failure Mode and Effect Analysis is very good solution to meet these customer requirements.

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THE EFFICIENCY OF PROCESSING THE LATERAL SAWN TIMBER OF PINE ON ELEMENTS TO THE PRODUCTION OF THE GLUED OF BEAMS

Summary: The subject this paper is to determine the efficiency of production of the various dimensions of semi-finished elements for the production of glued of beams. Given the methodological assumptions has been made a representative selection of raw logs, carried out experimental of sawing, an assessment of technological suitability of different grades sawn timber and semi-finished elements and was determined efficiency of production.

Key words: effectiveness, productivity, semi-finished elements, sawn timber, volume of products, market prices of products

INTRODUCTION

The growing market demand and requirements for wood products has led engineers to obtain such material, which meet the technological requirements of the elements of any size, thickness, length and radius of curvature. This material proved to be glued wood. The most common use of the glued of wood as joinery, and as construction timber. Structural components of glued laminated timber can be shaped exactly the dimensions, which requires a design. The normative specification of the properties of wood indicate that wood glued to the strength properties at about twice higher than the standards applicable to crude, a typical wood construction.

The raw material used to manufacture semi-finished products for bonding must meet the highest standards of quality. The material may not be defects such as knots and rot or insect marks on the pavement (Zenkteler M. 1996). The wood should have a uniform system of annual growth rings, fiber curl is acceptable only in a small way, may be the presence of congested and resin

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blisters. Of great importance is the density of the wood, which should not be less than 350 kg/m^3. These conditions are perfectly meets the pine.

The sawmill in Bielsko Pomorskie planned to expand its product range with a new product - glued elements. Before the start of production was decided to analyze the efficiency of the production based on experimental tests.

THE RESEARCH AND ANALYSIS

The subject this paper is to determine the production efficiency for the production of semi-finished components glued subject to conditions prevailing at the ZPD "POLTAREX" in Bielsko Pomorskie.

In order to determine the efficiency of production, the experimentally determined performance of particular groups of semi-finished products, depending on their size, origin of logs (logs butt, middle), and quality grade of lumber. The main task before proceeding to carry out experimental rubs a proper selection of research material. The methodical assumption of was to determine such a selection of raw material by which to obtain comparable results for all forms and stages of wood processing and at the same time meets the condition of full representativeness of the various stages of research. (Hruzik G.J., Gotycz W., Wieruszewski M. 2005). Given the above it was decided that the basic form of output to examine the relationship of technological processing of raw materials to sawn timber and semi-finished elements for production glued of beams are logs and sawn timber obtained from them (Hruzik G. J. 1993).

Sawing experiments were performed on pine because it is the dominant species in the species structure of raw material processed in a sawmill in Bielsko Pomorskie. The share of the amounts to 84,36 %.

For processing experimental were used 30 pine logs. Selected two types of logs: butt (O) and middle (S). Logs (O) and (S) are derived in turn from one long log. Were analyzed at 15 of logs with the each group.

Downloaded for testing experimental material in the form of logs properly marked sawed single.

As a result of sawing of butt logs obtained the unedged material in the form of two balks and the lateral sawn timber.

From the sawing 15 butts logs obtained 2,33 m^3 balks and 0,5 m^3 the lateral sawn timber. As a result of sawing of middle logs obtained the unedged material in the form of a balk and the lateral sawn timber. From the sawing 15 middle logs obtained 1,146 m^3 balks and 1,149 m^3 the lateral sawn timber. As a result of sawing of individual logs (butts and middle) received the materials in the form of sawed unedged balks and the lateral lumber, whose measurements of thickness, width and length allow a determination of material yield.

The following table 1 shows the average performance of elements of different dimensions (length and width) depending on the origin: the logs butts "O", middle "S" and the lumber quality grade III.

Figure 1 shows the average performance the elements without defects with a width of 50 mm and lengths of 250, 500, 1000, 1500 mm from lateral of lumber, extracted from butt logs "O", middle logs "Ś" and the lumber III quality grade.

Table 1. Summary of performance of elements of various dimensions (length and width) depending on the origin of timber sidewall.

Length	Yield of elements [%]		
lp [mm]	Sawn timber „O"	Sawn timber „S"	Sawn timber „III"
Width of elements b_p=50 [mm]			
250	98,1	91,1	91,6
500	96,7	85,4	84,4
1000	94,8	79,6	77,6
1500	92,8	76,7	67,0
Width of elements b_p=70 [mm]			
250	97,0	89,8	90,7
500	95,5	81,9	87,6
1000	94,2	77,4	78,4
1500	91,5	72,1	61,5
Width of elements b_p=100 [mm]			
250	97,4	89,3	88,2
500	95,3	81,0	78,1
1000	92,1	77,7	50,0
1500	90,6	62,6	27,8

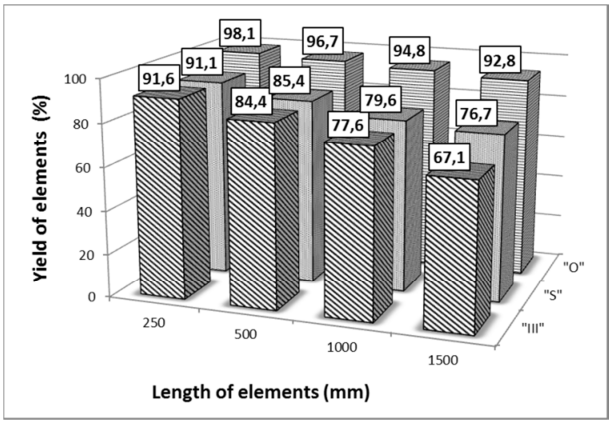

Figure 1. Productivity Indicators of semi-finished elements with a width of 50 mm and various lengths obtained from lateral sawn timber

Analyzing the average capacity of elements obtained by processing sawn timber from logs butt and middle and lateral sawn timber III quality grade, we can conclude:

- productivity of elements depends on the quality grade sawn timber,
- the highest productivity of elements we can get as a result of processing logs butts, then logs the middle, and worst of the processing sawn timber quality grade III, such as the processing of sawn timber for the elements with a width of 50 mm and a length of 1500 mm of sawn timber originating from logs butts yield is 92,8 %, sawn timber from logs middle 76,7%, and lateral sawn timber quality grade III 67,0 %,
- in all cases the processing of sawn timber lateral you can see a clear decrease in productivity with increasing of elements their length. Achieve highest yield with the smallest elements of the short width.

Taking into account the market prices of sawn timber and glued beams, was found efficiency indicators processing sawn timber for semi-finished elements for gluing. The efficiency of production of elements of various dimensions shows a graph (Fig. 2).

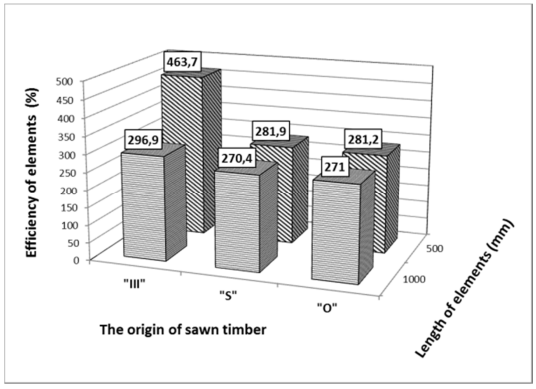

Figure 2. The efficiency of production of semi-finished elements obtained from lateral sawn timber

Analyzing the results of the efficiency of production of elements for further processing, we can conclude that the most reasonable solution would be to use lateral sawn timber III quality grade, which is cheaper, and in periods of lower demand in the market the surplus can be used to manufacture semi-finished elements. The effectiveness of production of elements with dimensions of 25 x 100 x 500 mm with lateral sawn timber originating from processing logs butt is 281,2 %, from the middle logs 281,7 %, and sawn timber quality grade III is 463,7 %. On the other hand, for elements with dimensions of 25 x 100 x 1000 mm effective secondary processing of lateral sawn timber coming from of butt logs processing is 271 %, 270,4 % for middle logs, and lateral sawn timber quality grade III is 296,87 %.

SUMMARY

Summarize studies the efficiency of production for the semi-finished elements of lateral sawn timber, we can say unequivocally that the most preferred solution is the destiny for this sawn timber quality grade III. Use of lateral third grade sawn timber to produce semi-finished, enables us to utilization lower-quality sawn, and produce the finished item - glued beams.

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IMPLEMENTATION OF E-LEARNING IN TERMS OF EDUCATION AND ITS POTENTIAL RISKS

Abstract: Project implementation and its risk considering, as well as an appropriate response to risk is the part of any complex activity. Project management of implementation of e-learning in terms of education requires a methodical approach. It includes the definition of e-learning basic concepts, evidence of its effectiveness, development of faculty requirements for implementation, as well as possible risks during implementation. Blended e-learning is preferred form in terms of conditions of Faculty of Business Economics. It is a modern form of individual students training which properly combine the attendance form to e-learning form of study.

Key words: Project implementation, blended e-learning, risk

INTRODUCTION

The authors provide an introduction to e-learning to focus on blended e-learning and its role in economic education by defining the basic concepts. Then it will be credited to the requirements of the faculty for its development in the use of blended e-learning in the educational process, without forgetting the possible risks associated with its implementation and use.

The e-learning is mainly used by web interface for the study; the student has control over the content, learning sequence, pace of learning. It is possible that e-learning is at least as effective as traditional teaching under the guidance of teacher, but not students see e-learning as a replacement for the classic approach, but only as a supplement to traditional education, which is part of a strategy for blended e-learning.

Blended e-learning uses a combination of traditional methods of teaching process and web interface for upgrading the knowledge and skills in the field. Faculty development towards the use of this form of learning requires the creation and development of infrastructure supporting e-learning within education itself, to which required matching material, technical and technological security. We do not forget to prepare teachers who are a major part of this form of teaching. Blended e-learning support is based on the need of modernization the teaching process and of course the competitiveness of the faculty. The new infrastructure includes a repository or digital library, control access to e-learning materials, technical standardization and method for the production of specialist materials. E-learning is a range of faculty research opportunities with documenting study. Modernisation of the teaching process by using e-learning technology is a revolution in the classical educational process that enables individual learning and enhances student interaction in the learning process, thereby changing the role of the teacher himself.

Implementation of e-learning in teaching may accelerate the shift towards the application of theory to solve practical problems.

BASIC TERMS

In this article, the authors examine the current status of implementation of blended e-learning at the UoE in Bratislava, FoBE with seat in Košice in the education of future managers and economists. Below are defined the basic terms, the evidence of its effectiveness, the need for faculty development for the purpose of implementing e-learning. We can find many definitions of e-learning, but no one of them is entirely apposite. Pejša [1,6] argues that “e-learning is the application of information technology in the development, distribution and management education". According to Stockley, “e-learning is education or training provided by electronic means” [3,7]. The

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basis for the development of e-learning is distance education. "There are many more definitions, therefore, e-learning is nothing other than a channel, the way, which can connect students and give them the opportunity to learn. Success is strongly dependent on appropriate and effective combination of attendance and distance forms of instruction, as well as the ability to use and combine e-learning best and most easily available methods and approaches so that we can reach the widest possible group of students, and yet not lose sight of their skills, capabilities and requirements."

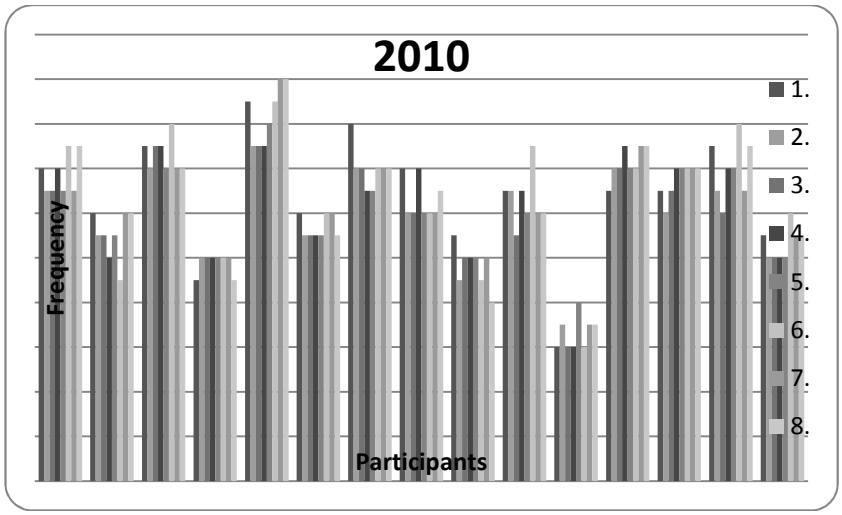
The term e-learning has a wide range, and therefore under the term we can include all types of education, which in any way use information and communication technologies.

BLENDED E-LEARNING IMPLEMENTATION

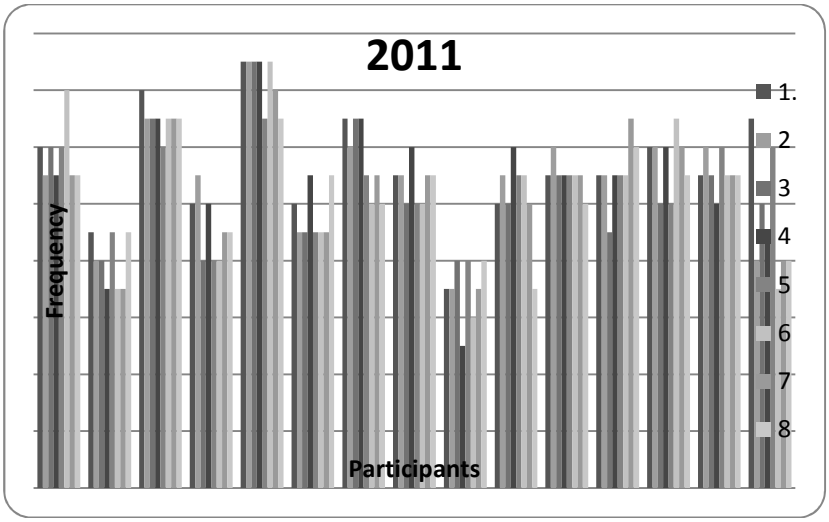
Implementation of e-learning is clearly motivated by the many benefits which it offers. But this form of education cannot completely replace the teacher in the learning process, and thus completely eliminate or suppress other forms of education.

Study materials for e-learning should be assessed in terms of quality education, but also in terms of quality electronic learning materials. The evaluation should be specified in the following interface evaluation: evaluation of knowledge and skill requirements of the learner, evaluation of information sources, assessment of proposals for electronic processing and evaluation use. Student assessment is most important outcome of education.

For e-learning using it is very important that prepared self-study materials for trainees were at a high level, i.e. they must meet prescribed standards. As a case study we show the comparison of results from tests for the course Mathematics II. The values of the tests were collected during two years, 2009/2010 and 2010/2011. [1] These years were compared due to the fact that during these two years we changed the materials for study and based on practice in the academic year 2009/2010 we change texts to the demands of practice. The effect of these changes was compared by statistical methods. During the semester students wrote eight tests. The test included main topics, which were explained at the seminar, but trainees had to study and prepared teaching materials to pass the test. The maximum number of test points was 80. Graphs no. 1 and 2 include the values of these tests.



Graph 1. Test results in 2009/2010.



Graph 2. Test results in 2010/2011

We test it on significance level α = 0,05, if change of study material and its adaptance to students requirements is statistical significant. We test the hypothesis about the equality of two expected values:

$H_0 : \mu_1 = \mu_2$

$H_1 : \mu_1 \neq \mu_2$

- μ_1 - expected value of test results in academic year 2009/2010,
- μ_2 - expected value of test results in academic year 2010/2011.

Calculated values of characteristics:

$\bar{x}_1 = 68{,}32$ $\quad s_1 = 2{,}56$

$\bar{x}_2 = 70{,}58$ $\quad s_2 = 2{,}04$

As variance of both sets were unknown, we must test the hypothesis of variance equality:

$H_0 : \sigma_1^2 = \sigma_2^2$

$H_1 : \sigma_1^2 \neq \sigma_2^2$

- test characteristics:

$$F_0 = \frac{s_1^2}{s_2^2} = \frac{2{,}56^2}{2{,}04^2} = 1{,}575$$

- critical field:

$$F_0 > F_{1-\frac{\alpha}{2}}(n_1 - 1; n_2 - 1) = F_{0{,}975}(14; 14)$$

where , so the hypothesis about the equality of variances was not rejected on significance level 5 %. The variances of basic sets are same;

- test characteristics (when we assume the equality of variances):

$$t_0 = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{(n_1-1)\cdot s_1^2 + (n_2-1)s_2^2}{n_1+n_2-2}} \cdot \sqrt{\frac{1}{n_1}+\frac{1}{n_2}}} =$$

$$= \frac{68{,}32 - 70{,}58}{\sqrt{\frac{14\cdot 2{,}56^2 + 14\cdot 2{,}04^2}{15+15-2}} \cdot \sqrt{\frac{1}{15}+\frac{1}{15}}} = -2{,}675$$

- critical field:

$$|t_0| > t_{1-\frac{\alpha}{2}}(n_1 + n_2 - 2) = t_{0975}(28) = 2{,}048$$

$$|-2{,}675| > 2{,}048$$

The test characteristic was in a critical field, so we reject the hypothesis of equal mean values of basic sets. Based on these results we conclude that modification of the learning materials for teaching e-learning within the subject of Mathematics II. was justified. Since process improvement is infinite, so in that work will continue.

RISK OF BLENDED E-LEARNING IMPLEMENTATION

Implementation of e-learning requires the creation of enabling environment, which requires not only mastering the electronic processing of all teaching materials, but also change the style and philosophy of teaching and learning. In this form of learning it is required to change from an instructive way to constructive learning, using information and communication technologies. Many aspects should be taken into consideration during processing the teaching materials to effective usage of human and financial resources in developing the content.

For developing the training materials it is needed to solve two basic tasks. The first task includes the creation of a new teaching curriculum, because it is ineffective to repair the old learning curriculum for new teaching process. It should be based on a broader context, ranging from labour market requirements through graduate profile, follow-on to other subjects studied, to the student's skills and abilities. The second problem is the actual processing of content in the most appropriate electronic form. The PHF EU is in the process of experimenting, seeking alternative technologies, where a long-term development of the faculty have built new facilities with the necessary technologies as the basis for successful implementation of blended e-learning in the learning process.

Potential risks in the implementation and subsequent use of blended e-learninig are shown in the figure below.

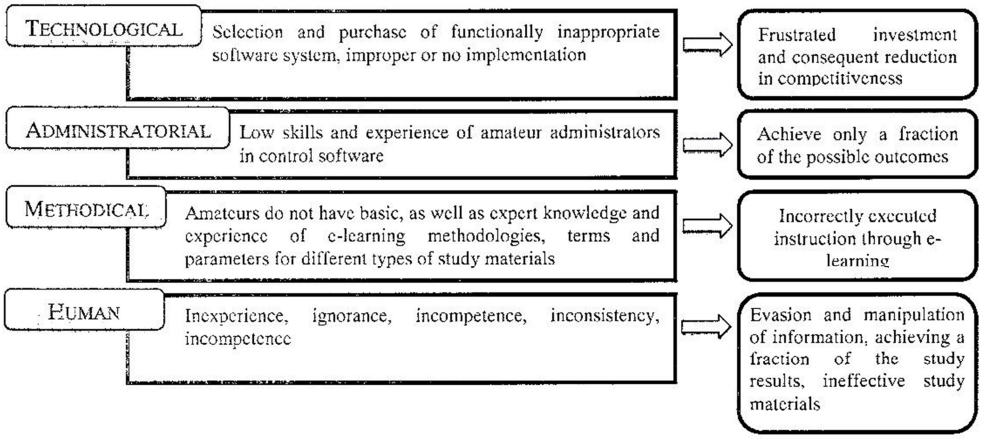


Figure 1 The risk of implementation and using blended e-learning

On the implementation of blended e-learning in terms of PHF EU it should be seen as a project that is the constraints by technology, administration, methodology and human resources. The project is implemented in concrete terms of the applicable legislation, the business culture and other factors. From the perspective of new learning materials, enterprises should define the required skills and knowledge graduates PHF EU, which requires in practice.

CONCLUSION

For the implementation of blended e-learning in terms of PHF EU should be seen as a project that is the constraints: technology, administration, methodological and human. The project is implemented in concrete terms of the applicable legislation, the business culture and other factors. From the perspective of new learning materials, enterprises should define the required skills and knowledge graduates PHF EU, which requires in practice

Information and communication technologies open new dimensions of education at all levels. That the faculty will continue on creation the materials for blended e-learning, it will differ from those using the traditional approach to education. Faculty must be aware of this difference and should make reasonable efforts to create new curricula. Exploiting new technologies in the learning process becomes a competitive advantage and offers considerable scope for better education and graduates preparation for practice.

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Marta Kučerová, Iveta Paulová[11]

SIX SIGMA THAN METHOD PROCESSES IMPROVEMENT OF WOOD COMPANIES

Abstract: Six Sigma is a business strategy that enables the all organizations include wood companies to dramatically improve their level through planning and monitoring of everyday business activities.

The basis of Six Sigma is a detailed knowledge of customers' needs, the disciplined use of facts and objective data, statistical analysis and continuous efforts to optimize business processes. The main emphasis is on improving of all processes and human activities, because the quality of processes is a key pillar of the Six Sigma methodology. The active participation of management is necessary for implementing this methodology, as major changes are not possible without the participation of top managers. Management has to create the opportunities for improvement, support and motivate staff in order to best satisfy the customer. Focusing on customers, processes and staff makes from Six Sigma the way of building and developing a new corporate culture and it provides wood organizations with a tool to maintain competitive advantage in a constantly changing market environment.

