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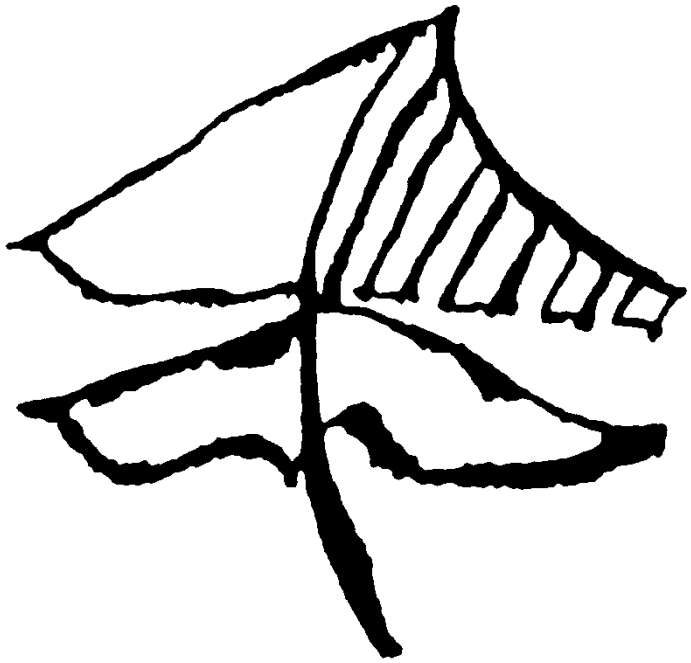

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SPIS TREŚCI

WSTĘP

26 zeszyt Rocznika „*Intercathedra '2010*" jest rezultatem współpracy naukowej Katedr zajmujących się zagadnieniami ekonomiki, organizacji, zarządzania i marketingu, zwłaszcza, choć nie tylko, w drzewnictwie - z Poznania, Zwolenia, Warszawy, Krakowa, Tarnowa, Trnawy, Zlina, Żyliny, Koszyc, Zagrzebia, Brna, Presova oraz innych ośrodków naukowych zarówno polskich, jak i zagranicznych. Zawiera między innymi opracowania zamówione przez Komitet Redakcyjny, oparte na treści wybranych referatów, wygłoszonych na Międzynarodowej Konferencji Naukowej pt.: Problemy energetyczne i ich wpływ na sektor leśno-drzewny w Polsce, Unii Europejskiej, Europie (Energy problems and their impact on the forestry and wood sector in Poland, the European Union and Europe) ECONOMIC FORUM '2009". Laski k. Kępna, 15 - 17.09.2009.

Zasadniczą zawartość zeszytu stanowią artykuły naukowe przekazane Komitetowi Redakcyjnemu w 2009 – po zamknięciu numeru 25 i w 2010 r. oraz zakwalifikowane, po pozytywnych opiniach recenzentów, do druku. Część z nich będzie przedmiotem rozważań i dyskusji podczas organizowanej w bieżącym, 2010 roku przez Katedrę międzynarodowej konferencji naukowej: FORUM EKONOMICZNE 2010' - Nowe wyzwania w zarządzaniu łańcuchem dostaw w przedsiębiorstwach przemysłu drzewnego - New challenges in management of supply chains in wood industry enterprises (14-16.09.2010).

Konferencje FORUM EKONOMICZNE zorganizowana są przez **Katedrę Ekonomiki i Organizacji Drzewnictwa** przy współpracy:

1. IATM - ***INTERNATIONAL ASSOCIATION FOR TECHNOLOGY MANAGEMENT,***
2. Leśnego Zakładu Doświadczalnego w Siemianicach,
3. Sekcji Drzewnej Stowarzyszenia Inżynierów i Techników Leśnictwa i Drzewnictwa w Warszawie,
4. Instytutu Technologii Drewna w Poznaniu.

Konferencja FORUM EKONOMICZNE '2010 jest XXVI międzynarodowym spotkaniem naukowym pracowników katedr prowadzących prace badawcze w zakresie ekonomiki, zarządzania, organizacji, marketingu w przemyśle drzewnym - z Krajów Europy Środkowej. Konferencja zorganizowana została między innymi przy współudziale IATM - ***INTERNATIONAL ASSOCIATION FOR TECHNOLOGY MANAGEMENT*** – międzynarodowej organizacji naukowej, zrzeszającej liczne katedry prowadzące badania naukowe w zakresie ekonomiki i organizacji w przemyśle, drzewnictwie i leśnictwie w krajach Europy Środkowej i Wschodniej.