Key words: Six sigma, customer's satisfaction, efficiency increasing, quality improvement, process approach

1. INTRODUCTION

One of the ways in which today renowned world companies achieve the top performance is the application of the Six Sigma strategy principles. It is the flexible system of achieving, maintaining and maximizing business success of organization. The basis of Six Sigma is a detailed knowledge of customers' needs, the disciplined use of facts and objective data, statistical analysis and constant effort to optimize business processes. Potential benefits of the method are equally important in companies providing services as well as in manufacturing plants. The main emphasis is on improving all processes and human activities. It is not enough just to be good in every day activities that affect the perception of business customer. An effort to best meet the customer need is the necessity and the source of competitive advantage. Six Sigma begins with assessing of its own performance at the customer. For example, if an important indicator of performance for customers does not achieve the values defined by the customer it is the impulse for improvement. The methodology of improving applied by the Six Sigma strategy is based on a thorough understanding of customers' requirements and expectations. It uses proven tools to eliminate defects especially in processes aimed to meet customers' requirements. Focusing on customers, processes and staff makes from Six Sigma the way of building and developing a new corporate culture and provides for organizations a tool to maintain competitive advantage in a constantly changing market environment.

2. SIX SIGMA AS AN ENTERPRISE STRATEGY

Six Sigma is a business strategy that enables the organizations to improve dramatically their level via planning and monitoring everyday business activities. This makes it possible to minimize the occurrence of disagreements and reduce needed resources and to increase the customers' satisfaction, because Six Sigma is focused primarily on the prevention of disagreements, the shortening of continuous period of production and cost savings.

Its application is strict, focused and highly effective implementation of reliable principles and methods of quality management. Six Sigma strategies are focused on problem solving based on

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disciplined data collection and their statistical analysis to precisely determine the sources of errors and ways to remove them. Quality improvement projects should be selected on the basis of feedback from customers and potential cost savings. One of the basic principles of Six Sigma methodology is the active participation of management in implementing this program, but also the participation in its further course, because big changes are not possible without the participation of top managers. Unlike other approaches to improve the strategy of Six Sigma is now characterized by the involvement of top management and that it is established "top down". The management of plant has to create the opportunities for improvement, encourage and motivate employees, create the environment aimed to use skills and knowledge of workers in order to best satisfy the customer.

Basic principles of Six Sigma strategies are:

- focus on customers,
- focus on processes,
- focus on staff,
- proactive management,
- management and improvement based on data, information and knowledge,
- organization to support Six Sigma,
- perfection as a long term goal

Quality of processes is one of the most important pillars of Six Sigma methodology. More efficient processes are directly reflected in an overall improvement in running the company. Process control is therefore one of the most important activities. The role of corporate management strategy of Six Sigma is the improvement of business processes, the reducing of failure products and improving of manufacturing processes, but also the managerial, administrative and transaction processes. This strategy can be applied at different levels of organization. The length of its implementation depends on the level, it may take several weeks (at the processes level) but also several years (at the level of the whole organization). The main purpose of the program realization is finding ever new ways and opportunities for continuously improving the observed processes.

Difference of Six Sigma strategy from other systems and improvement philosophies can be expressed in the following paragraphs:

- above all it commits top management team, not only the workers of quality and specialists,
- to deal with correctly identified projects it allocates extra capacity and the necessary resources,
- experts and specialists receive and immediately, even during practice they apply the knowledge gained from the training program specifically established,
- Six Sigma does not realize big projects aimed to big processes, but gradually and systematically eliminates losses and causes of major problems hidden in the sub-processes or sub-sub-processes, or in individual activities of processes,
- it builds statistics throughout the life of the company as the backbone of all events,
- during dealing with projects it uses only those exact tools and methods which lead quickly to the goal and are maximum effective,
- requires careful analysis of the results and makes maximum use of knowledge gained by measuring, during realization of projects improvement it focuses on evaluation of direct and measurable economic benefits to business results.

3. SIX SIGMA THAN METHOD PROCESSES IMPROVEMENT OF WOOD COMPANIES

Six Sigma is understood as comprehensive, uniform methodology for improving manufacturing and non-manufacturing processes. It uses own solving capacities of enterprise and the organization (wood companies) of Six Sigma program requires that for the solution of improvement projects have been allocated sufficient resources - especially resources in the form of specially trained investigators working on the project full-time and part-time. For each project on improving is created the research team which engages additional staff. Management and

improvement is based on data, information and knowledge. For realization Six Sigma methodology are significant the following characteristics.

- Processes and activities are improved by solving individual projects. The selection of projects is the responsibility of a team of mentors made up of top business managers. Each project has pre-set goals and quantified the expected benefits (financial and non-financial).
- The project is assigned to a specially trained investigator, who controls the processes and Six Sigma tools and whose main job is solving projects. Investigator creates the research team of the project.
- The project solving is continuously recorded in a standard form and the investigators regularly present the interim results of the mentors' team.
- Each mentor is responsible for managing several project investigators. Supervises the compliance of standard procedures and Six Sigma tools and helps the solvers to implement organizational changes and overcome any obstacles.
- During the project solving a standard procedure of DMAIC (Define -Measure-Analyze-Improve-Control) steps is used. It helps to monitor the progress of the project, unify the work of various investigators in the business, to choose the right tools for the stated phase of project solving, but especially it provides a unified language of communication for all involved.

At individual steps of the standard DMAIC process the activities listed below are carried out.

Defining - at this stage should be set out the main goals of improving activities. This step begins by defining who the customers are and what they want. The key outcomes for the customer (the characteristics of a product or services) are defined and also is defined how the process provides them. Then there are input factors that most significantly influence these outcomes.

Measurement - includes investigation of measurement types on the basis of key indicators classification. The system of measurement is analyzed, the possibilities of measurement errors occurrence, the types of collected data and methods of their evaluation are stated. The frequency of disagreement occurrence and character of processes that affect the incidence of disagreement has to be stated. The data collection process will be placed.

Analysis – takes place after collecting data in order to know the principles of the process, interdependencies between inputs and outputs. Practical problems are transferred to the statistical problems and using statistical methods and tools the principal causes of the problem are identified.

Improvement - involves a procedure known as Design for Six Sigma, by which the analyzed process is re-designed and modified to be able to achieve the quality level of Six Sigma. After removal of the causes of the problem is measured by the changes brought about improvements. At this stage, there is decided whether the modifications made have brought no improvement, or other interventions to be implemented in the process

Control - by ongoing processes monitoring is demonstrated that the problems are not jet occurring. This last step is the important feature of Six Sigma, which seeks to prevent problems by the early detection of them in the phase of key inputs monitoring.

By Six Sigma strategy application in a business practice can be achieved significant benefits in the following areas:

- retain of existing customers,
- growth in market share,
- shortening the response time requirements,
- shortening the time of delivery of products and services,
- shortening the duration of administrative processes and pre-production stages,
- improving the quality of products and services,
- reducing costs,
- increasing productivity,
- and many other benefits, resulting in increasing of enterprise value, improving its market position and so forth.

Under the grant task VEGA we have carried out a survey in Slovak companies, which included a research into the level of cognition, possibly an application of Six sigma strategy. The companies included wood processing companies and their distributors. It was found out from the surveyed wood processing companies, that the six sigma strategy was known by 80% and was aplied only by 5% of the companies. Furthermore, it was found out that 64% of the companies were intersted in implementation of the six sigma strategy. The most negative aspect of the implementation are heavy demands on financial, time and personal resources.

The positive is that 56% of the surveyed wood processing companies apply statistical regulation and 38% use method of capability of process

From the above is obvious, that wood processing companies are interested in implementation of six sigma in improving production process, many of them are using methods of statistic management and therefore are ready for six sigma method.

CONCLUSION

In connection with the Six Sigma philosophy can be stated that this is actually a strategy typical for all successful businesses with a high focus on quality where the customer is in the centre of interest, profit is the result of error-free production and error-free processes and employees have a keen interest in the success of the enterprise. Most aspects of this process improvement methodology is not so new. Implementation of the concept does not mean to use new tools, but attempts to combine the best tools of quality management and strong project management application.

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ADHESIVES IN THE PRODUCTION OF LIGHTWEIGHT PANELS IN WOODWORKING INDUSTRY

Abstract: Chosen aspects from the important role of adhesives in the production of lightweight panels was presented. Components of lightweight panels and particular adhesives basis on poly(vinylacetate)-PVAC, polyurethane (PUR) prepolymer, and reactive hot melt (HM) used in production and their characteristic was described. For the production of lightweight panels are used a various adhesives such as PVAC dispersion, products based on PUR prepolymers, and particular reactive PUR HM systems. Kind of adhesives influenced upon the properties of obtain joints im lightweight panels and their functionality and stability. Comparison of various methods of

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lightweight panels production. Given some economic aspects of production of lightweight panels, using various adhesives and methods of their application.

Key words: lightweight panel, adhesive, technology, economic aspect

1. INTRODUCTION

For many years, both in the furniture industry and buildings are used various types of wood products, especially wood-based panels. In addition to adequate strength properties, requirements for low emissions is expected that in the near future regulations will apply, according to which the weight of the elements of furnishing packages intended for self-assembly can not exceed 15 kg [8, 9]. Therefore, from the last decade, it can observe the development of the production of lightweight panels. Currently, the biggest challenge is the use of frameless lightweight boards. The commitment to reduce the weight that makes their development is towards increasingly thinner of upper and lower layers. Carried out numerous works to replace the traditional honeycomb with plastics or composites at progressively smaller density. In Germany, assume an "igeL association', whose purpose is the promotion and implementation of lightweight panels in the woodworking industry [2].

Due to the large various and properties of joined materials is recommended to use dispersion adhesives based on the following polymer systems, poly(vinylacetate)-PVAC, polyurethane (PUR) prepolymer, and reactive hot melt (HM) adhesives.

The aim of this article was to present some aspects of adhesives problem in the production of lightweight panels in the woodworking industry.

2. COMPONENTS OF LIGHTWEIGHT PANELS

Lightweight panels are isotropic or anisotropic materials, whose density is lower than the density of particular materials used for their production, or where the density of the structure of the raw materials used specifically for the mono- or bidirectional strength training without increasing the density. In Table 1 comparison of density of various panels used in woodworking industry with the classification on traditional, lightweight, extra-lightweight and ultra leight-weight was presented [17, 18].

A typical lightweight panels consists of two facings made of hard, strong and rigid materials, glued together with a filling material or a multilayer agent, usually of lower density. The idea of panels produced from the inner cardboard insert is well known and used for last decade in a number of technical solutions [1, 7].

Facings can be made from materials such as all kinds of wood-based panels, plastic panels, or sheet metal, depending on the method of surface finishing. Fillings are made from lightweight materials, not characterized by high strength materials such as molded paper respectively, low-density wood, veneers, cork, fiberboard or light porous plastic (polystyrene or polyurethane foams). As a cheap and good filling for a long time are used in various constructions of paper soaked cardboard glued together with synthetic resins to form a so-called honeycomb or sinusoid curves. Selection of a suitable material for the manufacture of honeycomb determines the resistance to shear, strengthens the linings wall and outer layers provides stiffness [7].

The frame can be made of wood, particleboard, MDF, HDF, OSB or other wood-based materials. They are designed to connect panels with other construction elements of paper cartridges and protection against environmental influences.

Due to the large variety of possible joining of materials requires the use of suitable adhesives and gluing technology.

Table 1. Comparison of density of various boards used in woodworking industry [1,17]

Kind of board	Density [kg/m^3]	Classification
HDF	≥ 880	traditional ("heavy")
HD - FPY	780 – 800	
MDF	690 – 750	
KF	600 – 760	
FPY	575 – 735	
BU	680	
ST/STAE	450 – 650	lightweight
OKU	460	
FI/TA	450	
FU-CEI	330	extra-lightweight
SLP	300	
KAPA	150 – 350	ultra-lightweight
BAL	160 – 250	
SWAP	110	

3. ADHESIVES FOR PRODUCTION OF LEIGHTWEIGHT PANELS

For the production of lightweight panels are used, a few adhesives, such as PVAC dispersion, products based on PUR prepolymers, and reactive PUR HM systems [8, 15, 16]. Choosing the right of the binders depends on the combination of materials used (e.g. HDF, combined with a paper honeycomb structure, aluminum plates with aluminum plaster, laminates with PUR foam) adhesives application methods (usually rollers or nozzles), and the destination of manufactured elements.

In technologies of panels edgebanding, adhesives have a dominant role too. A wide range of HM adhesives for the furniture industry, provides a number of requirements for application and performance properties of obtain glue lines. They represent an interesting proposal to perform many assembly operations. Characterized by various utility open assembly time (UOAT), which primarily depend on the used in their manufacture thermoplastic polymers. The time can be adjusted within certain limits, such as by increasing the temperature of use, heating of surfaces of glued elements. Currently, in addition to ethylvinylacetate copolymers (EVA), which is achieved through flexible glue lines at low temperatures for the manufacture of adhesives are also used thermoplastic polymers applied in HM adhesives (APAO, PA, PP, reactive PUR or POR HM systems). Obtained glue lines from APAO HM adhesives and reactive systems, exhibit significantly higher thermal resistance, which exceeds 120°C [13, 14]. In Table 2 compared the basic properties of PUR HM adhesives used in the production of lightweight panels.

Table 2. Basic properties of chosen PUR HM reactive adhesives used in the production of leightweight panels [10]

Properties	Kind of Jowatherm Reaktant adhesive		
	601.70	601.88	601.90
Apparent viscosity [mPa·s] (at 120°C)	8 000	10 000	
Reactivity	low	high	
Open assembly time [min]	15	2-3	5-7
Initial strength	low	high	medium

Gluing in production system of lightweight panels is achieved with specially designed rather complication,full authomatic equippment with adds share argon or nitrogen gases in melting processes of this HM adhesives. The PUR HM is then applied remains as a edges at the honeycomb walls. This increases the bonding area and therefore the strength of glue lines.

Advantages of this system:

- economical consumption of the adhesives
- larger bonding surfaces, due to bulge formation

- even application to the honey comb, no leaking into the cells, optimal adhesives application as excess spread is avoided
- crosslinking reaction without foaming
- higher bond strength and better surface relaxation
- less cleaning and contamination
- higher tack to various materials
- high initial strength, faster processing [4, 5, 10].

Price of PUR HM adhesives is very high, but amounts of applying of this adhesives are very low: on the comb within the range 25-30 g/m2, and on the deck or frame 80-100 g/m2 . Order volume declines lead to lower of the strength [12].

If it remains at the old technique of semi-continuous production with the use of prefabricated frames and PVAC or urea-formaldehyde (UF) adhesives in the short-cycle presses, or one decides for a modern continuous manufacturing using PUR hot melt adhesives [12]. Pressing of the board elements is done via press calendars or roller presses. After pressing, the boards can be stacked immediately in the appropriate stacking systems.

Another group of binding agents, that can be used for the production of lightweight boards are PVAC dispersion adhesives. Appropriate modifications of these adhesives (e.g. EPI – Emulsion Polymer Isocyanate), make it possible to give them a number of special characteristics, in terms of both application characteristics and performance of glue lines. Their advantage is the possibility of cold gluing, so you are limited by costs related to electricity energy. Technological process of bonding can be done in an automated production line for lightweight panels [11]. Bürkle Comp. proposed technology, in which the longitudinal edges of elements are provided in the stiles and top are closed by pressing the thickly-layered edges [3]. This type of production is particularly suitable for the performance of semi-finished for further processing. In this method may be used waterborne adhesives (EPI, PVAC, UF), which is a measurable advantage. In Table 3 various methods of lightweight panels were presented.

Table 3. Comparison of various methods of lightweight panels production [6]

Specification	Kind of board panels				
	Frameless panels	Board on frame	Ladderboard-multiple board on frame	Stileboard	Multiple stileboard
Kind of typical adhesive	PUR, UF	PUR, PVAC, UF	EPI, PVAC, UF		
Grade of automation	low or high	low up to middle		high	
Panel length [mm]	various		2800 – 6400		
Panel width [mm]	up to 2800		up to 1400		
Capacity [m^2/h]	depending on line design and properties of the adhesive	approx. 100 - 200	750 (depending on line design)	up to 1750	
Capacity [m^2/turn]	depending on line design and kind and properties of the adhesives	approx. 800 - 1600	6000 (depending on line design)	up to 13500	
Designated customers	small capacity or mass production	small up to middle size production	middle-size up to mass production	mass production	

4. ECONOMIC ASPECTS

The use of lightweight panels for furniture production is an alternative solution for the furniture industry and has many benefits. Obtained boards in comparison to conventional wood-based materials, let reduce the weight of the construction, while maintaining full functionality and utylity properties. Due to the weight lower by 65-70% achieved significant cost savings also in between

operating transport and to customer. It should be emphasized high performance of applied materials. Practically each waste can be used to strips or blocks in the production of various types of lightweight panels. In addition to the achieved wood savings, binding agents and energy savings, which is the result of changes in the type of material of filling boards. This has a direct impact on the price of the product [7]. Material costs represent about 50% of the total production cost of furniture, so the lightweight panels offer a chance for cost reduction, thereby increasing the profitability of production. In Table 4 costs of production of lightweight panels by using various adhesives and methods of application was presented [6].

Table 4. Costs of production of lightweight panels by using different adhesives and methods of application [6]

Comparison of costs	Kind of adhesive/method of application				
	EPI/roller	PVAC/roller	PUR/roller	PUR/nozzle	UF/roller
Application onto	top-layers, full size			top-layers or core, strings only	top-layers, full size
Typical amount of application [g/m^2] per side	120		80	40	120
Size of panel [mm]	800 x 600				
Surface of panel [m^2]	0.48				
Total amount of application [g/pcs]	115.2		76.8	38.4	115.2
Price of adhesive [€/kg] approx.	3.50	1.00	7.00		0.50
Price of adhesive [€/pcs] approx.	0.403	0.115	0.538	0.269	0.058
Approx. costs for 1000 m^2 panel production [€]	840	240	1120	560	120

Obtained panels are also characterized by very low content of formaldehyde emission, so are environmentally friendly products. After graduating of the life time in a very easy way boards can be recycled, give a raw material for production of briquettes or used as an another source of energy.

5. RECAPITULATION

The use of lightweight panels for furniture and building elements production is an alternative solution for the woodworking industry and has many benefits. Obtained boards in comparison to conventional wood-based materials, let reduce the weight of the construction, while maintaining full functionality and utylity properties. Due to the weight lower by 65-70% achieved significant cost savings also in between operating transport and to customer. Material costs are about 50% of the total production cost of furniture, so the lightweight panels offer a chance for cost reduction, thereby increasing the profitability of production.

For the production of lightweight panels are used a various adhesives such as PVAC dispersion, products based on PUR prepolymers, and particular reactive PUR HM systems. Kind of adhesives influenced upon the properties of obtain joints im lightweight panels and their functionality and stability.

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***Wojciech Lis, Marek Tabert, Katarzyna Mydlarz, Jan Chudobiecki, Leszek Wanat*[13]**

PRIMARY ENERGY CONSUMPTION AND ENERGY SAVING IN POLAND AND THE EUROPEAN UNION

Abstract: Primary energy consumption in Poland, European Union and word-wide has been presented. Energy sources as well as export-import balance of fossil fuels of selected countries have been correlated. The study allows to state that energy sources situation, availability of resources and vital investments require an intensive development of nuclear energy sector and renewable energy sources in Poland.

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Key words: primary energy, energy consumption, energy resources

INTRODUCTION

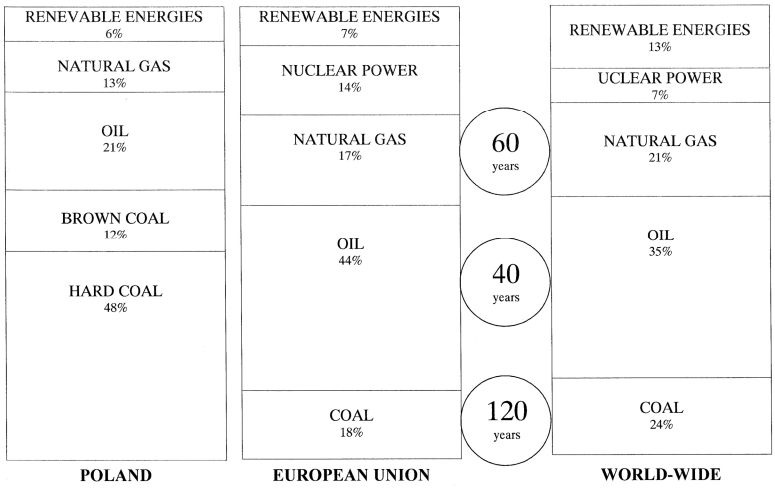
There are main premises of energy saving and significant increase in interest in renewable energy:

- EU Directive from April 2006 which requires 9% saving on an average domestic annual energy consumption.
- energy saving obligation which will be imposed on all units of public sector of 250m^2 or larger.
- forecast provided to European Commission by Polish economy estimates that by 2020 Poland has to reach 15% share of renewable energy in national energy balance.
- growth in energy consumption in Poland which by 2030 will increase by 54%.

When forecasting energy consumption there is a „golden rule" which states that 1% increase in GDP means 0,7% growth in electric energy demand. GDP increase in Poland is crucial as it is the biggest civilization potential of our country and factor of growth of population prosperity.

PRIMARY ENERGY SOURCES AND THEIR CONSUMPTION

The structure of current primary energy consumption in Poland and the EU as well as world-wide is presented in picture 1.



Picture 1. Primary energy consumption in Poland, European Union and world-wide in 2010 and the main energy sources

source: own elaboration – data: Central Statistical Office, EUROSTAT, Energy Regulatory Office

In Poland the largest share of primary energy source, namely 60% of it comes from coal, divided into 48% from hard coal and 12% of lignite. In the EU coal constitutes only 18% of primary energy and the largest energy source that is 44% is oil which in Poland accounts for 21% of primary energy. In world-wide consumption oil also holds a domineering position - 35%, and coal makes up 24%. The third energy sources is gas: 21% word-wide , 17% in the EU and 13% in Poland. Nuclear energy – the fourth source of energy in the EU accounts for 14% of total energy balance, 7% world-wide and in Poland it does not exist. The construction of nuclear energy plant in Żarnowiec was terminated following the accident in nuclear power plant in Czarnobyl in Ukraine which took place on the 26th of April 1986. The remaining sources among them renewables (RES– renewable energy sources) – account for 13% of all energy sources world-wide, 7% in the EU and 6% in Poland. Therefore the situation in our country in this respect does not differ much from RES consumption in the European Union.

In the EU oil is the main energy source in: Malta (this country does not use any other energy sources), Cyprus, Luxemburg, Ireland and Portugal.

Poland together with Estonia, Czech Republic and Bulgaria is one of the countries which rely mainly on solid fossil fuels (hard coal and lignite). Gas as the main energy source is used by Holland, Great Britain, Italy and Hungary. France, Sweden and Lithuania rely mainly on nuclear energy yet in Sweden renewables among them hydro, solar and geothermal resources are equally import similarly to Latvia, Austria and Finland. According to Eurostat data between 2000 and 2010 in all EU countries there has been a significant increase in the importance of renewable energy sources. The largest RES consumption took place in Denmark (from 8% of total gross energy consumption in 1999 to 17% in 2009), Sweden, Germany and Portugal. In Poland increase from 4% up to almost 7% was also noted.

Between 1999 and 2009 the share of renewables consumption in 27 countries of the European Union embraced by Eurostat data doubled. Currently it amounts to over 9%. The main energy source in the EU however is oil and its by-products (44%), while nuclear power remains stable (14%).

Climate and energy package mandatory for European Union and ambitious forcing of limiting emissions and intensive investment in RES significantly increase the cost of economic activities and costs related to energy consumed by individual households. For example costs of generating electric energy in the EU are 20% higher than the same costs in the USA and 200% higher than in China. High energy prices drastically decrease competitiveness of European economies. Gradual transfer of enterprises dependant on emissions to those regions of the world where strict ecological norms have not been enforced, escape from costs of CO_2 and other greenhouse effect gases takes place followed by translocation of work places which results in diminishing inhabitants prosperity.

Table 1. Dependence of selected EU countries from import of basic energy sources (coal, oil and gas) and the balance of energy sources

SN	Country	Balance of import and export of the energy sources (%)			
		Total	Coal	Oil	Gas
1.	Italy	84,0	97,7	82,9	80,3
2.	Spain	76,4	63,4	99,6	99,1
3.	Austria	69,8	83,8	93,5	78,7
4.	Slovakia	64,6	79,9	90,6	96,8
5.	Germany	61,1	29,1	98,0	78,8
6.	Hungary	61,1	26,8	71,0	83,6
7.	Latvia	58,7	93,7	101,5	104,4
8.	France	50,5	86,0	99,4	95,5
9.	Lithuania	45,3	98,9	89,5	100,0
10.	Sweden	42,9	92,7	106,3	100,0
11.	Estonia	27,4	6,8	73,7	100,0
12.	Czech Republic	24,9	-17,4	95,8	98,2
13.	Poland	14,3	-23,0	96,5	66,6
14.	Great Britain	-5,9	52,2	-33,2	-8,2
15.	Denmark	-31,7	98,3	-98,0	-55,7

source: own elaboration – data: Central Statistical Office, OECD, EUROSTAT

IMPORT OF ENERGY SOURCES

Wider RES consumption will allow Poland not only to reduce gas emission but also free our country from the dependence on price fluctuations of conventional fuels limiting dependence from highly captive market being the source of import of energy sources (oil and gas from Russia). Table 1 presents the dependence of selected countries of EU from the import of basic energy sources that is: coal, oil and gas. Total balance of energy sources was shown, too. Poland is coal exporter (23%) and importer of oil (96,5%) as well as gas (66,6%). Cumulative prevalence of import of energy sources over export in Poland amounts to 14,3%.

In table 1 relation of net import to consumption and level of stock was calculated. The ratio over 100% means changes in stock (complement deficiency in stock level). Negative ratio informs that export of resources by a given country exceeds import.

The biggest importer of energy sources among the 15 selected EU countries in table 1 is Italy (84%), and the biggest exporter is Denmark (31,7%). Apart from our country among coal exporters there is also: Czech Republic (17,4%). Apart from Denmark among net exporters there is also Great Britain (5,9%).

ENERGY SOURCES

In picture 1 the sizes of world-wide energy sources have been marked. So far known and technology-wise accessible for exploitation sources will suffice for 120 years in case of coal, 40 years in case of oil and 60 years in case of gas.

However, there is a continuous exploration of new sources (for example recently discovered Shtokman field in Barents Sea, Snohvit field in the Arctic Ocean) and new forms of energy sources (for example shale gas in the USA and in Poland) so far not exploited and used on a larger scale due to non-availability or unprofitability of its exploitation. Also new exploitation technologies appear and gradually, sometimes rapidly growing energy prices increase the profitability of, not so far used on industrial scale, due to the costs of obtaining processes of their obtaining exploitation technologies. In table 2 recognized resources, as well as consumption of the main energy sources in Poland have been presented.

Annual lignite output in our country may increase by 2020 by almost 50%. Assigned for future exploitation, deposits of that resource based in Legnica are the largest in Europe. Investment cost is very high - it is estimated to be worth 24 billion PLN. Lignite in Legnica deposit has a very good calorific value - 20% higher than in almost exploited deposits in Bełchatów.

Table 2. Recognized resources and consumption of the main energy sources in Poland

Deposits in Poland			
Raw mine	Resources	Yearly	
		Consumption	Yield
Natural gas	95,5 mld m³	14,5 mld m³	4,3 mld m³
Oil	15,5 mln ton	17 mln ton	0,6 mln ton
Brown coal	4,13 mld ton*	0,060 mld ton	0,060 mld ton
Hard coal	75,8 mld ton*	0,078 mld ton	0,104 mld ton
* *geological resources*			

source: own elaboration – data: Central Statistical Office, Energy Regulatory Office

CONCLUSIONS

Poland is a net importer of energy fossil fuels. Own deposits constitute of hard coal and lignite which Poland exports overseas. Energy production based on coal significantly pollutes environment. All gas emissions are excessive – including currently closely monitored CO_2 and other greenhouse gases for example NO_x, SO_x, methane etc. It causes an increasing financial burden for Polish economy in a form of fees and fines which have to be paid due to emissions levels exceeding those acceptable by EU and domestic regulations.

Costs of environment usage constitute yet another argument for an intensive development of both nuclear energy and renewable energy sources.

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***Elżbieta Mikołajczak*[14]**

FACTORS CONDITIONING PRICES OF SAWMILL BY-PRODUCTS

Abstract: During the research various factors conditioning the changes in prices of sawmill by-products: price of sawmill raw material, seasonality of demand and supply, inflation, euro rate as well as general climate and economic situation in industry. Also the fact of Polish accession to the European Union has been taken into consideration and the implementation of rules concerning the production of renewable energy forcing onto energy sector the obligation for co-firing biomass with other fuels.

Key words: Wooden by-products**,** prices of wooden residue , factors conditioning changes in prices

INTRODUCTION

To make the analysis more comprehensible in figure 1 average prices of sawmill by-products in individual quarters of the period between 2000 and 2010 were presented. Price curves of five types of wooden residue show substantial similarities what is further backed up by the data on the trend line. Only bark prices looked differently and were not characterized by such significant changeability in the period under analysis.

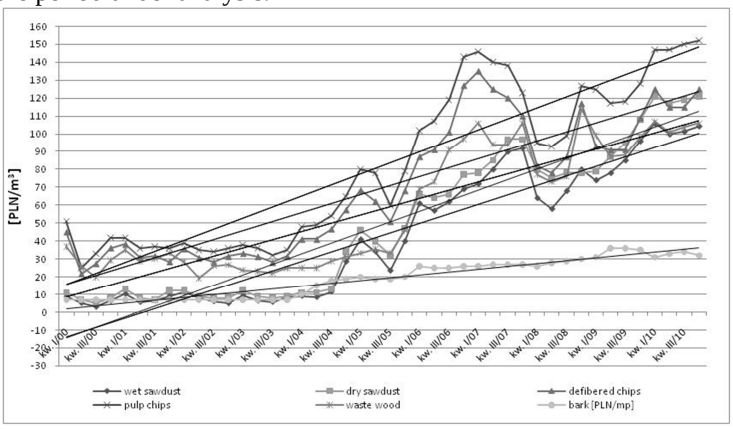

Fig. 1. Average prices of sawmill by-products in individual quarters of years from 2000 till 2010

source: own elaboration

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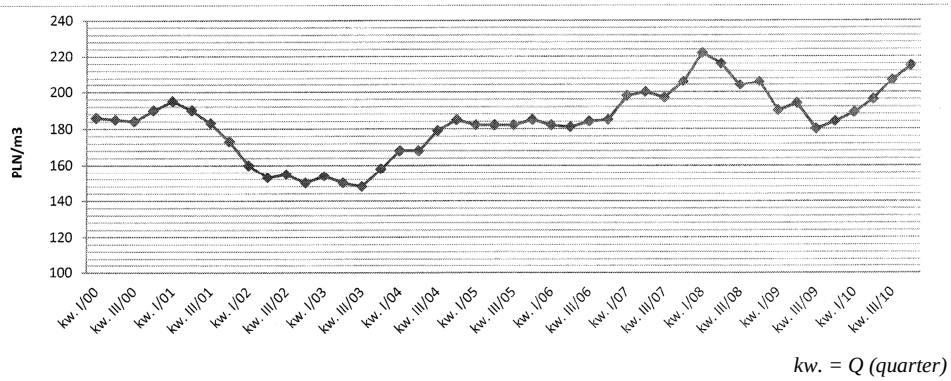
CHANGES IN THE PRICES OF WOODEN MATERIALS

Comparison of prices of wooden by-products and timber material in the analyzed period shows some relation. Initially, the increase in timber prices (Fig 2) did not have any impact on the prices of wooden "residue" which between 2000 and 2002 were underestimated by-product and very often even a cumbersome burden (bark, sawdust). Actual lack of competition on the market of post production by-products in the middle of 2000 led to the situation where the producers of wood-based panels forced on their suppliers very unprofitable prices. It concerned especially chips but also sawdust as well as wings and edgings. Actions undertaken by wood-based panels sector looked like a plot. Breaches of contracts were unilateral. Laconically worded explanations had, in all cases, similar arguments quoting seasonal decrease in prices of wood-based panels and increased supply of raw materials. Changes in prices were introduced almost simultaneously using similar procedures. As a result prices of some of those by-products decreased even by 50%. Following apparently short slump again they returned to the level from the beginning of 2000. Between 2001 and 2003 wooden residue prices underwent visible stabilization. Changes were only observed within one year and were linked to the seasonality of demand for that type of raw material (heating purposes). Also timber prices in this period were on average lower than before. Visibly connected increase in prices of timber and wooden by-products started in the first quarter of 2004 and continues till now however the comparison shows higher pace of increase in the prices of wooden residue. Stabilization on timber market was not reflected by calming the market of wooden by-products, what was the result of the emergence of strong new competition – industrial recipients of firewood as well as producers of wooden briquettes and pellet.



kw. = Q (quarter)

Fig. 2.Average prices of pine debarked lumber at the end of each quarter between 2000 and 2010

Source: own reserch on the basis of data from Central Statistical Office [Rynek drzewny 2000-2010]

SEASONALITY OF DEMAND AND SUPPLY ON THE MARKET OF WOODEN BY PRODUCTS.

In the analysis of the impact of demand and supply on the prices of wooden by-products the data from 2005 was used in Figure 3 and the data from 2009 in Figure 4. Such approach facilitated proving that seasonality to a lesser degree influences the prices of wooden by-products. In 2005 prices of the most popular categories of post-production residue as of March started to decrease systematically reaching visible minimum in August. Sawdust prices decreased by over 50% and chips by almost 15%. An increase which took place in the following months resulted in prices slightly exceeding their January level in December. The increase in case of sawdust amounted to 1,2% and in case of chips to 8,6% . Decrease in prices was characteristic for summer season while in winter along with the growth in demand for energy sources, prices of wooden residue rose in relation to minimum figures by over 100% (sawdust).

Seasonality is currently disrupted by stable gradual increase in their prices. As it is visible from the data shown in Figure 4, in the first months of 2009 only slight decrease in the prices of: wet sawdust by 0,7%, defibered chips by less than 3% and pulp chips by 5,6% was recorded. The biggest decrease, by 14%, embraced the group of wood waste. In spring, prices of bark went up by 20%, which proves that the main area of its utilization is gardening not energy sector.

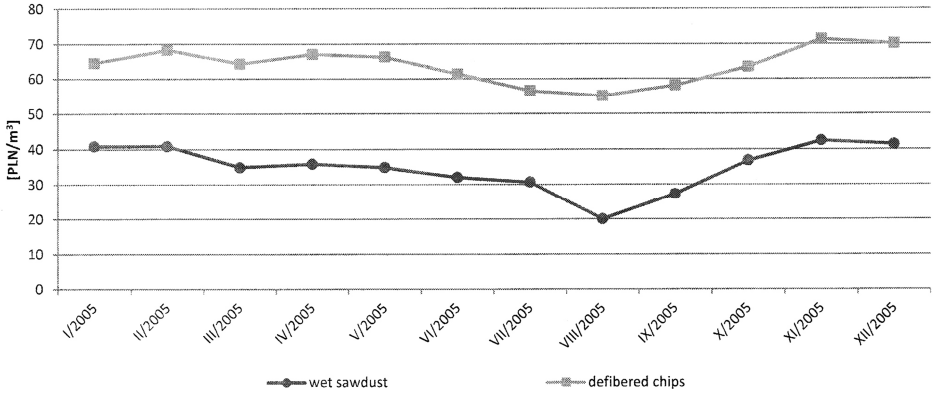


Fig. 3. Prices of sawdust and chips in individual months of 2005

source: own elaboration

Downward trend in the prices of post-production residue excluding bark did not last for long. Sawdust prices started to grow again in May and chips and wood waste in September and in December their level significantly exceeded January figures: from 10,5% (pulp chips) up to 38,4% (dry sawdust). Only prices of wood waste reflected their level from January 2009. Small seasonal price variance in 2009 confirm a more leveled than before demand for that type of biomass. It is the result of constant demand from energy sector as well as growing annual production of an easy to store pellet.

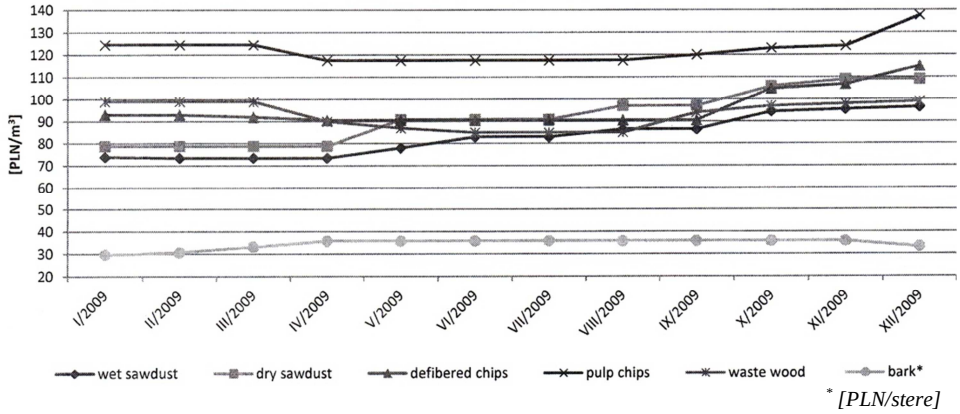


Fig. 4. Prices of various wooden by-products in separate months of 2009

Source: own elaboration

ECONOMIC SITUATION

The period of economic slump between 2001 and 2002 (Fig 5) converges with low prices of wooden by-products. First signs of improvement in economic situation began to be visible at the beginning of 2003. They however did not have any impact on the prices of post-production wooden residue. Only significant economic boom in 2004 connected with the upcoming accession of Poland

to the EU caused at first the increase in demand for timber and later shortage of material in the whole wood sector and finally the increase in timber prices initiated by State Forests. As a result the increase in interest in underestimated wooden by-products took place and its natural consequence was the increase in their prices. The next significant, especially for the section: "manufacture of wood and cork products, manufacture of articles of straw" period of slump took place between April 2008 and August 2009.

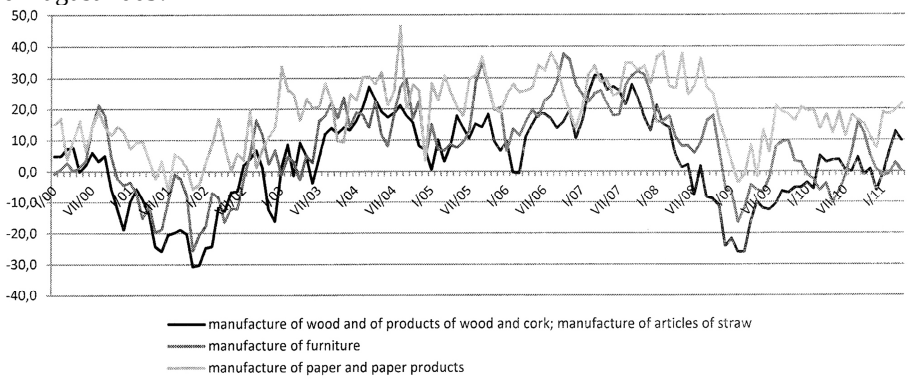


Fig. 5.Economic cycle in industry – general climate in selected sections of GDP from January 2000 till April 2011

source: own elaboration on the basis of [Koniunktura 2011]

POLISH ACCESSION TO EUROPEAN STRUCTURES AND THE INTRODUCTION OF LAWS CONCERNING PRODUCTION OF RENEWABLE ENERGY.

Polish accession to European structures and the introduction of laws concerning production of renewable energy had significant impact on the prices of sawmill by-products. It is confirmed by the curves presenting previously scrutinized factors. As to facilitate detailed analysis data concerning prices of sawdust and chips was presented in Figure 6 monthly. Analyzed figures come from 2004.

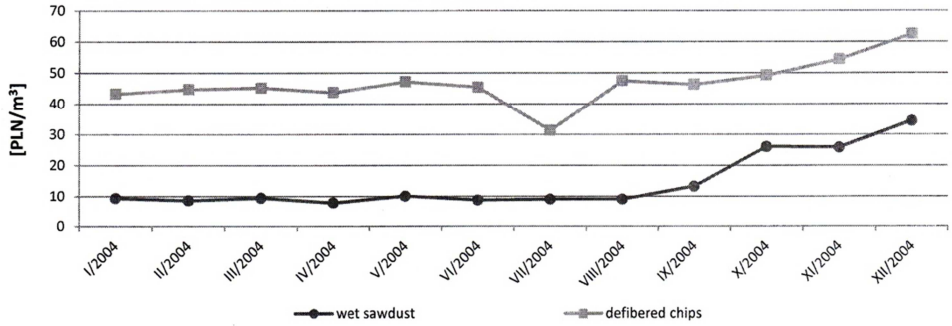


Fig. 6. Average prices of sawdust and chips in separate months of 2004

source: own elaboration

Contrary to previous years in 2004 no decrease in prices of wooden by-products was recorded, following the end of heating season which could be the result of lowered demand for that material. Immediate perspective of Polish accession to the EU with all of its consequences: free trade, leveling of prices, the need to implement EU laws and all obligations related to our membership in EU structures led not only to such temporary phenomena as the increase in euro rate between February and March up to over 4,9 PLN (Fig 7) or inflation increase up to 4,5% (Fig 8), but also to

stable increase in prices of wooden residue. Gradual price increase took place in the final months of the previous year and kept constant throughout the whole 2004 gathering pace in autumn what was the result of the second factor – seasonality of demand for wooden energy biomass. Lasting for one month slump in prices of chips, slabs and wings and edgings (July/August) was most probably the result of lowered production of goods based on wooden residue during holidays which finally led to the decline in demand for that type of raw material.