Część opracowań i artykułów naukowych prezentowanych w niniejszym, 26 Roczniku „***Intercathedra '2010***", jest wynikiem wspólnych badań pracowników naukowych katedr z Poznania i Zwolenia nad realizowanym w ramach współpracy międzynarodowej w Unii Europejskiej tematem: „Survey of consumer attitudes towards wood products" (Analiza zachowań konsumentów i popytu na wyroby z drewna).

Rocznik niniejszy wydany jest pod auspicjami IATM, a członkowie tej organizacji honorowo opracowali recenzje, materiały do druku i przygotowali konferencje naukowe, za co składam im serdeczne podziękowania.

Wojciech Lis

Rafał Baum[1]

THEORETICAL ASPECTS OF SUSTAINABLE FARMING

Abstract: The study presents how sustainable development (SD) should be defined in agriculture and it was attempted here to define sustainable farm development. Moreover, the paper discusses a systemic approach to the organization and management of a farm.

Key words: sustainable development, farm's organization, farm management, holistic management

INTRODUCTION

In the literature, it is more and more often attempted to adapt the concept of sustainable development to microeconomic reality, where the object of development is a single enterprise or household. This trend is also noticeable in agriculture, although still it is manifested less dynamically than it could be expected. Many proposals have been put forward indicating in what way the concept of sustainable development may be realized in farming practice. Obviously such initiatives as social responsibility of business, business ethics, triple bottom line[2], or management of relations with participants of economic enterprises and processes contribute to sustainable development [Witek-Crabb 2001].

We need to indicate that there have been attempts, sometimes highly specific[3], to define agriculture following the concept of sustainable development, as well as determine requirements faced by farming striving to maintain sustainable development. Various ideas and diverse approaches do not yield a precise description identifying functions to be served by farming following the concept of sustainable development. At present conducted analyses do not offer a comprehensive picture, but they definitely show that it is a multi-faceted and multi-criterion problem.

In the course of studies on the creation of foundations for agriculture consistent with the theory of sustainable development it is necessary to define sustainable development of farms. Thus the aim of this paper was to collect justifiable recommendations for sustainable development in agriculture and attempt to propose its definition. An essential element of such a reasoning and process is to focus our attention on the criteria which – when using appropriate indicators – would facilitate an assessment of sustainability in agriculture, within the generated notional framework and in relation to agriculture on the macro- and micro-scale.

RECOMMENDATIONS FOR SUSTAINABLE FARMING

Agriculture is this area of human activity, which is very strongly and inseparably connected with nature and natural resources. Thus, since the very beginning farming was a crucial element of the green revolution at the turn of the 1980's and 90's. In view of the ideas contained in the Report of the United Nations Committee on the Environment and Development, entitled "Our Common Future" [1987], more commonly known as the Brundtland Report [Brundtland G.H. 1991], as well as regulations of another basic program document on sustainable development, such as Agenda 21 [UN 1992], the Food and Agriculture Organization (FAO) was one of the first bodies to formulate the concept of sustainable agriculture. In the developed definition [FAO 1994] we can read that "sustainable development is the management and protection of basic natural resources and it directs technological and institutional changes so as to guarantee the satisfaction of human needs – both for the present and future generations. Sustainable development (in the sectors of agriculture, forestry and fishery) protects soils, preserves pure waters, maintains plant and animal genetic resources – it is harmless to the environment, technologically adequate, economically justified and socially acceptable". In FAO's further documents (at the 21st Regional Conference for Europe, held in May 1998 in Tallinn) it was stated that "economically, ecologically and socially sustainable farming takes into consideration the preservation of the rural landscape, maintenance of economic attractiveness of rural areas and prevents job cuts and migration to the cities, both of women and men" [Minoiu 1999].

Among many definitions of sustainable development in agriculture a view predominates that it is a road to development, on which resource utilization and environmental management are combined with an increasing and sustainable production, guaranteeing satisfactory income and capital returns, food security, social stability and the participation of the population in the development process [Pearce and Atkinson 1993]. Sustainability, i.e. permanence and balance, is understood here as a result of dependencies and relationships between technologies, input of means of production and management, applied for a unique resource (the agricultural ecosystem) within a specific socio-economic context [Herdt, Steiner 1995]. It needs to be observed that the understanding of the term "sustainable agriculture" has evolved: from the first definitions, stressing the main objective as increased production of food and attempts to guarantee food security [UN 1992], to the definitions in which sustainable agriculture integrates three equally important objectives: concern for the environment, profitability of production as well as economic and social justice. These aims have to be supported by various activities in the area of ethics, politics and economic practice. The society in all its diversity – from the farmer to the consumer – contributes something to the vision and implementation of sustainable agriculture [UC SAREP 1997].