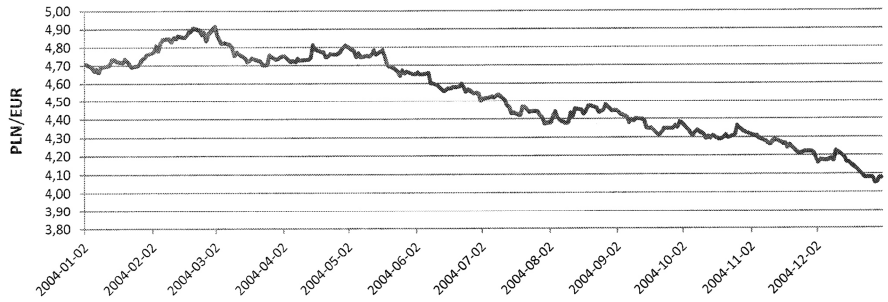


Fig. 7. EURO exchange rate throughout 2004

source: own elaboration on the basis of [www.money.pl]

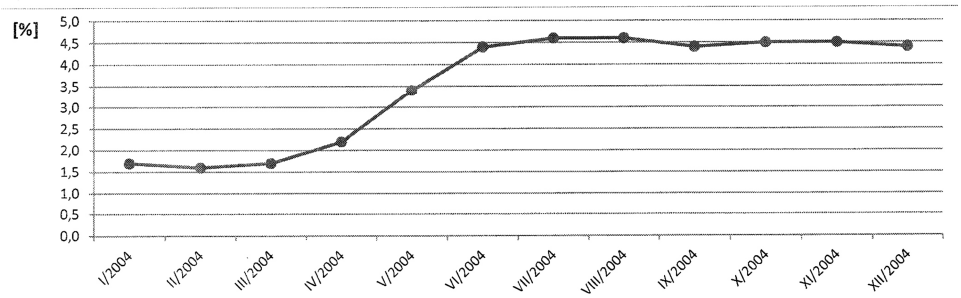


Fig. 8. Inflation compared with analogi cal month of previous year in 2004

source: own elaboration on the basis of [www.money.pl]

INCREASE IN PRICES OF OTHER ENERGY SOURCES

The increase of interest in firewood and all types of wooden residue is also caused by increase in prices of other energy sources. In current price scenario wood becomes a cheaper and more ecological alternative for numerous conventional sources of energy. This thesis is supported by price analysis of selected fuels (Mikołajczak 2011). Findings point at almost 64% increase in electric energy prices over the last 10 years and approximately 100% increase in the prices of natural gas and propane-butane. Between 2001 and 2010 the lowest increase embraces transport fuels: petrol by 45% and fuel oil by almost 67%. Coal prices at that time increased by 75%.

Objective presentation of economic superiority of any of those energy sources requires not only accounting for its unit price but also its calorific value and installation efficiency which the useful heat unit consists of. Those conditions are fulfilled by calculations made for a 150 m^2 house heated by various energy sources presented in Fig.9 in two options: for a badly and well-insulated building.

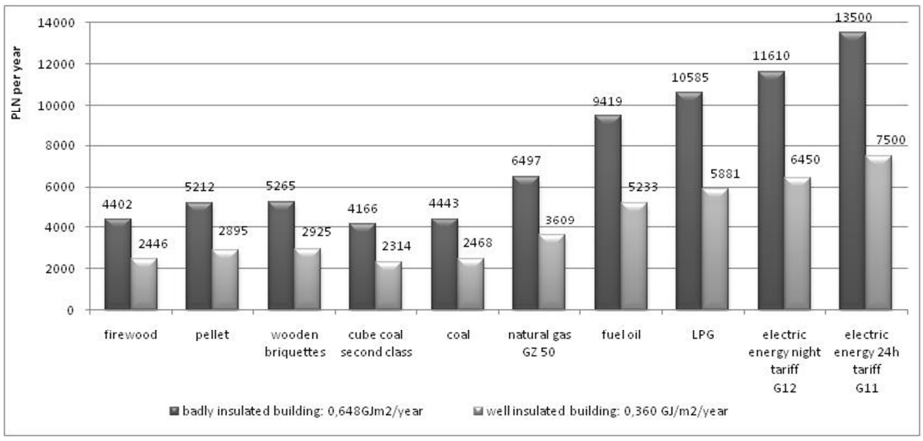


Figure 9. Comparison of costs of heating a 150m^2 family house

Source: own elaboration based on products prices from December 2010.

Forecast further increase in the prices of conventional sources of energy will trigger the increase in prices of their substitutes among them firewood and such ecological fuels as pellet or wooden briquettes based on sawmill post-production residue. As a result one may expect further increase in prices of wooden by-products.

CONCLUSION

The biggest direct impact on the prices of wooden post production residue was made by Polish accession to the European Union and the consequential introduction of legal regulations concerning cofiring biomass with other fuels. In 2004 those factors caused almost quatrofold increase in the prices of sawdust, approximately 44% increase in the prices of chips and wood waste. Those annual fluctuations in prices of wooden residue are less conditioned by seasonality of demand related to the areas of their utilization. It is due to the constant demand from energy sector and the producers of easily stored pellet.

The increase in interest in firewood and all wooden residue is also caused by the increase in prices of other energy sources. In current price situation wood becomes a cheaper and more ecological alternative for numerous conventional sources of energy.

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Andrzej Pacana, Igor Liberko[15]

PROPOSAL RELATED WITH EVALUATING AUDITORS OF SYSTEMS COMPLIANT WITH ISO 9001 IN TIMBER INDUSTRY ENTERPRISES

Abstract. The thesis contains proposals concerning evaluation of internal auditors for quality management systems compliant with ISO 9001, taking into consideration the specificity of timber industry enterprises. It is a concept considering both the requirements determined in ISO 19011 standard, as well as knowledge gained through experience in auditor valuation. Due to its particular character it may be used without changes, or may be modified depending on peculiarity of the given enterprise as far as scope of auditing is concerned.

Key words: ISO 9001, auditor, audit

INTRODUCTION TO EVALUATION OF INTERNAL AUDITORS

Point 8.2.2 of the ISO 9001 standard is devoted to internal audits. In the light of the above requirement, organization should perform internal audits within anticipated time intervals in order to determine whether the managing system has been implemented, whether it meets anticipated assumptions and requirements, and finally if it is effective. The programme (schedule) of audits should be planned with consideration of priority concerning the audited processes and areas, as well as results of previous audits. Management responsible for audited area should take immediate actions leading to eliminated stated discrepancies and their origins, and these actions should be verified, which means that *correcting* and corrective activities should be executed without undue delay. It is essential to establish, implement and maintain the auditing procedure(s), which settle the following:

- responsibility and requirements related with planning and conducting audits, presenting results and supporting related records,
- determination concerning criteria of the audit, as well as the scope, frequency and methods of the above.

Selection of auditors and conducting audits should ensure objectivity and impartiality of the auditing process.

In order to ensure propriety associated with execution of audits it is essential to ensure appropriate selection of auditors, namely persons with competences to conduct the audit (point 3.8 ISO 19011), as audits and management inspections, next to corrective and preventive actions constitute fundamental elements associated with perfecting the quality management system.

Instructions included in standard ISO 19011 can be used to evaluate the work of auditors. In compliance with this standard the valuation of internal auditors should be planned, implemented and recorded, compliant with accepted procedures in order to ensure an objective, coherent, honest and reliable result.

Evaluation of auditors shall cover the following phases:

- initial evaluation of persons, who want to become auditors;
- evaluation of an auditor before this person becomes a member of the auditing team;
- continuous evaluation of achievements made by the auditor in order to determine the needs within the scope of maintaining and perfecting his knowledge and skills.

It seems that the continuous evaluation of the work performed by auditors may have the most significant influence on perfecting audits focused on quality and the whole quality management system. This evaluation process may cover four main stages:

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- Stage 1 — Identification of personal features, knowledge and skills essential to meet the requirements of auditing programme.
- Stage 2 — Establishing the evaluation criteria.
- Stage 3 — Selection of an appropriate evaluation method.
- Stage 4 — Making the evaluation.

A person or a group of persons, according to strictly determined evaluation criteria, should execute the evaluation. Methods associated with evaluation of auditors include: review of records, positive and negative feedback, conversation, observation, inspection and review after the audit, and an organization can use one or more of these methods.

Making an evaluation lies in comparing information on the evaluated person with criteria settled during the previous stage. In case when the person does not meat any criteria, additional training, experience in such work and/or experience in auditing may prove to be necessary, and repeated assessment may be executed. When determining criteria of the evaluation, indication focuses on qualitative and quantitative criteria:

ISO 19011 Standard when determining the appropriate level of knowledge and skills, the following should be taken into consideration:

- audited organisation (size, character) as well as complexity of its managing system,
- the aim and scope of the auditing programme,
- requirements concerning certification/registration and accreditation,
- auditing process and its role within the organization,
- required level of confidence towards audits.

As it can be already concluded from this retrospection covering ISO 19011 requirements, the implementation of these guidelines for example in timber industry enterprise, which did not previously undertake audits, not to mention perfecting or evaluating auditors, seems relatively difficult. Hence Representatives of quality management systems sometimes conduct an uncomplicated, yet unfortunately inimitable evaluation of internal auditors. This evaluation is quite often of a non-formalised character. That is why it seems purposeful to propose such concept of internal auditor evaluation, which could be used with or without modifications in every organization and which would not cause too much trouble for the Representative conducting the assessment.

CONCEPT OF INTERNAL AUDITOR EVALUATION

The first step in creating the concept covers determination of evaluation criteria. It is possible to take advantage of criteria determined in the above-mentioned standard, yet both the qualitative as well as quantitative criteria stated in ISO 19011 are not too precise.

Taking into consideration the two indicated sources of criteria (experience and 19011) the following evaluation criteria concerning internal auditors of quality management system can be indicated as fundamental:

A) personal features
B) conducted trainings
C) knowledge gained during trainings within the scope of timber industry
D) capability to use knowledge related with audits and quality management systems
E) number of conducted audits
F) punctuality of conducted audits
G) subjective evaluation of the work conducted by the auditor performed by the assessor (Representative).

These criteria take into consideration the ISO 19011 guidelines (criteria: A, B, C, D, E), as well as previous experiences (criteria: F, G, H).

Another step within the conception project devoted to evaluation of internal auditors is the determination concerning gradation of the evaluation related with particular criteria. On the basis of literature it was assumed that a five-stage gradation would be appropriate. However, it has been

assumed that one point would stand as the worst evaluation, while five points would be the best assessment.

To conclude with, it is necessary to determine the rule related with evaluation of internal auditors of quality management systems. The rule determination process covered an attempt to group the criteria, and then determination of criteria group importance. It has been assumed that the subsequent evaluation criteria (from A to H) shall have the following weight: 0.1; 0.05; 0.1; 0.2; 0.05; 0.15; 0.25; 0.1. The following approach to the evaluation of internal auditors has been assumed.

$$Q = 0.1\,A + 0.05\,B + 0.1C + 0.2\,D + 0.05\,E + 0.15\,F + 0.25\,G + 0.1\,H \quad (1)$$

Where letters from A to H reflect criteria determined in table 1. Table 1 presents an example sheet helpful in evaluating internal auditors of quality management systems.

Tab. 1. Evaluation sheet for internal auditors of quality management system

Name and surname of the auditor		……	……	……	……
Personal features	(A)				
Conducted trainings	(B)				
Knowledge gained during trainings	(C)				
Ability to use the knowledge	(D)				
Number of conducted audits	(E)				
Punctuality of realised audits	(F)				
Quality of audit documentation	(G)				
Negative remarks concerning the work of the auditor	(H)				
Final evaluation of the work conducted by the auditor	(Q)				
Note: Values for particular criteria according to the subjective evaluation of the Representative should be entered in the scale from 1 (the worst) to 5 (the best)					
Conclusions following the evaluation: 0 ÷ 20 – improvement is necessary 20 ÷ 30 – proper performance (continuous perfection) 30 ÷ 40 – very good performance (continuous perfection) ..... date, signature of the Representative					

Table 2 may also prove helpful in evaluating internal auditors of quality management systems. It introduces a certain repetition in subsequent evaluations of the same auditor, as well as between auditors. Using it will make it possible to draw conclusions from the analysis and plan a route of development for internal auditors of quality management system.

The presented table 2 is of initial character and stands as a general proposal of authors, who did not want to develop the procedure related with evaluation of auditors and assumed certain simplifications. It is possible to give up the above by introducing certain changes into the assessment of criteria. These modifications should also take into consideration the specificity of organization where the evaluation of auditors is being conducted.

Tab. 2. Values of the criteria for the evaluation of quality management system internal auditors

		1	2	3	4	5
Personal features	(A)	Lack of features typical for the auditor	Poorly developed features typical for the auditor	Moderately developed features typical for the auditor	Well developed features typical for the auditor	Perfectly developed features typical for the auditor
Conducted trainings	(B)	0	1	2	3	More than 4
Knowledge gained during trainings	(C)	0	1	2	3	More than 4
Ability to use the knowledge within the scope of audits	(D)	Bad execution of audits	Sufficient execution of audits	Good execution of audits	Very good execution of audits	Perfect execution of audits
Number of conducted audits	(E)	0	1-2	2-3	3-4	More than 4
Punctuality of realised audits	(F)	Delays more than 1 week	Delays up to 1 week	Max 3 day delay	Max 1 day delay	No delays
Quality of audit documentation	(G)	Numerous remarks of the Representative	Remarks of the Representative	Some remarks of the Representative	Very few remarks of the Representative	No remarks of the Representative
Negative remarks concerning the work of the auditor	(H)	Numerous remarks	Some remarks	No remarks	Very few small remarks	Praises

CONCLUSION

Internal auditor stands as a certain element of the quality system, as he inspects the system and he may be perceived as a tool used for quality management. He knows his enterprise quite well and he knows the specificity of the timber industry. This can facilitate his evaluation of observed facts. Nevertheless, on the other hand he may be accused of lack of objectivism due to his personal engagement in company matters and the fact that he knows examined persons. That is why ISO 9001 standard requires the audit to be conducted by the person who is not responsible for the inspected area. In a certain sense the internal auditor is an instrument of management in the enterprise. His activity may be helpful in implementing procedures or improving the production process. Due to the fact that he is an employee of the audited facility, he may help in setting corrective actions. In order to do the above, the evaluation of auditors is simply indispensable. This will allow to indicate well-working auditors, next to those in need of training and those who cannot become auditors or who do not want to become auditors. The evaluation may be executed on the basis of the proposed concept. It can be modified. Especially in the case when the already obtained results of evaluation are satisfying as far as perfecting the work performed by internal auditors of quality management systems is concerned.

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Ewa Ratajczak[16]

THE LINES OF ECONOMIC RESEARCH IN THE WOOD INDUSTRY IN THE LIGHT OF FORESIGHT

Abstract: Changes that have been occurring for a few years in the modern world as a result of the global economic crisis, cause doubts as to the possibility and correctness of implementation to economic practice of theoretical concepts suggested by economics. However, a belief prevails that in the case of macroeconomic phenomena the possibilities of empirical verification of developed theories will always be limited due to changeability and complexity of economic phenomena that are very difficult to isolate from other social phenomena. A multidisciplinary approach, and especially taking into consideration economic issues in connection with technical issues, is especially needed in so-called industry economics, including the wood industry economics. The issues of innovativeness, knowledge transfer and implementation of innovative scientific and research solutions in business sphere have an important place in this process. The fact that the wood industries are based on a natural raw material offered by forestry, which raw material is a national good to some extent, results in the situation where the whole society should express their opinion on the rationality of this raw material use. Such a possibility was offered by a foresight project concerning the Polish wood industry.

Keywords: economic research/sciences, foresight, wood industry

INTRODUCTION

The economic crisis, that has been a global issue for a few years, has raised a question about the effectiveness of application of theoretical economic concepts in economic practice. A similar discussion also concerns the core and strength of relationships between economic sciences and other social sciences, especially such sciences as sociology or psychology[17].

If the wood sector is understood as a production domain, the wood industry economics deals with research on and analyses of economic processes observed in this industry. The specificity of this scientific sub-discipline stems from the nature of the research object, including destination of manufactured goods, properties of material and technical bases (production technique and technology) and various working and production conditions in this industry[18]. In the case of detailed industry economics it is extremely important that economic issues are considered in close connection with technical knowledge. An important element of this process consists in taking into account the issues of innovativeness of offered products and technologies, and thus pointing out desired research lines driving at offering the best solutions in this area.

CHANGES IN THE WOOD INDUSTRY ENVIRONMENT AS A STIMULUS OF CHANGES IN RESEARCH LINES

As a member of the global community, including the European economic and science area, Poland and the Polish wood industry are influenced by phenomena and processes of a megatrend nature that, on the one hand, accelerate science and technology progress, and on the other bring

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[17] *See inter alia: M. Brzeziński, M. Gorynia, Z. Hockuba, Między imperializmem a kooperacją – ekonomia a inne nauki społeczne na początku XX wieku, in: Nauki ekonomiczne wobec wyzwań współczesności, scientific editing B. Fiedor, Z. Hockuba, PTE, Warszawa 2009, p. 50-81; A. Wojtyna, Współczesna ekonomia – kontynuacja czy poszukiwanie nowego paradygmatu?, in: Nauki ekonomiczne wobec wyzwań współczesności, scientific editing B. Fiedor, Z. Hockuba, PTE, Warszawa 2009, p. 26-49; M. Ratajczak, Ekonomia w dobie kryzysu: Między antyekonomizmem a ekonomicznym triumfalizmem, in: Ekonomiczne wyzwania XXI wieku: Świat – Unia Europejska - Polska, University of Szczecin, Szczecin 2010.*

[18] *W. Fabiszewski, Ekonomika drzewnictwa. Wybrane zagadnienia ekonomiczno-techniczne, SGGW textbooks , Warsaw 1977.*

about defined challenges. In a long-term perspective, the development strategies of the European states take into consideration fast changes caused by globalisation, the idea of intelligent development based on knowledge and innovation, and also by growing demand for running low natural resources. The Polish national strategies usually adapt these goals and formulate a vision of economic and social development of Poland and improvement of the level and the quality of life as well as the situation on the labour market. These goals are to be achieved by fast and sustainable economic growth based on human resources development and increase in innovativeness and competitiveness of the economy and regions, including investments in science and research sphere. In strategic programmes concerning development of science and technology in Poland, the key criteria for priority determination are: supporting multidisciplinary and transdisciplinary research targeted at goals of strategic importance to sustainable development, increasing innovativeness and competitiveness, supporting science domains in which Poland's international position is strong, and strengthening educational effects of research.

IMPORTANCE AND SPECIFICITY OF FORESIGHT IN THE WOOD INDUSTRY

An interesting and a relatively new method for forecasting future is foresight. There are many definitions of this process; however, in the most general terms, foresight means systematic attempts at looking into the future of science, technology, economy, and society with the view of identification of strategic research areas of the highest potential of economic and social advantages[19]. The important thing about foresight is that it assumes the possibility of influencing the course of events (on the basis of assessment of future needs, opportunities and threats connected with social and economic development, and taking appropriate advance actions)[20]. A characteristic feature of foresight is participation in it (during different forms of social debate) of the highest possible number of social and economic life participants coming from various backgrounds.

Currently in many countries foresight is relatively often applied for determination of the future of various economy domains; whereas in Poland it is a relatively new methodical approach that was broadly used in the National Foresight Programme Poland 2020 and that has been more and more often applied in programmes concerning either defined matter area (e.g. science development) or development of a given region. Recently foresight also has determined perspectives of the development of specific economy sectors and their industries.

With reference to the wood industry the elements of foresight were applied as late as at the end of the 20th century – initially in the USA and then in the European Union countries. In Poland the application of foresight was possible thanks to the execution of the project "Foresight in the wood science and industry - research development scenarios in Poland till *2020"*carried out in the period 2009-2011[21]. The aim of the project was identification of research lines that are priority for the development of the Polish wood sector and increase in its innovativeness and competitiveness by 2020.

The main reason for choosing the wood industry as an object of the foresight process was the fact that it is a very specific domain of manufacture and this fact justifies gathering society opinions on the domain's future. Among other things this specificity stems from the fact that this sector uses wood that is a product of forests that cover approximately one-third of the area of Poland. The forests that are mainly state owned (94% of wood production comes from the State Forests National Forest Holding) and forest products may and should be regarded as a national good. Therefore,

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[19] Acc. to B. Martin, see: Unido Technology Foresight Manual, United Nations Industrial Development Organization, Polish Agency for Enterprise Development, Warsaw 2005, op. cit., p. 8-9.

20 Jak realizować projekty foresight na potrzeby zrównoważonego rozwoju regionu?, ed. R. Szewczyk, Information Processing Centre, Industrial Research Institute for Automation and Measurements, Warsaw 2008, p. 15-16.

[21] A project co-financed by the European Regional Development Fund under Innovative Economy Operational Programme 2007-2013 (POIG.01.01.01-30-022/08) and executed at the Wood Technology Institute. Further information: www. itd.poznan.pl/foresight.

optimum and sustainable use of forests is of interest to the whole society. This is overlapped by the growing social awareness of the important role of forests and forest management in prevention of climate changes as well as the expectation that ever growing social needs will be met. The issue of rational use of wood resources (that are renewable, yet in a long-term) is an important matter that requires involvement of the scientific community and economic practitioners. Moreover, taking innovativeness as a determinant of the development of industries based on wood, it is characteristic of the wood industry that there is a strong dependence of wood supply and its properties as a raw material on the natural conditions. This limits the possibilities of subsequent modifications of wood and innovative changes. However, at the same time renewability of wood is the reason why, in the times when the sustainable development idea is preferred, wood is a desired raw material and especially important in terms of the possibilities of its versatile use. This effect is magnified by the ecological nature of wood observed at every stage of wood use (from harvesting to final utilisation), which is conducive to increase in demand for both advanced, innovative wood processing technologies and wood-based, continuously improved, innovative products. The recently growing interest in innovation in science as well as in business also is a consequence of strengthening of the knowledge-based economy paradigm. Research that is conducive to economic growth, job creation, and effective use of available raw material resources, may and should be helpful in struggling with present and future social challenges, i.e. poverty and social exclusion, the need to ensure health protection and safety of society, counteracting degradation of the environment and climate changes. This also concerns the wood science and industry to an exceptionally great extent. Furthermore, economic and social issues concern all wood industries and their customers. The operation and development of the wood sector as a whole, its particular industries and individual companies depends on the demand of consumers – the size and type of their needs and the drive of the producers towards meeting these needs; while the highest possible production effectiveness is maintained. An inherent element of this process is attention to high level of innovativeness and competitiveness which requires adequate technique and technology, and organisation. Each of these actions is based on economic calculation and evaluation of possible profits. The important thing is that these profits not always have to be measurable.

MAIN ECONOMIC AND SOCIAL CHALLENGES IN THE WOOD INDUSTRY

The growing global population and limited natural resources caused escalation of the key dilemma: how the ever growing social needs may be met with these resources? This question concerns also the resources from the area of wood science and industry, and especially wood raw material.

Amongst future challenges that wood industry will have to face and that are described in the European strategy documents[22] as challenges with economic and social aspect (but also considered in the context of economic and market choices and behaviours) the most important are the following:

- ensuring access to renewable raw materials through support of multifaceted use of forests and protection of biodiversity,
- supporting society in prevention of climate changes,
- ensuring economic and environmental balance in the use of wood biomass for product manufacture and energy generation in order to significantly increase effectiveness of energy consumption by the industry,
- offering products and services corresponding to changing social needs (tailor-made products, mass customisation),

[22] *Vision 2030. Innovative and sustainable use of forest resources, A Technology Platform Initiative by the European Forest-Based Sector, Brussels 2005, p. 8-11.*

- development and design of products taking into consideration the possibilities of recycling, re-use and eventually bioenergy generation,
- considerable decrease in capital outlay and increase in production flexibility through innovative processes,
- being a match for continuously occurring new competitors (from various regions).

These matters, which contain inside them many various detailed issues, require research in the future. This research can be synthetically described by such keywords as: society, consumer needs, competitiveness, sustainable development, energy, technology and knowledge.

RESEARCH PRIORITIES IN THE WOOD INDUSTRY ECONOMICS – FORESIGHT RESULTS

The starting point for building scenarios of the development of science sphere and the research lines in the wood industry in Poland by 2020 consisted in a strategic analysis of the wood sector in the context of its innovativeness and a SWOT analysis of R&D sphere, and then identification of key forces and trends expected in the macro-environment of science and research sphere in the wood industry in a long-term, cross-analysis of impacts, and other auxiliary techniques[23]. A very important source of information consisted in the results of survey carried out using Delphi method. The survey covered the science community not only in the wood science area, but also in related domains, representatives of business practice and government and non-government administration, PhD students and students of various specialisations, and also representatives of the media[24].

The most important development trends in Poland by 2020 in the area "Wood industry economics (and social aspects)" were described in seventeen theses that were hierarchised by the respondents according to the line and strength of impact of the events described in the theses on the environment, employment increase, the development of science and research sphere, strengthening of the bond between science and business spheres, increase in assortment and quality offer of wood materials and products, and increase in innovativeness and competitiveness of the wood sector (Table 1).

The main condition for implementation of assumed research lines is not only intensification of scientific and R&D activities, but also existence and effectiveness of economic, financial and legal instruments supporting the development of research and manufacture spheres in the wood sector, and rationalisation of technology transfer process. Another important thing is a breakthrough in the attitudes of producers in the wood industry as regards their understanding of the role and importance of science to the wood sector development, recognition of the need to use research results to increase their companies' competitiveness, as well as noticing the necessity of co-financing research (also the long-term research that does not bring any commercial effect in a short-term). The development of research in the area of "Wood industry economics (and social aspects)" requires continues growth of human resources in science and business spheres in the future, and not only the growth in quantity aspect, but also, and even mainly, in quality aspect. Another necessary thing is combining actions aimed at reduction of research costs and costs of its results implementation in economic practice with searching for every possible source of research financing.

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[23] *Innowacyjność sektora drzewnego w Polsce, scientific editing E. Ratajczak, Wood Technology Institute Publication, Poznan 2009; Sfera nauki w drzewnictwie w Polsce, scientific editing E. Ratajczak, Wood Technology Institute Publication, Poznan 2010; Badania naukowe w drzewnictwie, scientific editing E. Ratajczak, Wood Technology Institute Publication, Poznan 2010; Postęp naukowy w drzewnictwie, scientific editing E. Ratajczak, Wood Technology Institute Publication, Poznan 2010.*

[24] *The survey was conducted electronically. The number of received opinions in relation to one thesis was 1928 in the first round, and 1563 in the second. See: Scenariusze rozwoju badań naukowych w drzewnictwie, scientific editing E. Ratajczak, Wood Technology Institute Publication, Poznan 2010.*

Table 1. Ranking of theses in the field of "Wood industry economics (and social aspects)" by their positive influence on possible effects

Theses	Index [a]
Evolution of life styles and consumer values (with priorities: health and safety, fulfilment of various needs) will dynamise the wood market increasing the demand for ecological products of the wood sector	86.2
Resource preservation will be a continuously gaining importance image trump of the wood industry (as a result of sustainable development of forest resource base, repeated recycling, use of post-consumer wood, raw material-saving and energy-saving technologies)	82.9
Further growth of knowledge importance in economy will create the need for close and systematic co-operation of the wood sector and science and research sphere increasing the scope and intensity of this co-operation	79.3
Professional and intensive promotion of wood as ecological raw material will improve its social image and increa in economy (inter alia in construction), also in new applications	79.3
Modernisation and increase in effectiveness of small and medium-sized enterprises will increase their actual role in the wood sector development	78.9
Development of the market in research services in the wood industry will strengthen co-operation of producers and science and research sphere ensuring sustainable development of the wood sector	78.9
Integration of economic, social and environmental goals (holistic approach) will increase adaptation of the wood sector to growing demands of the environmental protection	76.8
New information techniques and technologies will dynamise economic development of the wood sector and create conditions for operation of wood companies on the global market	75.5
Growing importance of customer as an object of value generation and new instruments of customer's influence on the market (the Internet) will intensify differentiation of business models in the wood industry (inter alia customisation of product offer and research, business partnership, clusters)	74.2
Long-term development strategies based on systems principles (e.g. foresight) and fast access to information (on the wood sector, consumer needs, product life cycle including environmental aspects, and innovative technologies) will increase the effectiveness of operation of the wood sector and accelerate its development	73.9
New organisational forms in the production sphere (specialisation, networks, clusters) will increase the speed and level of adaptation of the new generation wood product supply to changing consumer needs	73.6
New forms of commerce (e-commerce) will increase the share of the wood sector in the global market dynamising the demand for wood products	71.9
Systematic monitoring of economic and social aspects of the wood industry operation will improve and regulate the process of creation of economic and science policies in this area	71.8
Creation and growth of added value in the whole "wood chain" and the sequence: production-distribution-consumption, will increase its effectiveness (and adaptation to sustainable development principles)	71.7
Acceleration of knowledge transfer and the development of information techniques will influence the increase in the quality of human resources in the wood sector and the increase in qualification of scientific staff in the wood science area	71.4
Development of electronic economy (e-economy) will change former image of the wood market (a decrease in the demand for some traditional products of the wood sector, e.g. paper information carriers)	70.7
New instruments of customer's influence on the market (such as Internet social networking services) will have an increasing influence on the development of the wood market creating its demand and supply sides (industry and commerce)	64.4

[a] *Global impact index – total impact of individual theses on possible effects of their implementation, i.e. positive influence on the environment, employment rate, development of science and research sphere, strengthening of the bong between science and business spheres, increase in assortment and quality offer of wood materials and products, and increase in innovativeness and competitiveness of the wood sector.*

Source: Scenariusze rozwoju badań naukowych w drzewnictwie, scientific editing E. Ratajczak, Wood Technology Institute publication, Poznan 2010, p. 49 and 163.

Further steps of the research procedure allowed for hierarchisation of research priorities by their importance to the wood sector innovativeness and possibilities of their execution in the years to come. The experts' opinions showed that key research for innovative development of the wood sector, at the same time having the greatest chance to be carried out by 2020, concerns:

- innovativeness and performance of small and medium-sized enterprises,
- long-term strategies of wood sector development with the use of modern equipment and methodical approach,

- influence of promotion of wood as an ecological raw material on the increase of its use in the economy.

At the same time research lines considered important for further development of the wood sector, but whose execution in the future was less probable, were identified. This research should be specially treated and, if possible, its commencement and conduct should be supported by decision-makers using various economic, political or legal instruments. These research lines concern:

- sustainable management of wood raw material resources,
- research on the evolution of life style models and consumer values to evaluate changes in the demand for products.

It is worth adding, that 54% of Delphi survey respondents regarded the position of Poland in discussed issues, compared with the leading economies in Europe, as average, approximately 41% considered it low, and only 5% thought it was high. Another interesting result was that concerning self-assessment of the respondents in terms of their knowledge of the issues described in particular theses of the area "Wood industry economics (and social aspects)" – 41% of the respondents assessed their knowledge as average, and only 9% regarded it as high.

CONCLUSIONS

One of the main challenges that researchers dealing with economic aspects of the wood industry will face, is an understanding that transformation from traditional (industrial) economy to knowledge-based economy that uses new information technologies is a revolution in terms of theory (methodology) as well as in terms of pragmatism. Even the concept of market has changed (e.g. virtual market), as well as company model and approach to factors deciding the company value. In modern business human resources and intellectual capital are the things that matter, and the special company asset, which minimises the risk of wrong decisions and gives temporary advantage over competition, is fast and above all equal access to information. These phenomena require new principles of management and work organisation that will spark individual creativity and enterprise, as well as an understanding that the high qualified staff is the basic company value.

It should be stressed that, as a matter of fact, in Polish wood companies there is awareness of the significance of economic research; however, still its results are relatively rarely used. This is so because to a greater extent this thinking is oriented to fast, short-term profit, and to a less extent to building strategies based on economic calculation of long-term innovative undertakings. Still, it may be assumed that in the future the more and more fierce competition will increase demand for this kind of research. Moreover, stabilisation of the general economic situation and the need for knowledge about the European and global trends and the position of Poland in the global economy should increase the interest of bodies deciding the economic and science policies of Poland in research relating to economics and social aspects of the wood industry.

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Andrea Sujová[25]

MANAGEMENT OF RESTRUCTURALIZATION IN SLOVAK ENTERPRISES DURING ECONOMIC RECESSION

Abstract: Restructuralization in traditional understanding is considered for solution of crisis situation in a company. However, it is important to emphasize that restructuralization shouldn´t be connected only with crisis of a company. Global economic recession has broken out in 2008 and its impact on Slovak economy has started to display in the beginning of 2009. The paper is focused on explaining the reasons of company crisis and on the aims, areas, types and methods of restructuralization in period of company crisis influenced by worldwide economic recession

Key words: worldwide recession, company crisis, restructuralization, revitalization, crisis management

INTRODUCTION

The crisis of en enterprise is situation with corrupted balance between business characteristics and attitude of business environment to an enterprise. To provide next prosperity of enterprises is impossible without crackdown recovering balance.

Crisis is today the most frequently word in the world in different modifications. The most common idea is that the source of the crisis is bank- financial crisis in USA, which stepwise changed into economic crisis. The worldwide economic recession causes problems and crises situation in most of enterprises.

An effective form by overcoming and managing the crisis is restructuralization indicated as revitalization of enterprise. Enterprise revitalization is a system tool for providing the radical changes in enterprise. The aims and methods of crisis restructuralization are focused foremost on ensuring the survival and next existence of enterprise, on overcoming the period of macroeconomic recession, on starting the development forward recovering the prosperity and thereafter on enabling the next enterprise growth. Ideas about simplicity of restructuralization process are wrong and effort to find the unified effective form with application in all enterprises is also problematic. Each change involves different aims, conditions, process and different impact on enterprise and its environment.

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1. DISPLAYS AND IMPACTS OF ECONOMIC RECESSION IN SR

Global economic recession has broken out in 2008 and its impact on Slovak economy has started to display in the beginning of 2009. Slovak economy has been influenced by activating factors multiplying crisis impacts and also by attenuation factors softening the crisis impact in Slovakia.

Activating factors:

» open pro-export economy SR strongly dependent in external environment, industrial production, dominate standing of foreign investors, many of each force to global crisis (e.g. Volkswagen),
» strong orientation to depressed markets (Germany, USA),
» high rate of enterprises in building phase without internal reserves (effect of last investments, restructuralization, sensitivity to changes),
» financial crisis fear is transferring to enterprising and consumer sectors what decreases the demand.

Attenuation factors:

» entry SR to euro zone in 2009,
» health financial sector,
» active government policy – anticrisis connection to global measures, own programmes,
» good competitiveness level, flexibility, new-built capacities in growth position,
» possibility to use sources from previous economic growth and from euro funds,
» experiences with restructuralization in Slovak enterprises, ability of flexible reactions in Slovak enterprising sectors.

Impacts of worldwide economic recession to Slovak macroeconomic indicators

GDP. The Slovak republic is export oriented economy that is why the most negative influence to Slovak economy had demand decrease on exported markets that affected especially foreign trade. Demand decrease caused reduction of activities in production factories and their subcontractors and consequently turnover decrease. The effect was GDP decrease in 4, 7 % in 2009. Decline of availability of credits for enterprising and consumer sectors has been expected and it will influence slow-down of investments and consumption growth.

Unemployment. The Slovak enterprises had to reduce production and costs connected with employees firing. A lot of big companies made collective redundancies that resulted in unemployment increase to 12, 1 % what represents increase of unemployed persons in 66 000 persons.

Balance of payment. In consequence of worldwide economic recession a balance of payment deficit in SR has increased that is effect of demand and thereby payment flow decrease.

Inflation rate. Under influence of economic recession slow growth of price level in SR has been recorded. Inflation in 2009 reached the lowest level – 1, 6 %. The inflation decrease was drawn down by continually decreasing prices of food, drinks, cars, transport and house equipment.

2. SUBSTANCE AND DISPLAYS OF COMPANY CRISIS

Company crisis is a phase of company life cycle when during a longer period the trend of company performance is unfavourable, profitability and solidity are lowering, capital structure is retrograded. In the case of longer duration of negative trend the next company existence can be endangered. Situation in enterprise in this stage of development is characterized by following signs:

» Turnover is decreasing,
» Costs are higher than revenues and the loss rises,
» By loss the solidity retrogrades, company indebtedness increases, a company becomes insolvent,
» Company cuts the production,
» Company sells the property,
» Company reduces employees.

Among often signals of imminent crisis belong: insufficiency of materials, raw stock for fulfilling the orders, increasing the error rate in production, decrease of labour productivity, increase of consumers claims and number of complaints, increase of fluctuation and costs, retrograding of company climate. Company crisis can appear in consequence of negative, unexpected or hard expected development of internal or external factors and it endangers prosperity, stability and future existence of enterprise.

Basic reasons, resp. factors causing the company crisis can be characterized as follows.

Accidental external reasons - disaster damage, terrorist attack, war conflict, collapse of financial markets, breakdown of sales markets.

Factors of macro environment – legislative, politic, financial changes, globalisation, higher dynamics on markets, influence of financial institutions, global economic recession.

Factors of micro environment – customers´ insolvency, high bargaining strength of customers and deliverers, loss of strong customers, competition reinforcement, change of customers needs, influence of substitute goods, decrease of company competitiveness.

Internal reasons – company age, company culture, quality of management, company flexibility, financial stability of enterprise, obsolescence of technologies and production equipment, non-mastered changes in IS/IT, inflexible motivation system, high in-plant overheads and low labour productivity.

Mistakes in business activity of the enterprise:

» incorrect decisions of management – incorrect decision by company foundation and running, problems by managing the company, absence of strategic management, planning, incompetence of top manager, weak managerial competencies of company management, unstable ownership structure, employing the members of family, slow reactions to appearing problems, aversion to changes.
» failure of basic rules for financial and investment management – investments directed to wrong business activities, excessively high investments, usually higher than planned, financing is not adapted to investments. The consequences are low liquidity, profitability, unfavourable profit.
» other internal mistakes – insufficient maintenance, attendance, inattention with consequence of fire, explosion or ecologic disaster.

3. THE CRISIS AS THE BASIC CAUSE TO RESTRUCTURALIZATION

To decision to provide restructuralization a company is conducted by several causes and factors evocating a change need. Causes of restructuralization can be classified by two ways: external and internal causes.

» Among external causes belong: market opportunities and threats, competition benchmarking, changes in customer requirements.
» As internal causes are considered: crisis and problems in enterprise, prevention, vision of management, requirement of foreign investor (foreign holder enforces changes in accordance with strategy and skills in mother company).
» Negative and positive causes:
» Negative causes are: crisis and problems in enterprise, market threats, competition benchmarking.
» Positive causes are: prevention, management vision, market opportunities.

The first, standard cause for restructuralization the company crisis is. The crisis endangers its prosperity, stability and existence in the future. This situation should be solved radically. Impulses are obtaining on the base of financial analyses from economic indicators of company (lower liquidity, higher indebtedness).

In period of crisis we deal with crises restructuralization where the reversion of bankruptcy and bad success to success of enterprise the main aim is. According to definition of EBRD the

restructuralization is a radical change in structure of business activity including management, marked lowering of employees and depletion of much assets, branches and parts of enterprise.

Restructuralization in crisis period is marked as revitalization which represents changes of present parameters of enterprise leading to rise of crises situation. These changes should ensure turnaround of crises situation and focus in optimal adjustment of all factors influencing the healthy development and prosperity and in renewal of fighting power of enterprise. The synonymous to revitalization is sanitation or turnaround.

In term of range of restructuralization changes the restructuralization can be:

» operative – realization of partial changes in chosen enterprise structures, duration of restructuralization process and measures are short-term. The main aim is company survival in short period. Operative steps mean cost cutting, employees lowering and reorganization of standard procedures.
» strategic – complex system of changes, radical changes interfering all company systems, measures are long-term, the result is a new company system. The aim is to ensure long-term growth and prosperity of enterprise.

If an enterprise occurs within its life cycle in crisis phase it is necessary to perform crises restructuralization with strategy of revitalization where the aim is a radical sanitation of non-prosperous enterprise, renewal of stability and consequential recovering the growth of enterprise. Dominant are changes eliminating the reasons of company crisis: non-functional management system, unsuitable organization structure, out of date products, low productivity and efficiency of processes.

4. AREAS OF CRISES RESTRUCTURALIZATION

According to several authors the key part of crises restructuralization is *financial restructuralization* especially account on that main aim of restructuralization process is mostly in financial character. Financial restructuralization closely relates with changes in property and ownership structure of company. Process of financial restructuralization can be based on great numbers of measures. Among basic measures of crises or operative financial restructuralization belong: sale of needless property, leasing of excessive property, reduction of expenses for research, development and investments, sale of depts., change of liabilities structure and delay of their payment.

Except financial restructuralization the coessential and key areas of restructuralization are following:

Restructuralization of management system – change of management system and methods, application of management methods on process principles, application of process controlling in enterprise.

Organizational area – creation of simple internal company structure as much as possible in term of hierarchy, communication relations, competencies and responsibilities, to simplify decision making and control mechanism, to create process organization based on management and optimalization of processes.

Restructuralization process can be successful only by realization of changes in all three key areas. Further restructuralization areas depend on character and range of proposed needed changes in company. Inasmuch as crises restructuralization requires realization of large-scale and radical changes forwarding to company revitalization, restructuralization changes should be directed to following areas.

➢ *Basic company direction and mission* – rethinking the range of activities, chosen strategy, reaching new competitive advantages, change of business subject according to market opportunities.

- *Production programme* – change of assortment structure, optimalization of production volume, increasing production of products with higher added value and cover margin, implementation of quality improvement system and system of production innovation.
- *Production* – increasing the quality of production-technical equipment, technology modernization, change of using materials, utilization of alternative energy sources, optimalization of production process: cost cutting, shortening the production period, securing the production fluency, lean production.
- *Logistics* – implementation of system of supply chain management, stock optimalization, application of just in time system, using outsourcing of supporting processes.
- *Trade and marketing* – adapting to customer requirements, ensuring the customer loyalty, market diversification, implementation of modern sale methods, e.g. e-business, building long-term, good relationships with customers.
- *Informatics* – implementation of managerial information systems, creation of systems for supporting the decision-making, information transfer and administrative activities.
- *Human resources* – systematic education of employees, creation of effective motivation programmes, change of qualification structure, application of new labour forms and policy.
- *Corporate culture* – change of values, behaviour rules, change from function to process thinking, improvement of working conditions, application of ethic code.

5. METHODS IN MANAGEMENT OF CRISES RESTRUCTURALIZATION

In the long term used management system in most of enterprises the functional management has been. Enterprises consist of functional structures that perform partial elements of total processes. Crushed processes and specialty structures show dis-economy especially in overhead expenses. The most of slovak enterprises apply the *functional approach to restructuralization* that is solving only consequences of crisis rise. It is focused on measurable and quantificational results. It comes out analysis of company economy and its aim is to slim of enterprise towards better prosperity. Using instruments of functional management in present fast changing environment is not effective. Experiences of enterprises implementing changes confirmed that the basic prerequisite of successful restructuralization the process approach is. It means focus on changes in processes and eliminating the reasons of negative results.

Process approach is focused on reasons of negative results not only on reached results. It is based on change of processes running in enterprise towards their efficiency increase and bringing the value for customer.