In conclusion, definitions of sustainable agriculture focus on the requirements and expectations concerning farming practice, which should be economically justified, meet the expectations of the public in terms of food quality, bring positive results for the natural environment and focus on welfare of both humans and animals [Wilson and Tyrchniewicz 1995]. Since these tasks may be realized in different ways, sustainable farming is not connected with only way farming method (although it is frequently and erroneously considered to be equivalent to ecological farming).

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[2] *„Triple bottom line" – a concept introduced by J. Ellington (1998), it assumes that the success of an enterprise is affected by its achievements in three dimensions: economic, ecological and social.*

[3] *Requirements concerning protection of agricultural environment are defined in the Good Farming Practice Code or Simple Good Farming Practice.*

Based on Polish literature on the subject we can establish main requirements which in the opinion of researchers should be met by sustainable agriculture. These recommendations are as follows [based on: Mizgajski 1998, Fotyma and Kuś 2000]:

- Production of food materials of high quality and in sufficient quantities (satisfying the domestic and foreign demand and at the same time not resulting in excessive, hard to manage surplus stocks);
- The application of environmentally-friendly production technologies in terms of soil, water and air protection and maintenance of ecosystem stability and diversity;
- Guaranteeing an adequate standard of living for the rural population thanks to the generation of technological infrastructure, jobs and decent income, covering not only the living expenses of the farmer's family, but also facilitating development, or at least recreation of the production assets;
- Maintenance and development of esthetic and recreation value of rural areas, with special emphasis on landscape and creation of potential for development of alternative types of activity for the rural population – e.g. rural tourism;
- Guaranteeing health and adequate welfare for humans and animals (health safety of producers and consumers, health food, livestock welfare).

All the above mentioned directions of activities have to be perceived as complementary, and not substitutive or mutually exclusive. Even in case of a conflict of the above mentioned objectives, it is desirable to treat them as integrated objectives – defined as a result of a compromise, realistically taking into consideration all priorities [Adamowicz 2000].

In case of farms that means, among other things, that it is necessary to adapt the directions and intensity of production to natural conditions found in the area. These issues are investigated in studies on the principles of organization and operation of farms, which would make possible the realization of objectives of sustainable development under varied natural, socio-economic and organizational conditions. Thus, the primary problem is to search for an optimal structure of production, which would facilitate efficient utilization of resources of a farm and effective combination of plant and animal production.

A NEW OUTLOOK ON SUSTAINABLE DEVELOPMENT IN AGRICULTURE

The model of sustainable development in agriculture, in which social and economic objectives are fully integrated with environmental goals, was initiated by the Common Agricultural Policy (CAP) reform implemented in 1992 under the supervision of Commissioner Mc Sharry. It started the creation of a new outlook on European agriculture, in which the primary role was assigned to such actions as providing conditions for sustainable development of rural areas, promotion of environmentally-friendly agriculture or the incorporation of planning concerning environmental activities into economic practice.

A significant contribution to the establishment of the concept of sustainable development in agriculture was also brought forth by the EU summit meeting in Cardiff in June 1998 [Jorgensen 1998]. Starting from that moment the so-called *Cardiff process* was initiated, in which successive European Councils confirmed and introduced environmental sustainable development issues to all EU policies. After the next Council meeting in Vienna (December 1998) the published "Guidelines for sustainable agriculture" [EC 1999] indicated the direct relationship between farming and environmental protection. The document explained also the *cross-compliance* concept, contained in the CAP reform adopted at the Berlin summit meeting in 1999 [Agenda 2000]. According to that principle direct payments should be related to meeting specific requirements and standards concerning environmental protection. The European Council meeting in Helsinki (December 1999) adopted the strategy of integrating the CAP environmental dimension. A special importance for the discussed problem is marked by the summit meeting in Goeteborg (June 2001), which accepted the EU strategy for sustainable development, definitely combining social and economic development with environmental issues [EC 2001].

Integration of environmental requirements from the CAP demands insight into numerous feed-backs and interactions, both positive and negative, found between farming and natural environment. It is also necessary to take into consideration the diversity of local conditions, production systems, etc. existing in the EU. In this respect we need to stress the principle stating the necessity to follow the so-called good farming practice (GFP), being a compilation of general, basic environmental regulations found in individual EU member countries.

A stricter system of compliance is evidenced in the above mentioned cross-compliance concept, in which the payment of financial support depends on the need to meet basic requirements concerning the use of plant protection agents, fertilization, etc., and which is to constitute an economic incentive for farmers previously neglecting the condition of the environment. The other aspect is connected with the so-called agri-environmental programmes, in which the society enters an agreement with the farmer to fulfill environmental objectives over the level required by the GFP, resulting in increased production costs or reduced income. This agreement provides the farmer with an additional bonus for the environmental service.

The CAP reforms contained in Agenda 2000, confirmed and extended at the Luxemburg summit meeting in June 2003, constitute a significant step forward in the implementation of the above mentioned principles. Complete integration of the environment protection requirements from the CAP is connected with the need to meet specific environmental requirements (negative and positive financial incentives), but it is also more extensively reflected in the market policy and the policy concerning rural development.

In conclusion, the concept of sustainable development in agriculture, promoted within the Common Agricultural policy of the European Union, assumes a harmonious and simultaneous fulfillment by farms of three functions: agri-environmental, economic and social [Runowski 2004]. In farming practice (similarly as in other sectors of the economy) this means the introduction of socially accepted, economically justified and ecologically sound production technologies [Dubel 1998].

Such an approach to this problem indicates it is necessary to see a farm as a system – a set of elements identified in their environment, functionally integrated, combined by feed-backs and subordinated to the realization of a specific goal. It is an entity, which existence is manifested in the synergistic cooperation of components [Belinger 2002]. In relation to the definition of a system we may define a farm as an organization, constituting a separate entity and having specific objectives, which all components thanks to the conscious and planned human activity cooperate and contribute to the success of the whole. The specific character of agriculture is related with a large share of elements representing natural resources, as well as a relatively high reliance on external conditions, first of all weather, by nature independent of man.

The effect of sustainability of development needs to be considered as a state of dynamic equilibrium, something to strive for, but upon achieving which it may not be considered permanent or long-lasting. In case of high dynamics of environmental changes the reached state may even become undesirable in a short time. A farm has to, by appropriate management, apply adjustment strategies, which by continuous organization streamlining processes makes it possible to find an adequate road to development in the changing reality.

The degree of production sustainability in a farm will depend on the effect of two types of interacting forces:

1. Integrating forces, resulting from links existing within the farm. They lead to multi-purpose farming, i.e. growing many plant species and breeding many animal species. This type of farm organization results from the attempt to offset individual balances on the farm (feeding stuffs, fertilization), mainly based on the farm's resources and following the principle of the closed matter cycle.
2. Differentiating forces, originating outside the farm. Their source is first of all the market, on which the farmer practically has no effect or has a very limited effect. They affect decisions on the cropping and animal breeding structure, as well as the structure of farm production through the criterion of profitability (prices of products, means of production and services). These forces encourage the farmer to undertake production activity, which meets the current demand and under specific natural, economic and technological conditions and guarantees an appropriate level of income.

The general theory of systems may prove useful in the description of the operation and identification of determinants for the activity of a farm and its equilibrium status. This theory assumes that a sensible method to investigate a complex organization is to study it as a system, defined according to the premises specified above. Analysis of this type treats an organization as a system of mutually dependent variables. According to the general theory of systems we may distinguish closed and open systems. Simplifying we may say that a system is closed, if it does not communicate with the surrounding environment, does not exchange with it any information. In case of a material system it means that no matter enters it or leaves it. In turn, an open system is found when it collects and releases a material substance with the environment [Bertalanffy 1984].

Since in today's agriculture there are practically no closed systems in the pure form, in case of farms we deal with an artificial, socio-economic open systems. The essence of management under these conditions is to provide an enterprise with stability of development, through careful control over its operation in the surrounding environment so that on the one hand it retains its separate identity, and on the other hand maintains an optimal level of exchange with the environment. An enterprise found in such a characterized state of dynamic equilibrium is an enterprise developing in a sustainable way [Witek-Crabb 2003].