Process system is operating on following principles:

» principle of alternative procedures – choice from more possible procedures,
» team cooperation – involvement and motivation off all workers on results,
» lean management structure – competences and responsibility for result in each process,
» jointly perceived success or failure – better employee morale, cooperation and communication,
» orientation to customer – creation of added value for customer.

Within process approach *two methods* exist:

Continual improvement – never ending process whereat repeating small improvements in production and trade processes are achieving and company is becoming more competitive. This method can be applied in functional enterprises without permanent problems.

Reengineering – radical change of company processes in purpose to dramatic efficiency improvement. The main principle of reengineering is identification of outdated rules, methods and processes and their radical change to new, more effective.

For enterprises in deep crisis with big problems with little chance to survive the radical reengineering approach is necessary. According to founders of reengineering Hammer and Champy (1993) the reengineering means radical revaluation and radical redesign of enterprise processes

towards achieving a dramatic improvement in key performance indicators: costs, quality, services and speed.

Restructuralization is process and that is main reason why the process management of restructuralization is a necessary prerequisite for its realization. *Process management is therefore the main system and philosophy for management of restructuralization.*

During process of crises restructuralization it is necessary to apply principles and instruments of crisis management that belongs among conceptions based on process principles. Crisis management represents specific managerial approaches that are instrumental to prevention and solving extraordinary situations which can cause endangering existence or total bankruptcy of enterprise. The aim is to renewal all company functions and to reach determined company goals. An effective crisis management should lead to mastering the appeared crises situations but firstly it should be able to prevent from their rise.

A specific form of crisis management the risk management is. The base of risk management is permanent detecting, evaluation and reporting the risks, creation of risk list and its management. It is suitable preventive form, suitable instrument how to face to possible conception risks. By necessary risks the measures for risk externalization are applied: risk insurance, risk payment, risk dividing with other enterprises, risk diversification through wider production portfolio, risk overcome (to suppliers, customers and employees).

CONCLUSION

The crisis is classified as period of efficiency decrease. The company crisis can be caused by external or internal factors. If crisis period is of long duration the next existence of enterprises can be endangered. In this case it is necessary to provide measures for reversion of enterprise bankruptcy. The most effective way for overcoming a crisis is restructuralization. In crisis period we talk about crises restructuralization, resp. revitalization. The aim of crises restructuralization is diversion of company downfall, renewal of its fighting power and prosperity. Restructuralization changes should be focused in all areas and systems of enterprise of which are three key areas: financial, organizational and management system. Success of restructuralization depends on choice of suitable approach and methods. Crises restructuralization requires large-scale and radical changes focused on eliminating the reasons of negative results that is why reengineering is considered as the most suitable method. In management of crises restructuralization it is necessary to apply principles of crisis management based on process approach mixed with instruments of project management. In some cases the crises restructuralization process can be intervened by state through financial, legislative and other forms of support.

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Mikulás Šupín[26]

THE MEASUREMENT OF GLOBALIZATION INFLUENCE ON PULP AND PAPER PRODUCTS INTERNATIONAL TRADE FLOWS IN SLOVAKIA

Abstract: This paper sets out to describe the importance of the measurement of globalization. The existing globalization indicators are presented. The main focus lies on the Index of Globalization KOF with many variables. In the paper it is examined whether these method is appropriate for the measurement of globalization influence on the Slovak pulp and paper industry through international trade with pulp and paper products in Slovakia as a share foreign trade on the GDP Slovak Republic.

Key words: globalization, international trade with pulp and paper products, measurement of openness, measurement of globalization, composite index of globalization

INTRODUCTION

Globalization is a powerful real aspect of the new world system, and it represents one of the most influential forces in determining the future course of the planet. It has many dimensions: economic, political, social, cultural, environmental, security, and others. The focus here will be on the measuring of globalization influence on the Slovak pulp and paper industry as applied to the world economy. Partly as a result of these different interpretations, there are very different reactions to globalization, with some seeing it as a serious danger to the world economic system while others see it as advancing the world economy. The view taken here, is that there are both positive and negative aspects to globalization, that some of its positive features stem from the effects of competition that it entails, and that some of the negative aspects that could potentially lead to conflicts could be offset by international or global cooperation through agreements on policy or through the development of new international institutions. Thus, while globalization can cause international conflicts, it can also contribute to their containment through the beneficial effects of competition and the potential of global cooperation to treat economic and other threats facing the planet.

Globalization will be understood here to mean major increases in worldwide trade and exchanges in an increasingly open, integrated, and borderless international economy. There has been remarkable growth in such trade and exchanges, not only in traditional international trade in goods and services, but also in exchanges of currencies, in capital movements, in technology

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transfer, in people moving through international travel and migration, and in international flows of information and ideas. One measure of the extent of globalization is the volume of international financial transactions, with some $1.5 trillion flowing through New York currency markets each day, and with the volume of daily international stock market transactions exceeding this enormous amount. Globalization has involved greater openness in the international economy, an integration of markets on a worldwide basis, and a movement toward a borderless world, all of which have led to increases in global flows.

METHODOLOGY

Globalization is conceptualized as a process that erodes national boundaries, integrates national economies, cultures, technologies and governance and produces complex relations of mutual interdependence. Globalization is the process of creating networks of connections among actors at multi-continental distances, mediated through a variety of flows including people, information and ideas, capital and goods. How to measure the globalization? The Index of Globalization (KOF) was introduced in 2002 (Dreher, published in 2006) and is updated and described in detail in Dreher, Gaston and Martens (2008). The overall index covers the economic, social and political dimensions of globalization. Dreher, Gaston and Martens have produced the most systematic and comprehensive research. In constructing the indices of globalization, each of the variables introduced above is transformed to an index on a scale of one to hundred, where hundred is the maximum value for a specific variable over the period 1970 to 2008 and one is the minimum value. Higher values denote greater globalization. The data is transformed according to the percentiles of the original distribution. The weights for calculating the sub-indices are determined with the help of principal components analysis for the entire sample of countries and years.

The economic globalization (weights 36%) has two dimensions. First, actual economic flows are usually taken to be measures of globalization. The economic dimension of the KOF index measures an actual trade and foreign direct investments (FDI) volume on the one hand, as well as the extent to which countries apply trade and capital movement restrictions to protect their own economies on the other hand. The sub-index on actual economic flows includes data on trade, FDI and portfolio investment. The second index refers to restrictions on trade and capital using hidden import barriers, mean tariff rates, taxes on international trade (as a share of current revenue) and an index of capital controls. Given a certain level of trade, a country with higher revenues from tariffs is less globalized.

The KOF index classifies social globalization (weights 38%) in three categories. The first covers personal contacts, the second includes data on information flows and the third measures cultural proximity. The political globalization (weights 26%) is characterized by a diffusion of government policies. Therefore, the three dimensions of globalization are analyzed individually as well.

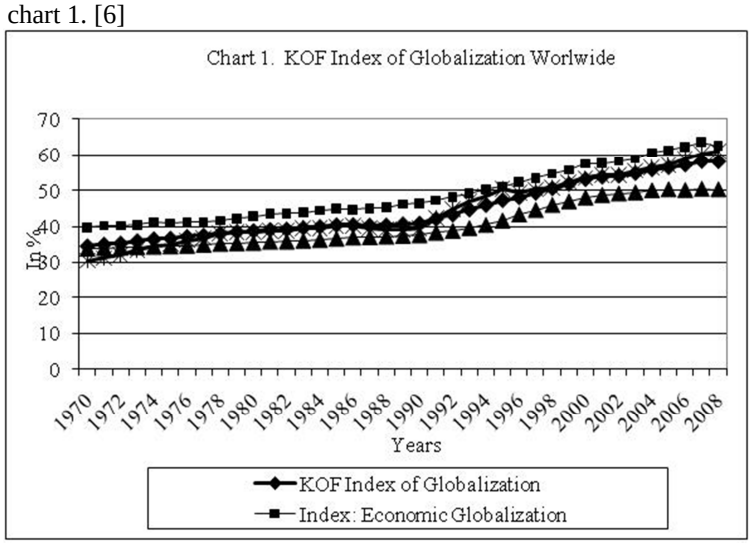
In an effort to provide more detailed information, we have applied the analysis with the sub-indexes instead of the overall index of globalization and we have tested our proposal Slovak international trade with pulp and paper products as a sum of exports and imports - turnover of goods in Euros measured as a share of Slovak gross domestic product (GDP). The resulting data are in percent of GDP.

There are various reasons why economic integration should promote growth. Trade makes it possible to exploit comparative advantages. Countries gain from specialization. Openness to international trade should promote growth since it encourages gains from trade and fosters innovation and efficient production.

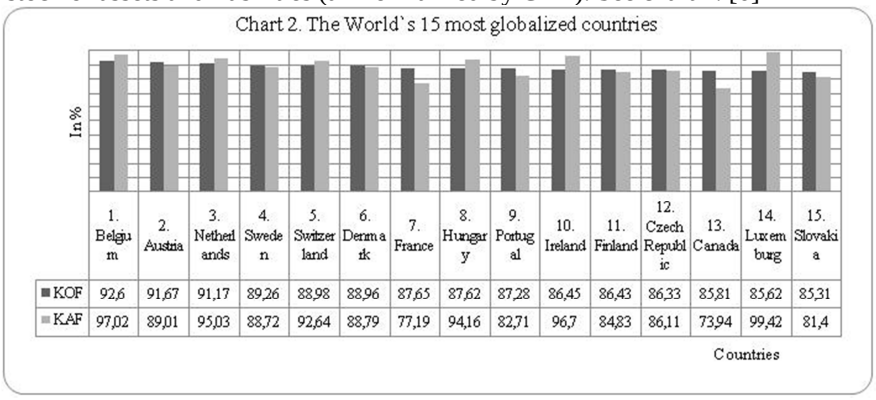
INDEX OF GLOBALIZATION – KOF

The KOF Index of Globalization measures the economic, social and political dimensions of globalization. The current analysis, which applies to 2008, shows the consequences of the financial and economic crisis. The crisis is clearly visible in the results of the current KOF Index of

Globalization: a falling trend in economic and social globalization. Only the third component of the Index of Globalization – political globalization – has continued undiminished. There has been a progressive upward trend in the three dimensions – economic, social and political – of globalization since the 1970s with a strong boost after the end of the Cold War. There has been a progressive upward trend in globalization in the developing and transition countries in Eastern Europe and Central Asia in recent years. However, the Index of Globalization 2011 now shows that this trend started to stagnate in 2008. The extent of globalization is highest in Eastern Europe, in Central Asia, although globalization in the industrial nations and Western Europe has been stagnating for quite some time. See chart 1. [6]

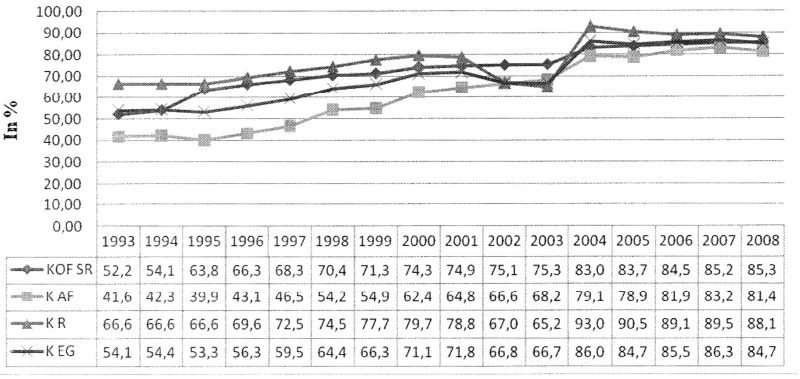


Belgium, Austria, the Netherlands and Sweden still occupy the first four positions in the KOF Index of Globalization. Switzerland (ranked 5th), Denmark (ranked 6th), Hungary (ranked 8th), Czech Republic (ranked 12th), Slovakia (ranked 15th) have changed places. Germany (ranked 16th) is no longer among the 15 most globalized countries. Poland ranked 28th position. The sub-index on actual economic flows KAF includes data on trade, FDI and portfolio investment. More specifically, trade is the sum of a country's exports and imports and portfolio investment is the sum of a country's stock of assets and liabilities (all normalized by GDP). See chart 2. [6]



Index of Globalization KOF, index of Economic globalization KEG, index of Actual Flows KAF and index of Restrictions in Slovakia from 1993 to 2008 years you can see in chart 3. [6]

Chart 3. Indexes of globalization KOF, KAF (Actual Flows), KR (Restrictions), KEG (Economic) in Slovakia from 1993 to 2008 years



	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
KOF SR	52,2	54,1	63,8	66,3	68,3	70,4	71,3	74,3	74,9	75,1	75,3	83,0	83,7	84,5	85,2	85,3
K AF	41,6	42,3	39,9	43,1	46,5	54,2	54,9	62,4	64,8	66,6	68,2	79,1	78,9	81,9	83,2	81,4
K R	66,6	66,6	66,6	69,6	72,5	74,5	77,7	79,7	78,8	67,0	65,2	93,0	90,5	89,1	89,5	88,1
K EG	54,1	54,4	53,3	56,3	59,5	64,4	66,3	71,1	71,8	66,8	66,7	86,0	84,7	85,5	86,3	84,7

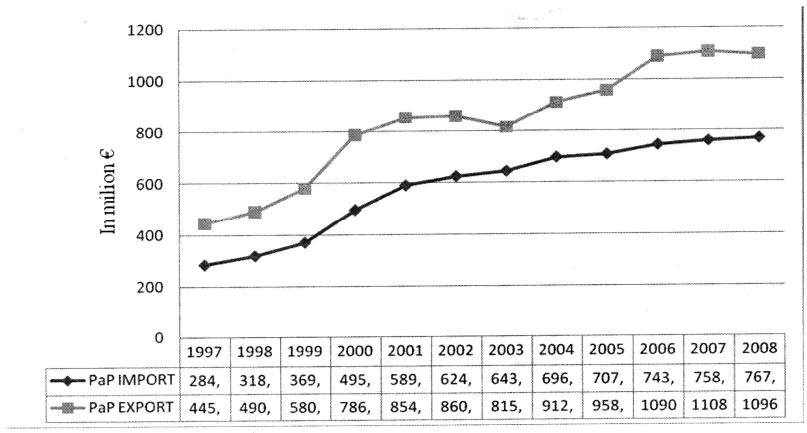
Production and trade of pulp, paper and paperboard have increased steadily in accordance with the development of global economy. Europe reached record production and trade levels in 2004 and became the largest producing region, surpassing North America. China has become the largest producer in Asia and second largest importer in the world to the USA.

Production and trade in major wood products have been increasing during the last decade. All of the world s forests are now joined in a single global market.

Two major shifts have occurred as a result of globalization of the forest products trade, a process marked by increasing centralization of the wood processing industry into a smaller group of large transnational corporations. The second shift in market dominance has been a replacement of raw logs by wood chips and pulp. Spectacular growth in the wood fiber trade – an increased by more than 300% since 1960 – has been matched by surge in pulp processing. In 1960, wood chips amounted to less 10% of the fiber trade (more than 60% in 2000).

This processes are similar or the same in the Slovak Republic. It has been confirmed by our analyses. The Slovak pulp and paper products import and export from 1997 to 2008 years you can see in chart 4.

Chart 4. Pulp and paper products import and export development in Slovakia from 1997 to 2008 years

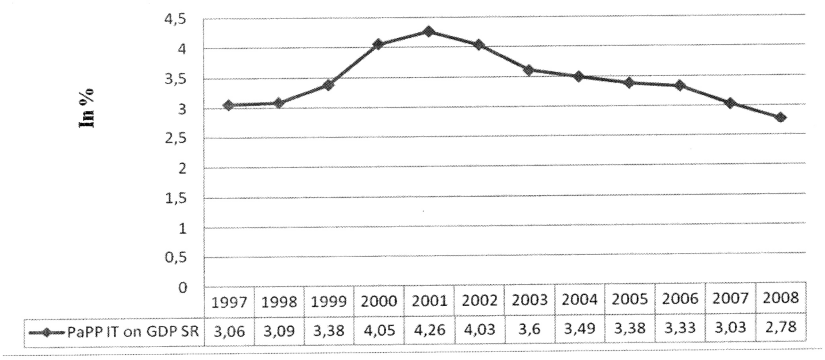


	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
PaP IMPORT	284,	318,	369,	495,	589,	624,	643,	696,	707,	743,	758,	767,
PaP EXPORT	445,	490,	580,	786,	854,	860,	815,	912,	958,	1090	1108	1096

World trade in forest products has changed in major respects over the past four decades. The value of trade has increased, the volume traded of all major products has expanded, but the product composition of trade in forest products has changed. Much of this trade is still within regions, rather than truly global, but world markets already exist for some products and seems to be in the making others.

The development of the share of foreign trade turnover Slovak pulp and paper products on the GDP of the Slovakia from 1997 to 2008 you can see in chart 5. The increasing trend is to 2001 than is declining because GDP have increased very rapidly. In 2008 Slovakia had the highest growth GDP in EU – 10.6%.

Chart 5. The share of international trade turnover of Slovak pulp and paper products on the GDP of the Slovak Republik from 1997 to 2008



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
PaPP IT on GDP SR	3,06	3,09	3,38	4,05	4,26	4,03	3,6	3,49	3,38	3,33	3,03	2,78

In the forest products industry economic globalization is evident both in the form increased forest product trade and in the form increase levels of cross-border mergers and acquisitions. Globalization affects strategies of wood processing industry companies in several ways and at different levels. Globalization leads to thicker markets, with more competitors. The result is that rivalry increases. Cost pressure increases. Advantageous positions in certain market segments may be threatened. The companies seem to respond in two ways. They differentiate their products by trying to identify new market niches and developing new products and services. They also pursue consolidation strategies. At the global basis, the forest products industry is in general fragmented, with many competitors. Recent mergers and acquisitions have changed this somewhat, so that in some segments such as pulp and paper products industry, market concentration is higher. Globalization is likely to be the main reason for this recent wave of mergers and acquisitions that have taken place in the wood processing industry.

CONCLUSION

The analysis conducted shows that there is presence as well as increase the impact of globalization on the pulp and paper products industry for the period of the last two decades. Globalization is manifested increasing degree of openness of the economy, increased share of imports and exports to GDP, as well as the rapid growth of imports and exports of Slovak pulp and paper products in comparison with the growth of total exports and imports.

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***Wacław Szymanowski; Magdalena Olkowicz*[27]**

APPLICATION OF QFD METHOD FOR THE PROCESS OF A NEW FURNITURE PREPARING

Abstract: Application of QFD method for the process of a new furniture preparing The article takes up a subject of proceedings preceding launching a new product on the market. Particular attention was paid to the use of this process QFD technique (Quality Function Deployment or House of Quality, which had already been successfully applied in industries such as: automotive, electronic, or in building. QFD method gives the company an undoubted advantage which is shortening time of the process of preparing a new product and, ipso facto, faster capability to launch it on the market. It is also an instrument that serves to transfer customers' expectations to product's features.

QFD method can be also adopted to the needs for the furniture industry. Indeed, there are reasons to use it, all the more that there is no scientific research prescribing any procedures and methods of implementation in the furniture industry.

Key words: designing a new product, furniture, launching product, Quality Function Deployment, House of Quality

INTRODUCTION

Developing market is still laying down new conditions against the products and services. It happens that even a properly designed product in terms of engineering, it may be unnoticed or unappreciated by buyers. Hit the tastes of the market is a very important determinant of the company's financial standing.

A particularly important moment in the company activity and associated with considerable risk, is the process of introducing a new product on the market. For company, new products are a key source of development. However, according to estimates even 90% of all new products does not bring the expected return, or even generate a loss. There are several reasons why so many new products fail: an enterprise has poorly valued rate and capacity, the product could have been wrong positioned (directed to the wrong group of consumers) or launched in incommodious time. Is also possible to overestimate the price of the product, poor design or errors in marketing action.

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In conclusion, the success of new products is dependent on understanding consumer needs. It is also worth a precisely look at your competitors and their offers, and then implement (or develop) products which will provide customers a higher value than the products that are currently on the market (Kotler, Armstrong 2010).

CHARACTERISTICS AND APPLICATION OF QFD MEHOD

In practice, designers and engineers communicate with another language than the clients. The engineers use technical terms, and assign numerical values to individual parameters. However the customers make use of general, colloquial formulations, for example: they are care about product's looks (e.g. wooden table) so they say that it should be modern, neat, occupied little space and serve for years. This creates communication barriers between product developers and customers. As a result, there is a product on the market which does not meet customer expectations. This is reflect badly on sales results. In order to prevent that and to improve communication between the customers and the companies, it is possible to use QFD method: Quality Function Deployment (Krzemień, Wolniak 2001).

QFD method is known, in the current version, since 1983. So far it has successfully been used in the automotive, construction, building machines, the preparation of new services in banks and health services (mainly in Japan and the USA). It was used also in developing new computer systems – the hardware and software (Hamrol 2008, Krzemień, Wolniak 2001). Recently it is said to increase importance of this method for the food industry (Luning, Marcelis, Jongen, 2005).

QFD method, however, is an universal instrument both all industries and services, and administrative processes. It is worth a closer look at the possibilities of its use in the furniture industry.

SCHEMATIC PRESENTATION OF THE "HOUSE OF QUALITY"

Quality Function Deployment is a concept that will provide the means to translate customer requirements into appropriate technical (or technology) requirements for each stage of product design (Luning, Marcelis, Jongen, 2005).

The primary tool in the QFD method is a diagram in the shape resembling a "home"- a house of quality. It contains a specially defined fields. Depending on the purpose, nature and complexity of the task number of these fields can be from 6 to 9 (Hamrol 2008, Luning, Marcelis, Jongen, 2005).