An approach to a production organization, which would take into account the systemic character as well as sustainability, should consist in the determination of appropriate proportions between components of a farm, especially an appropriate relationship between sectors of plant and animal production, since they are closely related with land and participate in the organic matter and nutrient cycles. This results in the necessity to reassess in the management of a farming enterprise of the role of the so-called farming balances. Careful balancing of feeding stuffs, organic fertilizers and litter is particularly essential. Due to the above mentioned three balances we have to state that it will be easier to balance the demand with supply in farms running both plant and animal production (this pertains also to processing) than it is the case in farms, where no livestock is kept or farms running intensive animal production with very limited land resources, as it is the case with poultry or pig farms.

At the same time, running both plant and animal production and an appropriate selection of plants and animals facilitates a more comprehensive and uniform utilization and balancing of available labour resources, since demand for labour and animal traction varies. A diversified profile of production improves financial fluidity of agricultural enterprises, since activities requiring outlays in periods when they do not yield results may be financed from the results of sales of other products. An appropriate selection of the production structure will thus facilitate farming at limited amounts of financial means.

EU CONDITIONS FOR THE DEVELOPMENT OF AGRICULTURE

Decisions taken in agriculture are dependent on many factors, affecting the operation of this sector in economy and prosperity of farmers. They may include natural conditions, the market situation, technological changes, the development of new products and changes in consumer preferences, training, the structure and size of the farm, family traditions, or political conditions (especially the CAP). Although the policy towards agriculture is only one incentive, it is this factor which most frequently determines the success of agricultural activity. Agriculture, as hardly any other sector in the economy, is dependent on external support and in the EU is strongly dependent on constant and varied subsidies.

Analysis and evaluation of phenomena predominating in management of European agriculture indicate that the environment and socio-economic surroundings are influenced most by four strongly diversified trends [EC 1998]: intensification, specialization, concentration and marginalization.

From the point of view of sustainable development the first three trends cause the main threat to the environment (the agri-ecological area), while the last trend causes disturbances in the social and economic area. In all trends a common

feature is the marked domination of economic objectives in the development of a farm and attempts to guarantee maximum profits or minimum costs.

Modern agriculture has a considerable environmental, social and economic effects. They have been investigated for many years and primary problems have already been clarified. Their main causes are also known. The most essential issues and problems are found within the following topic areas [Cammarata 1997, IHAR 1998]:

1. Production: pollutants and contaminant residue in food, adverse market conditions for agricultural production, overstocking.
2. Natural resources: dependence on fossil fuels for energy, low efficiency of energy consumption in agricultural production, dependence on non-renewable deposits of phosphorus, water shortage, including that of high quality water, losses of nutrients released to the environment (nitrogen and phosphorus), deterioration of soil fertility (acidification, carbon content, nutrient contents, texture, salinity, soil compaction), erosion, pesticide residue in soil, water and living organisms, accumulation of heavy metals and nuclides, soil pollution with stable organic and inorganic substances, losses of genetic resources and losses of biodiversity, air pollution (ammonia, methane, nitrous oxide, pesticides).
3. Human and animal welfare: professional hazard for the health of farmers and consumers, dependence on growth promoters and antibiotics in animal production, insufficient care for animals and threats to animal health.
4. Socio-economic factors: inadequate profitability of agriculture, a lack of food security or food production safety, a disadvantageous social structure in rural areas, a lack of protection for natural and historic value.
5. Education and qualifications: a lack of education, know-how or farming skills.

In conclusion, the biggest threat for the natural environment arises from large-area farms with high stocking rates, applying large doses of artificial fertilizers, or inappropriately run farms. The primary agri-environmental challenge is to reduce the negative effect of agriculture on water resources. This may be achieved by reduced biogenic contamination, which to a large extent comes from animal production and inappropriate application of fertilizers and by reduced risk connected with the use of plant protection agents. Moreover, there are considerable differences between countries being EU members for many years and the new member states (including Poland). In western European countries point sources of pollution connected with storage of animal faeces have been objects of different environmental programmes for decades. In the "old" Union countries the so-called non-point sources are still a problem. Losses of nitrogen are most frequently correlated with total nitrogen balance in the system. Numerous corrective measures applied in cereal production have not show with absolute certainty that it is possible to reduce nitrogen losses to the level acceptable for the aquatic environment. It is crucial to develop effective tools leading to the implementation of this limitation. Modern agriculture is to a considerable degree dependent on feeding stuffs produced outside the farm, non-renewable energy sources as well as non-renewable phosphorus resources. Specialization in agriculture has considerably increased transport of goods and agricultural produce. In the new EU member states the elimination of inappropriate methods of animal excrement storage has only started to be implemented. There are large gaps in education and knowledge on sustainable agriculture, thus it is necessary to provide training, consulting and extension services as well as continuous training courses. Considerable effects may be obtained also thanks to an increase and maintenance of biodiversity. As a matter of fact, considerable differences are observed in terms of economic conditions and infrastructure of rural areas between individual countries but also between regions. This means that measures undertaken to achieve sustainable development objectives should vary. In particular, we may state that for the realization of the sustainable development concept in Polish agriculture it will be decisive in the nearest future to :

- preserve the value of the natural environment,
- improve the quality and hygienic standards of food production,
- provide decent income and living conditions for the rural population,
- to ensure multi-functional development of rural areas.

We need to stress again that there are close links between individual areas: ecological, social and economic. In order to protect and enhance the agricultural production area, which is a definite asset and thanks to which uncontaminated and tasty Polish food may be promoted on the European market, it is first of all necessary to adapt Polish farms to the European Union standards binding in the field of environment protection, hygiene and animal welfare. The emergency of such actions results from the fact that the potential utilization of subsidies by Polish farmers within the framework of support programmes for rural development, structural funds (i.e. improved income levels of farmers), will depend on meeting the above requirements by the farm.

A disadvantageous phenomenon, which is a serious threat in view of low profitability and competitiveness of Polish agriculture, is the intensification of production. A change in the traditional system of cultivation and animal breeding, concentration of livestock in large commercial farms, reduced stocking in small farms and manure fertilization replaced with mineral or organic-mineral fertilizers (coming from waste and sewage sludge), abandoning of the grassland farming system or a lack of knowledge on the potential application of environmentally-friendly technologies of agricultural production may lead to the degradation of the natural environment, and next prevent further running of agricultural production.

The future of rural areas and agriculture is important not only for farmers, but also for the entire society – the fate of a considerable section of the nation has been and will be in the future connected with food economy. The state policy towards agriculture in the nearest years will be based on the concept of sustainable development. According to the assumptions of this concept we may distinguish three basic areas of problems and challenges faced by rural areas:

- *economic* (lower than average income, ageing of the rural population, strong dependence on the sector of means of production for agriculture and on processing);

- *social* (higher than average employment rates, the so-called social exclusion, low diversification of the labour market and low employment density, which results in inferior accessibility of basic services);
- *environmental* (the pro-environmental role of agriculture and forestry).

In view of the above mentioned issues, primary objectives and priorities for the policy of rural development in Poland may be presented for the years 2007-2013 [MRiRW 2007]:

- improved competitiveness (support for the agricultural sector and forestry),
- improved state of the environment and landscape (sustainable management of farmland and forest land resources),
- improved living conditions of the rural population and diversification of economic activity in rural areas.

It will be difficult to combine these tasks, but obviously further evolution of agriculture and rural areas will be an attempt at a more or less harmonious combination of the three above mentioned problem areas.

The CAP reform aims at the limitation of traditional forms of support for agriculture and strives to meet new social expectations, concerning the additional functions of agriculture, such as e.g. care for the natural environment, the preservation of landscape or culture of rural areas. The promoted concept of sustainable development in agriculture will be implemented in Poland at the simultaneous strong pressure to increase competitiveness of farms – overcoming by our agriculture of the gap from the most developed agriculturally EU countries. Adoption of the development strategy towards modern agriculture, efficient technologically and economically, and at the same time friendly for people and the environment results in many important changes in the outlook on Polish agriculture in the next 25 years. Due to the fact that we are an exceptionally large rural and agricultural country it is advisable to actively discuss the new model of agriculture both on the macro scale, starting from agricultural and rural policy, and in the micro scale – finishing with conditions determining the development of a single farm.

DEFINING SUSTAINABLE FARM DEVELOPMENT

In view of the above we may attempt to formulate the following definition: sustainable farm development is a harmonious process of development occurring with the maintenance of appropriate relations and proportions between individual elements of the farm and its environment. The harmonization pertains to three areas: economic, social and natural. Precisely speaking, it is an on-going improvement of relations between the farm and its widely understood surroundings. This improvement consisting in increasing the complexity and diversity of the farm understood as a system. It is necessary to provide the capacity of the farm to understand the functioning of the surrounding environment as a result of gained knowledge on the economic, social and natural environment, in which the farm operates. Thanks to the obtained knowledge the farm should gain the ability to react to changes occurring in the surroundings and efficient adaptation to the situation.