According to the most elaborate example (fig. 1), in the composition of House of Quality enter fields (Hamrol 2008):

I. customer Requirements,
II. the validity of requirements by customers,
III. technical parameters of the article,
IV. relationships between customer requirements and technical parameters,
V. the validity of the technical parameters
VI. dependencies (correlation) between the technical parameters,
VII. comparison one's own product (designed) with the competition's products,
VIII. objective (target) technical parameters,
IX. indicators of technical difficulties in implementation.

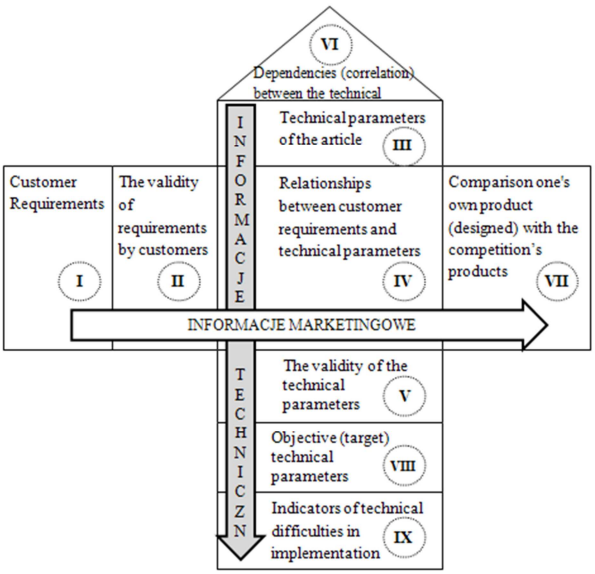

Figure 1. Scheme of "House of Quality"

Source: Hamrol, 2008

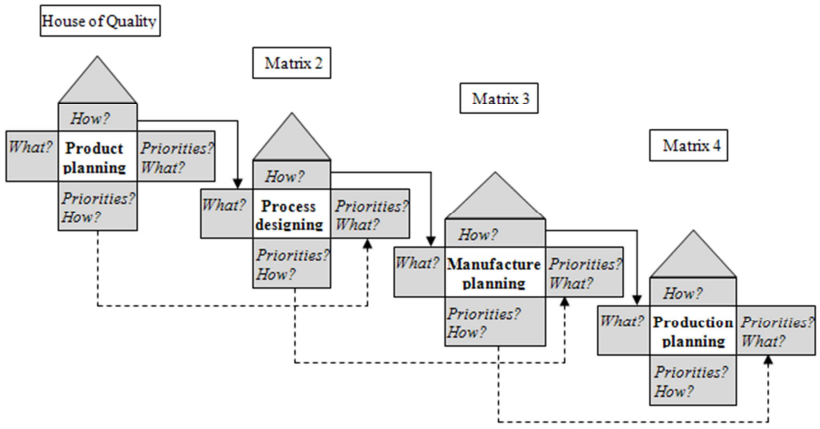

Figure 2. Houses or matrices for the development of quality function (QFD)

Source: Luning, Marcelis, Jongen, 2005

In the process of QFD can be constructed several matrices, forming the so-called: sequence of quality houses (fig. 2). Matrices describe the internal relationship between "what" (e.g. what consumers want?) and "how" (e.g. how to translate these customer expectations on technical parameters?). Furthermore, they describe the priorities among all the "what?" and "how?" (Luning, Marcelis, Jongen, 2005).

APPLICATION OF *QFD* IN THE FURNITURE INDUSTRY

Application of QFD method is shown in the example of leading up production of a new wooden table, with the possibility of spreading. House of Quality (fig. 3) for the proposed product was constructed according to the diagram of figure 1.

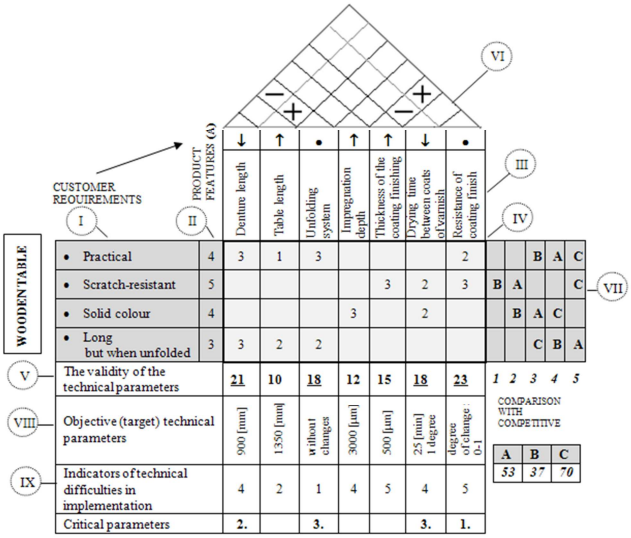

Figure 3. Example of House of Quality

Source: Own study (on the grounds of: Hamrol, 2008; Świetliczny, Bernatowicz, Mańkowski 1996);

Area I determines any requests specified by the customer. For this purpose, we should use the test results and analysis of marketing data, marketing departments and other sources.

Area II - individual features listed in the area I, customers give points (graduate the validity of each feature.) As a rule, the scale ranges from 1 to 5 (as shown in figure 3), with *1* indicating the invalid or unimportant, and *5* - very important requirement.

Area III is completed by the designers, engineers and technologists. Each articulated consumer requirement, they attribute a one or more of the technical characteristics of the product. Established parameters should be measurable and achievable at the production stage in the enterprise.

Area IV serves to establish the relationship between customer requirements and technical parameters. For that purpose points from 1 to 3 were assigned individual dependences e.g. *1* - poor relation, *2* - moderate dependence and *3* - strong dependence (Szymanowski, Pawłowska, Strychalska- Rudzewicz 2010).

In the **area V,** the sum of the products of points granted by the client in the area II and points assigned individual dependences in the area IV, was presented. For example for the length of the table sum of products is: (4 * 1 + 3 * 2) = 10.

The calculations allow determination of the so-called *critical features*. Only just dependences, which obtained the greatest number of points (23, 21 and 18 p.), in particular will decide the ultimate success of the product on the market and findings for these characteristics must be adhered to in the phase of production in first order.

Area VI - "roof" house of quality provides an analysis of technical parameters in terms of their interactions. Positive relationships: „+"- when improvement in one parameter leads to improvements in the second; negative relationship: „-" when the improvement of one leads to the deterioration of another parameter, and the lack of connection between the parameters: "•" or an empty ground (Hamrol 2008).

Area VII - products: our (A) and proposed by the competitors (B, C) are awarded points from 1 to 5 in the categories defined by the customer (area 1). Then, for each manufacturer is calculated sum of products of points from the fields: II and VII . Obtained in this phase information allows the answer to the question, how good is its own product on and where it should be improved, and what determines the strength of this product.

In **area VIII** should be specified numerical values for the technical requirements set out in the field III with the relevant units of measurement, which will meet the expectations of customers and help increase the competitiveness of the product.

Area IX that is "foundation" house of quality contains additional information, which highlight the difficulty in achieving the targets in the various technical parameters. On a scale from 1 to 5 - *5* points has been assigned to the parameters, in obtaining whose may occur the greatest difficulties, such as thickness and resistance of the coating finishing (figure 3) (Szymanowski, Pawłowska, Strychalska- Rudzewicz 2010).

BENEFITS OF PROJECT MANAGEMENT BY THE *QFD* METHOD

The company, using the QFD method can expect a variety of benefits. Krzemień E. i Wolniak R., break them down into the following groups:

- *organizational*, which could include for example, shortening time of product design, the creation of an uniform company's organizational structure and identification weak points of the process and product;
- *economic*, such as restriction the cost of designing changes, cost reduction of research and products' control, as well obtaining more competitive pricing of products;
- *socio-psychological* e.g. employees' and customers' feelings, systematization of workers' knowledge and identification areas of competitive advantage.

The biggest benefit from the implementation of the QFD method is shortening duration of the product development cycle (figure 4).

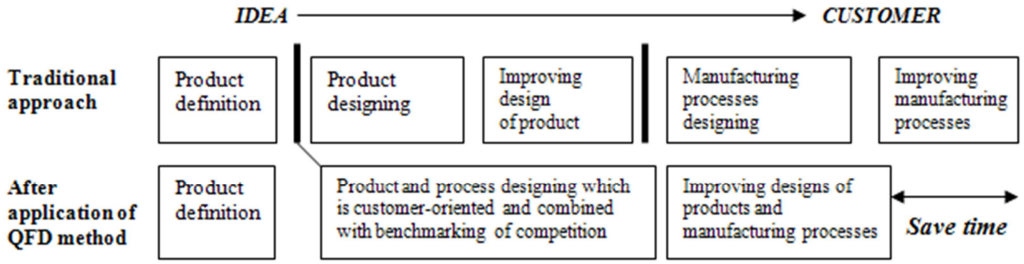

Figure 4. Benefits of using QFD method
Source: Krzemień, Wolniak, 2001

It is worth mentioning that there is a computer software (*QFD Designer, QFD/Capture, QFD Scope*), which provides comprehensive support QFD method. It facilitates the creation of both a single house of quality and sequence of many matrices. It allows you to avoid the inconvenience connected with traditional preparation of the analysis, while retaining at the same time all the advantages of the method (Krzemień, Wolniak 2002).

SUMMARY

QFD method promotes and develops customer orientation throughout the organization. However, requires preventive-oriented approach and investment in full efforts period prior the production process. It is essential to cooperate and commit employees from different company's departments.

Although the QFD method is not at all easy to implement, achieved thanks to its successes in range of improving the competitive position, make that many companies are choosing to take up the challenge (Karaszewski 2009).

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***Marek Tabert, Wojciech Lis, Włodzimierz Popyk*[28]**

PRINCIPLES OF PRODUCTION CONTROL ACCORDING THE LEAN MANUFACTURING APPROACH

Abstract: Manufacturing costs may be reduced not only through investment in new technologies, but also as a result of the application of production control based on the lean manufacturing concept. This paper characterises objectives, stages and effects of the application of lean manufacturing. Principles of value stream mapping for the present and future state were discussed. The following principles were presented in detail: functioning of the pull system such as "supermarket", FIFO lines, production levelling as well as rhythmical pull for the stimulation process. In the concluding remarks the stages of implementation were characterised for the new manufacturing organisation.

Key words: Lean manufacturing, value stream mapping, pull system, kanban, kaizen

INTRODUCTION

Economic slow-down recorded on a global scale for many Polish enterprises operating on foreign markets and on the home market, means a deterioration of their operating conditions. Demand for products is reduced and customer requirements are increasing. This is manifested in lower volumes of individual orders, at a higher frequency of their placement and an increasing assortment variation of orders. Deliveries of products have to be realised in shorter times than before. Under such conditions manufacturing processes require a change from large-lot or medium-lot production to small-scale production or custom-made manufacture. However, the two latter methods of production generate higher manufacturing costs, which may not be compensated for by higher prices, since such prices will not be accepted by customers. In such a situation the profitability of enterprises decreases. It may be stopped or even improved by the introduction of a

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new manufacturing organisation, reducing costs as a consequence of the application of the lean manufacturing concept.

Lean Manufacturing refers to the method of organisation of production, which was developed and applied at a Japanese car manufacturer Toyota. It is a result of experiences and practical actions of this company in the field of manufacturing management. Principles of a new organisation of manufacturing were presented for the first time in 1996 in a book entitled "Lean Thinking" written by Jim Womack and Dan Jones. A significant success of this publication and demand for additional information on the Japanese method of manufacturing organisation led to the publication of another book on the subject, entitled "Learning to See" in 1999 (Rother, Shook 2003). Its authors were Mike Rother and John Shook, who was an employee of Toyota for 10 years. In this book the authors focused on the description of the Value Stream Mapping. This method is the basic tool in the design of economical manufacturing. At Toyota this mapping method is used under the name of "mapping of material and information flows". Mike Rother formalised this method and named it Value Stream Mapping (VSM).

1. CHARACTERISTICS OF THE VALUE STREAM MAPPING METHOD

The VSM method is used to present the current state of the production system and to design its future state in order to implement a lean manufacturing method. The map of processes and actions connected with manufacturing of products makes it possible to detect losses of time occurring during production. Such a prepared map is the basis for the elimination of waste. As a result the flow of the materials and information streams is provided, which is characterised by uniformity, adequate flexibility, the shortest execution time, and the lowest costs of product manufacturing and their highest quality. The production process, during which the flow of the streams of materials and information is characterised by such properties, is defined as lean manufacturing.

The VSM method is focused on a comprehensive analysis of the value stream, and not on its separate component processes. The concept of the value stream refers to all actions, which add value to the manufactured products, as well as those which do not add value. Values comprise the characteristics of the product required by customers, for which they are willing to pay. Value is produced and it is added to the product only during its processing. Analysis of the value stream pertains first of all to a single plant and covers all actions comprising the production process - from deliveries of materials and parts up to the transport of final products to customers. Stream mapping consists in the reflection of the production itinerary of a selected product using arbitrarily selected symbols. Such a description covers flows of materials and information and shows relationships between these flows.

The objective of value stream mapping is to design and implement a new organisation of a manufacturing process, defined as economical manufacturing. The procedure connected with this approach is composed of several stages, which scheme is presented in Fig. 1.

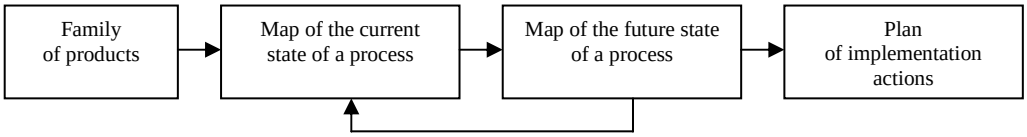

Fig.1. Scheme of procedure leading to lean manufacturing

Source: based on Rother M., Shook J. (2003) Naucz się widzieć. WCTT, Wrocław, modified by the author.

The first step in VSM (Fig. 1) is to identify the family of products, in relation to which mapping is to be performed. Next the current state of the manufacturing process is recorded for indicated products. In the next stage the represented process is analysed and its future state is designed, eliminating detected losses. The last phase in the procedure is to plan and implement a new organisation of the process.

On the diagram (Fig. 1) an arrow denotes a feedback between the map of the current state of the production process and the map of its future state. The arrow illustrates the fact that when designing a future state we may face demand for previously omitted information, which needs to be supplemented. Also in the course of representation of the current state ideas may appear concerning the modification of the future state of the process. After implementation of solutions described by the map of the future process the construction of a new process map is undertaken and again the potential to eliminate detected losses is analysed. The presented procedure is repeated many times and in this way the manufacturing process is improved continuously.

2. IDENTIFICATION OF A FAMILY OF PRODUCTS

Reflection of the flow of materials and information concerns the production process of one family of products. In enterprises producing many different assortments of products prior to VSM the manufactured products are divided into families of products in terms of their technological similarity. A family of products refers to a distinguished group of products, which goes through a majority of identical stages of the production process and for which the same groups of work stations or their lines are used. The manner to distinguish families of products is presented in the example given in Table 1. The table lists all types of products manufactured in an enterprise and all processing and assembly operations performed on them.

Table 1. Method to distinguish a family of products

Types of products	Processing and assembly operations							
	1	2	3	4	5	6	7	8
A	X		X	X	X	X	X	X
B	X		X	X	X	X	X	
C	X	X	X		X	X	X	X
E		X			X	X	X	
F		X		X			X	X
G	X		X	X	X	X		X
H		X	X	X	X	X	X	X
I	X			X		X		X

where X denotes the execution of operations on a specific product.

Source: based on Rother M., Shook J. (2003) Naucz się widzieć. WCTT, Wrocław, modified by the author.

The biggest number of identical production operations is performed in the course of manufacture of products A, B, C as well as G, H (tab. 1). These products form two separate families of products, distinguished on the basis of the technological similarity of realised manufacturing processes. For individual families of products one person is appointed – the manager of the value stream - responsible for the course of the manufacturing process for a specific type of product, from the beginning to the end of the process. At the same time the person is responsible for the implementation of changes, which result from the development of economical manufacturing, designed on the basis of VSM and the elimination of time waste.

3. PRINCIPLES OF MAPPING OF A CURRENT STATE OF VALUE STREAM

Stream mapping begins from the end of the production process and it is continued through its successive stages, and it is completed at the beginning of the process. Further actions consist in the elimination of identified sources of time waste and unjustified costs. Thus we distinguish the procedure referring to the improvement of the value stream, which are referred to as kaizen of flow and the procedure consisting in the elimination of waste at the level of work stations and employees, which is called kaizen of the process and concerns a single operation. As a result of these actions a map of the future, improved or ideal state of the production process is created. Such a constructed map of the future state of the production process becomes a project of the lean manufacturing system.

Value Stream Mapping consists in the plotting of a scheme of flow of materials and information in the production process using arbitrary symbols (icons) selected from a previously prepared set. Depending on the information needs this set may be modified or supplemented with new symbols. Individual symbols are described using additional information – parameters of the process. The basic scheme of the process is executed at the level of specificity, at which production operations are elementary components. In the course of the further procedure we may increase the level of specificity and perform VSM in relation to individual operations.

The process of map formation begins with the analysis of customer requirements, represented in the scheme by the icon of the factory. Information on the requirements of the client is recorded in the descriptive label under the icon. In case of constant deliveries two parameters are given: time of delivery (at what time intervals deliveries are executed) and the volume of deliveries (periodical demand for products).

In the representation of basic production processes icons of the process are used. One such icon symbolises a fragment pf the manufacturing process separated from the next with the interoperation stock, in which manufactured parts are gathered and transferred in batches to the next section of the process. Such an isolated fragment of the production process may cover one work station or several such stations. An example of the former may be the a work station for panel sizing, while that of the latter may be a processing line composed of several work stations connected with conveyors. To each icon of a process descriptive labels are attached, containing parameters characterising a selected process. Processes are described by the following parameters:

- cycle time (CT) - the time passing between moments, in which successive manufactured parts leave a specific manufacturing process,
- overtooling time (CO) - time required for the preparation of a work station (exchange of tooling and adjustments of tools) to provide the transition from manufacturing of one type of parts to another type,
- availability of work station (AW) - the proportion of time assigned to the performance of a specific type of products in the total work time of a work station during one shift,
- effective work time of work station (EW) - the time of a shift reduced by the down time of the work station,
- EPE index (every part every…) - the volume of a production batch expressed in time required for the production of the whole batch of parts.

Moreover, parameters describing the specified section of the process include the number of workers operating a work station or work stations and the number of shifts of work at the work station.

If periodically work station stocks are formed at the work stations (work in process), but processed parts are transported between these work stations in a continuous manner, there is no ground for the isolation of such work stations and assigning them different process icons. Stocks of manufactured parts, which are found between distinguished processes, are denoted by an icon, indicating the site of their accumulation. In the icon label information on the volume of stocks is attached. On the basis of collected data the flow capacity is determined for each production section, according to the formula:

$$FC = (EW/CT)*AW,$$

where:

FC - flow capacity (effective volume of production),
EW – effective work time of work station,
CT - time of the parts cycle,
AW - availability of work station.

After the construction of the map of flow of materials, in its upper part the scheme of information flow is added, marking it with arrows. Methods of information transfer (types of information flow channels) are described by appropriate descriptions on the labels placed next to

arrows (e.g. by fax, electronically – Electronic Data Interchange – EDI). The main source of information is the Production Control Department (PCD). It collects information sent by customers and supplied from the production process. Next DSP processes it, most frequently using a computer program (e.g. MRP, ERP) and assigns tasks and times of their realisation. Thus processed information creates the production schedule. PCD sent its appropriate fragments (section schedules) to individual sections of the production process. Labels placed next to arrows are supplemented with the periods, to which the transmitted information pertains (e.g. a week schedule, daily dispatch plan). The information flow represented in the value stream map is executed from right to left, while the physical flow of manufactured parts occurs in the opposite direction.

Manufacturing based on schedules determines a specific manner of materials flow. Each of the sections of the production process operates autonomically, according to its own section schedule, transferring produced parts to the next process. As a result individual processes "push" processed materials in the direction of completion of the entire production process. On the map of the process such a method of parts flow is marked with arrows with a graphically differentiated form.

Actual manufacturing processes are subjected to different disturbances. They are not reflected in the used section schedules, since such schedules identify only planned requirements. As a result, individual section processes supply manufactured products in the quantities most frequently exceeding the requirements of the successive processes. This results in the necessity to collect and store them. Such a method of execution of a production process prevents uniform flow of parts between individual section processes, i.e. the realisation of the basic principle of lean manufacturing.

On the basis of already recorded information, at the last stage of mapping of the actual state of the value stream two parameters are calculated: total lead time and total processing time. First for each location of parts storage, denoted on the map with the stocks icon, lead time is determined. It is a quotient of the volume of stocks and daily requirement of the next section of the process. Lead time is most typically expressed in days. The total of lead times for all processes and locations of stocks storage gives the total lead time for an individual part through the entire production process, from the moment of raw material delivery to the dispatch of a final product to the customer. In case of branched processes, total lead time is determined for a path with the longest lead time.

The other parameter, which is determined at the last stage of value stream mapping is the total processing time. It is a total of times of manufacturing cycles (CT) recorded for individual sections of the production process. Total processing time is expressed in seconds. A comparison of both these parameters shows how long the waiting time is for the processing of a single part in the entire production process. Waiting time is the result of overproduction, which needs to be maximally reduced in the course of designing a new organisation of the production process.