The foundation for such understood development is rational organization and efficient farm management, consisting first of all in the capacity to see the complex network of different types of dependencies, links, feedbacks and conditions, in which it operates. It is essential to understand the interactions of internal elements with external ones. The task faced by the modern farmer is thus to harmonize and find appropriate relations and proportions between economic, social and ecological components of the farm activity. In practice, this means taking into consideration various issues concerning e.g. such specific problems as (apart from the above mentioned) the selection of production technology or its spatial localization.

An appropriate approach, following the spirit and idea of sustainable development, is to determine the long-term, undisturbed operation of the farm and provide permanence of development, the key element of sustainability, which may be defined in the words of Witek-Crabb [2005] following the Brundtland Report, as "the ability to realize today's aspirations and profits, while not harming the future potential".

It is important to provide a systemic approach to sustainable farm development. As it was already mentioned, the farm itself is a system, but at the same time a part of bigger systems, such as the ecosystem, an administrative unit and the sector of agricultural production. It seems that any theory of systems supplies tools to describe phenomena connected with sustainable development, then the complexity of the problem suggests that at the present stage we should take the small steps policy. Isolated components of the farm and its relations with the environment should be analyzed focusing on the compliance or discrepancy with the principles of sustainable development.

In relation to the definition presented above, we need to explain in more detail what the above mentioned and desirable harmonization in farm management consists in. We need to see an enterprise as a system and view the elements it contains, observe and understand their interdependencies. We need to talk about the harmonization of forces, processes and components comprising an enterprise, as well as investigate feedbacks with the environment in these terms.

It results from the considerations presented to date [Mouchet 1998] and research conducted by the authors of this study that specific objectives of sustainable farm development (their list obviously not being definitely closed) include:

1) Protection and management of water resources.
2) Protection of soils.
3) Protection of the air.
4) Rational management of non-renewable resources.
5) Protection and management of landscape.
6) Protection and management of biodiversity.
7) Increasing quality of life for the farmers and their families.
8) Livestock welfare.
9) Business ethics.
10) Growing quality of products.
11) Farm profitability,
12) Increasing social awareness.

13) Technological adaptation.
14) Employment.
15) Coherency of the three domains (ecological, economic and social) of sustainable development.

From the complexity of the problem of sustainable agriculture (overlapping and cohesion of areas and objectives) stems the difficulty in the possible assessment of the degree of sustainability of a farm. Such an assessment would require the creation of a list of indicators within each domain of sustainable development. The above mentioned dependencies and the systemic approach result in the necessity for each indicator to refer to several objectives at the same time. For example, if in the ecological area (domain) of the farm operation we establish an indicator of the application of pesticides (which as it commonly known in the integrated agriculture systems should be limited to the necessary minimum), then its establishment would consist obviously in the analysis which of the above mentioned objectives from the presented list and to what degree it refers to. In this case, it seems it promotes the realization of objectives 1, 2, 3, 6, 7, 10, 11 and 15.

Thus, a challenge for researchers is to determine what relations within the farm system, as well as in the contact with the environment, we may consider as those realizing sustainable development. In case of the natural environment the key is to define the admissible pressure on the environment. In case of the social environment one of the important issues is to develop the acceptable standard of health food. In turn, the economic sphere will require consideration of agriculture subsidizing, which in the present form is not consistent with he principles of sustainable development.

Among specific issues, which would have to be solved in the nearest future we need to mention the determination of premises of the sustainable development policy in terms of expectations or requirements addressed to farm owners. If sustainable development is a pro-active philosophy, making it possible for the farm to realize its traditional objectives in harmony with the environment, then a question arises whether (and to what degree) profit from the farm should result from the level of the farmer's responsibility for the relations with the social environment and whether it may depend on the degree to which he cares for the natural environment.

In conclusion, the operation of farms consistent with sustainable development is an activity which combines the basic socio-economic activity and the willingness to reach economic profits with care to meet the expectations connected with widely understood welfare and respect for the natural environment.

The concept of sustainable development is undoubtedly a direction in the policy, which is definitely meeting the expectations of the large public. However, we may not forget about certain dangers resulting from the unquestioning acceptance of its simplified assumptions. The basic threat is found in the mentality of politicians, agricultural producers themselves and excessively instrumental treatment of the concept. It is necessary to provide the activity of state agencies and bodies, but the necessary condition for its success is a change in the attitude of farmers, manifested in the slogan "sustainable development for farms", instead of the instrumental call for "farms for sustainable development". Sustainable development should not be perceived as a certain inevitable evil, resulting in the imposed additional limitations and costs on the farmer, but rather as a source of new prospects and several potential benefits.