4. PRINCIPLES OF MAPPING OF A FUTURE STATE OF THE VALUE STREAM

Overproduction refers to the manufacturing of parts at individual stages of the process in higher quantities or at an earlier date that it is required by the next section of the process. It is the primary source of waste (unnecessary costs) in the production process. Overproduction results in an increase of costs and extends the time of order execution. In the lean manufacturing system each section of the process produces only as much as it is needed by the next processes. The transition from the state of overproduction to levelled manufacturing is executed through mapping of the future state of the value stream.

Overproduction is eliminated as a result of the adoption of several principles in the development of a new organisation of production. The design procedure begins with the determination of the parameter of synchronisation for the receipt of final products with the rate of their manufacture. Tact time is such a parameter. It is a quotient of effective work time of a work station during one shift and the volume of customer orders, assigned to one shift. Tact time defines

with what frequency final products need to be manufactured to meet the customer demand for these products. It is the basic parameter controlling the manufacturing process.

Another principle applied in the design of a future state of the production process is to introduce continuous flow of parts at all sections of production, in which it is possible. Continuous flow of production is determined by the transfer of parts from one work station to the next, immediately after the completion of the process, with no waiting time for processing in the next process. Stocks between work stations and waiting for parts are eliminated. The basic precondition for the introduction of continuous flow is the levelling of operation times at all work stations of the section of production, in which this process is realised. Sequences of sections of the production process, for which after reorganisation the continuous flow was introduced, are denoted on the value stream map by one common icon.

In some sections of the production process continuous flow may not be applied and it is necessary to run production in batches. Then for such processes links are created with the next processes thanks to the application of a supermarket type pull system. The introduction of a pull system between two processes (suppliers and customers) makes it possible to control production with no application of schedules or forecasted demand. The rate of parts collection from the supermarket (a mini buffer warehouse) by the process of the customer determines what, when and in what quantities the process of the supplier manufactures them. Flow of controlling information between both processes is executed using two types of kanban cards (Japanese: Kan – visible, Ban – a sheet of paper): production and transport. The production kanban controls the production of parts, while the transport kanban determines the demand for parts (Wojtasik 2000). The supermarket is a small warehouse, to which the supplier's process transfers the manufactured production batch and the customer's process receives it in part or whole. It is also a location where both kanban cards are stored and from which they are received. Supermarkets are located at the production shop in the vicinity of the supplier's processes. Each time when the customer's process requires deliveries of parts the worker responsible for its procurement collects needed parts from an appropriate supermarket. At the same time the production kanban is transferred from the supermarket to the supplier's process, constituting there an order for the realisation of a successive batch of production.

In case when the number of variants of manufactured parts is high, the use of a buffer warehouse in the form of the supermarket leads to the accumulation of excessive stocks. Such a situation occurs e.g. during the manufacture of products according to the specifications of customers (made to order), when a considerable number of manufactured parts are unique. Then instead of the supermarket the buffer in the form of the FIFO line (first in, first out) may be used. The line is a warehouse with a specific capacity. In case when the line is filled, the process supplying parts stops production to the time when the collecting process used (collected) a specific portion of the stocks (Liker 1998, Cutler 2006).

In some situations instead of the supermarket it is more advantageous to apply a simplified method of manufacturing process control, called sequential pull. Then the supplier's process produces a constant number of parts in times, when demand is indicated on the part of the receiving process. Such a solution may be applied only in cases when the supplier's process is characterised by a sufficiently short lead time.

The use of supermarket-type buffer warehouses facilitates scheduling of only one process in the entire value stream. The process controlled by the schedule is called the stimulating process (stimulator). Changes in the volume of production in the stimulating process influence the load of all processes preceding it. The method of transfer of semi-finished products from the stimulating process towards the final product has to be characterised by continuous flow. Supermarkets or other pull systems may not be applied in that case. Thus the last section of the production process is frequently the stimulator. Then it is controlled on the basis of orders placed by customers.

In case of production of many assortments of products the assembly of products occurs in production batches. Required component parts are also collected in batches. However, such an

approach increases considerably the volume of necessary inter-operation stocks accumulated in the supermarket-type buffer warehouses. At the same time, the volume of required stocks increases upstream the value stream (in the direction to the beginning of the production process). Assembly of products in batches results also in the necessity to store a higher number of final products in order to provide their availability required by the inflow of customer orders. Excessive stocks of parts or final products mean wastage, which during the design of the lean manufacturing system needs to be reduced.

For this purpose the assembly process is executed using uniform timing of production of different types of products. The procedure which leads to the above is referred to as production levelling. Then the assortment is manufactured alternately in small batches (. As a consequence, it results in smaller inter-operation stocks over the entire production process and a shorter execution time of customer orders, at smaller stocks of final products. However, such an organised manufacturing process results in an increased number of retooling of work stations, which run the assembly process. The longer the retooling times, the lower the efficiency of the designed organisation of manufacturing. In such cases a detailed analysis is conducted for operations connected with the longest retooling in order to provide their maximum reduction.

The last solution applied in the development of lean manufacturing is to introduce rhythmical pull in relation to the stimulating process (Hines 2000). It consists in the regular issue of small, uniform production orders for the stimulating process. Production time required for the execution of such an order is called the scale. Its size is determined on the basis of the quotient of the number of finished parts contained in a single transport container and tact time. For example, a container contains 10 pieces of parts and tact time is 120 seconds, then the scale takes the value of 20 minutes. The task to manufacture one transport container of parts is issued to the stimulating process every 20 minutes and at such a rate one full container of manufactured parts is received from the process. The size of the scale, the type of parts and execution dates are recorded on kanban cards, which constitute production orders collected by the stimulating process.

CONCLUDING REMARKS

The aim of value stream mapping is to indicate sources of wastage found in the production process in the form of overproduction of parts and final products. On the basis of the obtained picture of the course of the manufacturing process as it was executed before its new organisation is developed. A production chain is formed, in which supplying processes are linked with receiving processes with continuous flow or the pull system. As a consequence, such a designed system will manufacture parts and final products only when they are required and in quantities consistent with the demand.

Implementation of a lean manufacturing design may be best executed in stages. It begins with the stimulating process, which most frequently is located closest to external customers. Implementation of this process frequently reveals the necessity to introduce changes in the already designed preceding processes. The second stage covers section pull processes located first of all in the central part of the manufacturing process. Individual pull processes are best implemented successively in the direction from the beginning of the entire production process. In the last stage a new organisation is executed for processes connected with external deliveries of materials and parts.

The introduction of lean manufacturing in an enterprise is not a single action. It is a process of continuous improvement of production organisation. It is because the requirements of customers change, new manufacturing techniques or technologies are introduced, products are improved or new ones are implemented. These factors result in a necessity to introduce changes in the control of manufacturing processes, their adaptation to new production conditions.

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QUALITY ASSURANCE AND PRODUCT RECALL MANAGEMENT

Abstract: The automotive industry experiences changes and trends because of rising innovation requirements, shorter product life cycles, growing models/varieties and especially increasing process and product complexity[3031]. Product failures and critical situations are nearly inevitable. From this side a Product Recall Management fulfills quality criteria which are decisive for its effectiveness and success. Eight success factors („key elements") were formulated which describe an optimal Product Recall Management.

Key words: success factors, key elements, quality, standardization, unsafe product, product recall management.

1. PRESENTATION OF THE PROBLEM

For the long-term future safety of organizations, which are in an intensified competition, e.g. vehicle manufacturer and supplier industry, product recall processes and analyzing their requirements are essential because it supports the planning and the network of the organization substantially. In an accelerated and stronger measure than in the past management is faced with new challenges. Concepts which have been developed in former times are often insufficient in a globalised world and is not enough as answer to new questions. To that extent it is sensible to look for new solutions and use experiences of others.

In recent time above all the number of recalls in the automotive manufacturers and supply industry found large attention. A substantial challenge consists of it, that serious changes and high dynamics in the sociocultural, technological, ecological, economical and politically legal surrounding fields of the company have grown and new tasks must be fulfilled in an ever more aggressive becoming market. Many reasons speak for the fact that the number of the recalls will increase. The numbers of the German Kraftfahrt-Bundesamt (KBA) shows a frightening, constantly rising tendency of the numbers of recall actions (source: KBA, annual report 2010). The Fig. 1 shows this development of the recall actions from 1998 to 2010 in the overview.

Reasons for this development are the ever shorter product life cycles, shorter development times, technological complexity[32] as well as in the introduction on the market come prematurely due to the ever stronger pressure of competition, which intensifies the market situation increasingly from Eastern Europe and especially the new economic powers e.g. China, India and Russia, Brazil, Mexico and South Korea, in addition, Australia, Gulf or the Baltic states[33] would like to compete on

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[30] *Meffert, H.: Marketing. Gabler Verlag, p. 329.*
[31] *Schuh G., Stoelzle W., Straube F.: Anlaufmanagement in der Automobilindustrie erfolgreich umsetzen. Springer 2008, p. 33.*
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eye level with the old industrial nations[34] for markets and resources. In addition, it is often no longer possible to recognize product specific deficits and possible damage because of increased technological complexity of the products. Due to these numerous changes there are more and more questions. Which strategies make a contribution to success? Why are they successful? There is an increasing scientific interest in explanation because of novel changes, different open questions and at the end risen product recalls.

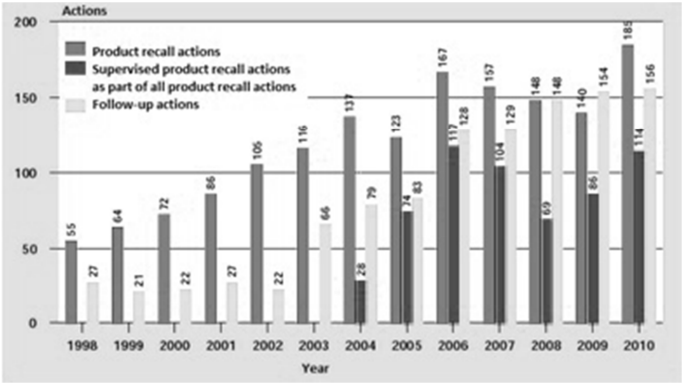

Fig. 1. Recall overview in Germany.[35]

2. RESEARCH QUESTIONS AND OBJECTIVES

Because of the shown changes and developments many companies had strongly increased their reaction. Whereby some efforts ran very successfully, others ran to failures. The question about factors, characteristics and conditions, which are relevant with recall efforts for successes, as well as the appropriate analysis of their effect and influenceableness represent are central problem for practice. For this reason there is a special focus on potential requirements, success factors („key elements") and the characteristics of Product Recall Management in profitoriented organizations. Practical experience and theoretical terms of the success factor research have to be adapted on key elements, so that a construct of a successful Product Recall Management can be illustrated. Empirical data will be used in order to be able to measure success factors and indicators, which should make possilble a measurement of the all items and confirm or refute hypotheses.

Hence, the purpose of this dissertation is to show success factors which have the possibility to influence positively the success of a Product Recall Management and point out a first theoretical framework in comprehensive perspectives, "Different companies and business/OE[36] vs. Parts& Service/Aftermarket". It fills out gaps in understanding of this special and maybe recondited sales structure, which come from the practice. To some extent, this study has shed light on questions by drawing together and exploring the existing knowledge. However, in most of the cases lacking a scientific perspective to provide reliable and valid answers to the research questions is consider on experience because of poor literature and on the other side every product recall situation is different.

Hence, the purpose of the work and survey is to derive the current situation (status quo) of Quality Assurance and Product Recall Management within companies and potential success factors. This international survey is completely anonymous and serves to obtain a general survey of this topic[37].

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[34] *By "old industrial nations" will be understood USA, Japan and Western Europe, which controlled the world economy in past.*
[35] *Annual Report from the Kraftfahrt-Bundesamt (KBA).*
[36] *Original Equipment.*
[37] *This survey is conducted at 2 ask, a well-known online survey provider and can be pursued by following below-mentioned link: http://survey.2ask.de/ea65d8553a765759/survey.html*

Research questions which sought to be answered:

1) which sales channels can be affected by a defective product of an OE system supplier?
2) what are the central success factors[38] and requirements of the Product Recall Management and how should these be arranged in order to ensure the success of the product recall management?
3) are there any significant differences regarding the success development of the Product Recall Management elements in dependence on the respective context (Differentiation of companies and business channels?
4) how is the status quo regarding the key elements of the Product Recall Management in companies today?

3. INTEGRATIVE RESEARCH MODEL[39]

A Product Recall Management fulfills eight key elements which are decisive for its effectiveness and success. In the following sections on the one hand will be examined, how the central elements of the Product Recall Management should be arranged, in order to guarantee the success in different contexts. The next section contains the development of the hypotheses which must be empirically examined (confirmed or refuted).

3.1 Reference framework for the hypotheses research model

In the following the presented reference framework is based on the basic assumption that organizations integrate central key elements which build a "Total Product Recall Management". In the following some hypotheses will be formulated in the context differentiation of business channels (OE – Aftermarket) and differentiation of company (Vehicle manufacturer – OE-Automotive supplier – NON-OE-Automotive suppliers - other) which is intigrated in the costructed model. See fig. 2.

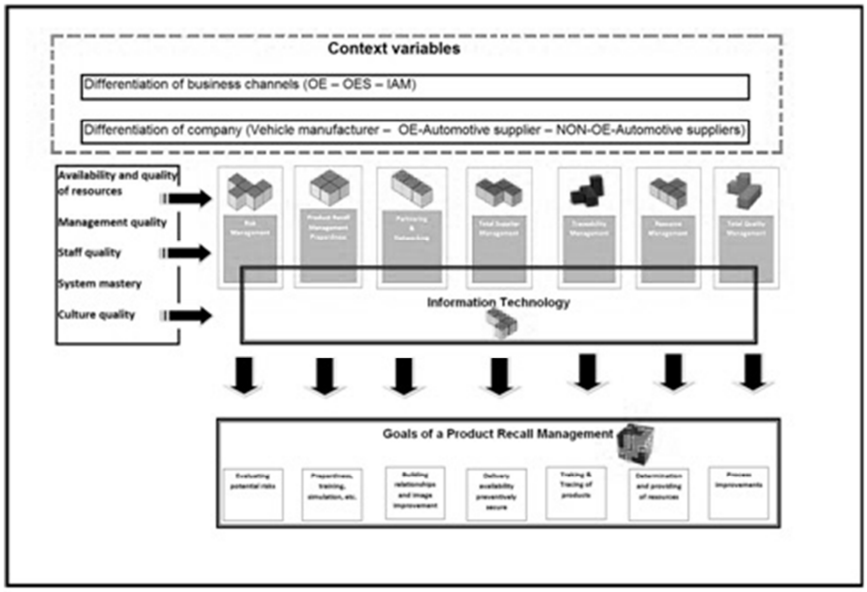

Fig. 2. Hypothized final integrated Product Recall Management model.[40]

[38] *Success factors are the key elements of the total Product Recall Management.*
[39] *Own source.*
[40] *Own source.*

3.2 Hypotheses development

In the costructed Product Recall Management model we have following main elements which are variables in the whole construct and includes follwing formulated hypotheses.

Risk Management

Risk management can mean the difference between the survival and failure or even future growth of an product recall effected organization. Risk management strategies are established once the organization has identified the risk that it faces. I propose the following hypotheses regarding Risk Management:

H_1: Risk Management has a positive effect to identification and reducing product or process errors.

H_2: Risk Management has a positive effect to reducing costs because of elimination of risks.

H_3: Risk Management has a positive effect to risk attention/sensitivity.

Product Recall Management preparedness

An organization which could be effected by a product recall must perform in such critical situation and able to tackle such problematic situation. Prevention, improvements and performanceoutput across all processes, departments, business units, and thus for the entire organization, are driven by managmeent who must ensure a total product recall preperdness. Management is the right discipline who has the empoverment to move things. Due to with great empowerment comes great responsibility. Thus, I hypothesize:

H_4: The organization quality has a positive effect to manage a product recall scenario of a product recall affected company.

H_5: The quality of planning, preparation and simulation has a positive effect to manage a product recall situation of a product recall affected company.

H_6: An already implemented Product Recall Management has a positive effect to the product recall scenario regarding prevention, intervention and postvention.

H_7: A good organization quality of the cause analysis has a positive effect to the extent of product recall-based improvements.

Partnering & Networking

Partnering&Networking is a soft (intangible) success factor which depicts the collaboration in networks (within and outside supply chain). Intense collaboration with highly integrated partners allowe an excellent communication with a high attention and sensibility on unexpected issues, e.g. product recalls. Therefore, the effect of excellent relationships is an advantage and benefits in critical situations regarding communication and support, and the following hypotheses will be proposed:

H_8: Intangible resources have a positive effect and efficiency to manage a product recall.

H_9: A good open and external communication has a positive effect to the product recall rate and customer trust.

H_{10}: Cooperation between a product recall affected company and external parties (e.g. supplier, customer, national authorities, consultants, etc.) has a positive effect to manage product recall situations.

H_{11}: Interdepartmental cooperation (between internal departments e.g. Quality Department, Purchasing, Sales, Engineering, etc.) within a company/group has a positive effect to manage product recall situations.

Total Supplier Management

Total Supplier Management is an important discipline regarding supplier releases and supplier integration in own processes which support the competition capability and in the end the success of the company by optimization and implementiation of process and cost potentials. Due to I rise the following hypotheses:

H12: Reducing process complexity has a positive effect to product costs.

H13: Supplier integration has a positive effect to reducing errors because of supply chain process optimization.

H14: A supplier reporting system has a positive effect to a product recall affected company and tackling a problem situation.

Traceability Management

Traceabilty Management is in the position of tracking and tracing of product within the complete supply chain. It speed up the identification and isolation of potential product which have failures. Based on these statements I rise following three hypotheses:

H15: The quality of a centralized traceability tools has a positive effect to the product recall rate.

H16: Clear product identification has a positive effect to reducing costs.

H17: Traceability has a positive effect to speed up and to tackle problem situations.

Resource Management

First of all, all departments, functional units or whole organizational systems, regardless of their nature, require resources in order to function effectively, or even to exist. Availability and quality of the primarily below-mentioned resources are essential:

- financial resources
- intangible resources
- human resources
- information resources

A clear connection is evident and therefore these lines of reasoning lead to the next following hypotheses:

H18: From the beginning an implemented Product Recall Management with available financial budget has a positive effect to the product recall scenario.

H19: Good available resources e.g. financial budget has a positive effect to the product recall scenario.

H20: Internal cost saving programs do not approve financial resources/budgets for prevention or focused product recall relevant issues.

Total Quality Management

Total Quality Management encompasses a really huge range of topics and perspectives. It focuses on giving value to customers by building excellence into every aspect of the organization by continue improvments, integrating in culture, etc. Thus I hypothesize:

H21: The extent of product recall-based improvements has a positive effect to the product recall rate.

H22: An escalation model has a positive effect to a product recall situation and tackling a problem situation.

H23: Quality improvements has a positive effect to reduce errors.

Information Technology

All systems exist for some purpose, and all parts of a system support the overall organization in fulfilling that purpose. A must be open and able to react to the environment within the system operates. That means it must respond or react to its internal and external environment. Information Technology is an open system and combines all elements in one integrated concept. This leads to the following hypotheses:

H24:A central implemented information system has a positive effect to information interchange within a company or international group and tackle problem situations.

H25:A central implemented data collection has a positive effect to avoid same errors.

H26: An information system speed up to tackle problem situations.

4. CONCLUSION

Results of success factors, characteristics and requirements of a Product Recall Management will be given by the survey which give all necessary data for evaluations and in the end confirmation/disconfirmation of all hypotheses.

All results will be given in details and illustrated in different diagrams. It is important to know how is the focus in different companies, different size of companies, etc.

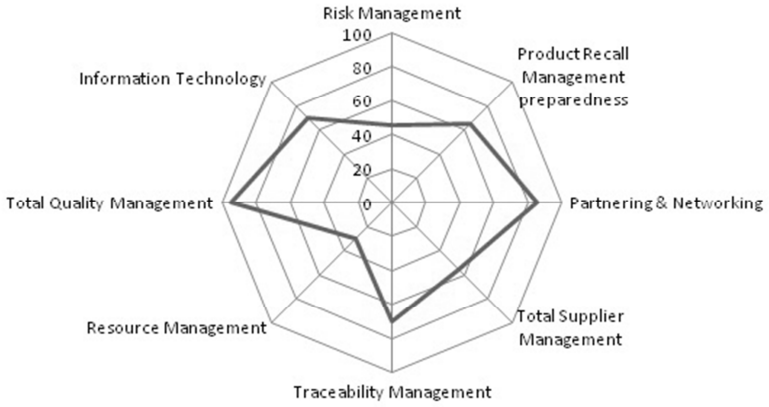

Fig. 3. Key elements of a Product Recall Management.

5. IMPLICATION FOR SCIENCE AND MANAGEMENT

Product Recall Management should be seen in full picture as a full integrating philosophy in the company´s culture. Due to it can be seen as a "Total Product Recall Mangement" (TPRM). [41]

Total Product Recall Management brings together the complete range of other relevant and important disciplines "key elements" as an integrated solution incorporating by the Information Technology[42] platform. Important elements are Total Supplier Management (TSM), Risk Management, Resource Management, Traceability Management, Total Quality Management, Product Recall Prepardness, Partnering&Networking and incorporating by the last key elements Information Technology (IT). The result is a combination of ultimate monitoring and controling in processes which focus a high efficiency in the elusive view of proactivity. Total Product Recall Management is incorporating a high level of value added.

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42 Information Technology (IT) is a part (key element as well) of the Total Product Recall Management.