Finally, we need to observe that fulfilling the requirements and tasks of agriculture facing the challenges of sustainable development requires an actual incorporation of the rural population to the information technology society, which will guarantee gaining new skills and huge amounts of knowledge, as well access to information, and ensure systematic keeping of records necessary to create indicators analyzing trends in sustainable development.

CONCLUSIONS

Based on the presented considerations on the definition of sustainable farm development we need to state that the key issue is the holistic approach to the organization and management of an enterprise. The road from theory to practice is burdened with problems. Running agricultural activity consistent with the requirements of sustainable development forces us to make decisions on the selection of methods and levels of utilization of available resources and rational decision-making on the allocation of these resources. Prior to the making of a management decision we need to define each time the objectives of a specific production activity (they are not exclusively economic criteria) and search for the best solutions, possibly guaranteeing maximization of the results within the adopted criterion for the realization of the objective. A condition for the proper organization and operation of a farm is to harmonize actions undertaken within all the three areas comprising its operation.

In consistence with the concept of sustainable development, apart from economic and ecological objectives, we need to fulfill specific social objectives, including for example the preservation for the future generations of an authentic rural environment, together with its culture and specific character, as well as provide good quality and healthy foodstuffs. It seems that the incorporation of the social factor may be most difficult when we consider the lack of education and civilization backwardness.

Such a generally outlined strategy of sustainable development in agriculture will undoubtedly be burdened with numerous theoretical and practical problems. It does not seem possible to be otherwise in case of the integration of economic, environmental and social objectives than with the complete utilization of the market mechanism and this generates multi-faceted difficulties [Tisdell 2006]. Technological change and scientific progress introduced to agriculture is obviously in opposition to the preservation of the traditional social structure and traditional cultivation systems. Uncontrolled progress may lead to mistakes and threats, such as those connected with the introduction of genetically modified organisms. Moreover, having agriculture subjected to the requirements of market competition should be an incentive to identify external costs farmers generate, which become the share of the society and next imposing them on producers.

The practice of subsidizing agriculture so far seems to promote opposite trends. The few existing programmes focusing on providing ecological operation of agriculture may be criticized for neglecting the economic component, since they in one way or another reduce production, as well as the social component, as they rather preserve than remove social

problems suffered by rural areas, especially the poorest regions. We may expect that in the nearest decades we will witness conflicts between competitive opinions on the manner to realize sustainable development. It may be also assumed that the confrontation will pertain to satisfying the market mechanism imposed on the agriculture with political control, which by subsidies and other incentives will strive to provide a relative balance between economic, environmental and social benefits.

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Jana Brieniková, Rudolf Rybanský[4]

THE APPLICATION OF THE PROJECT MANAGEMENT METHODOLOGIES IN WOOD INDUSTRY ENTERPRISES DURING WORLDWIDE RECESSION

Abstract: Wood industry has significant position worldwide. However, even on this type of industry has major impact the current worldwide recession, which has dramatically affected whole forestry and wood industry enterprises. Demand has been reduce at home and in foreign country. Therefore for wood industry enterprises is important initiate measure to the increase in wood consumption and its efficient processing. One of the verified options, how to respond flexibly to market, is application of the project management in business practice. In Slovak republic is still a low percentage of enterprises, which systematically apply principles of the project management. Maturity level of project management is low, especially in small and medium-sized enterprises and this is also due difference of used methods and methodologies**.**

Key words: worldwide recession; wood industry enterprises, project management; methodology; PMBoK, ICB, Prince2; STN ISO 10006;

INTRODUCTION

Recent development in global economy all over the world is characterized by the financial and economic recession. It refer to the fact, that transnational corporations has also been significantly affected by the global economic recession, and any sector does not remain without impact. Recession, after the crisis is the second following phase of the economic cycle. It proved by decrease and cessation of manufacturing and its stagnate on previous, a crisis or a somewhat higher level. The current recession will be probably deep and long, the largest since World War II. The economic depression significantly affected mainly car manufacturers, banking companies and also wood industry enterprises. Forestry and wood industry provides the basic materials, products and services for the future sustainable growth of companies. In EU countries forestry and wood industry provides around four million jobs and it uses renewable and constantly additional resources.

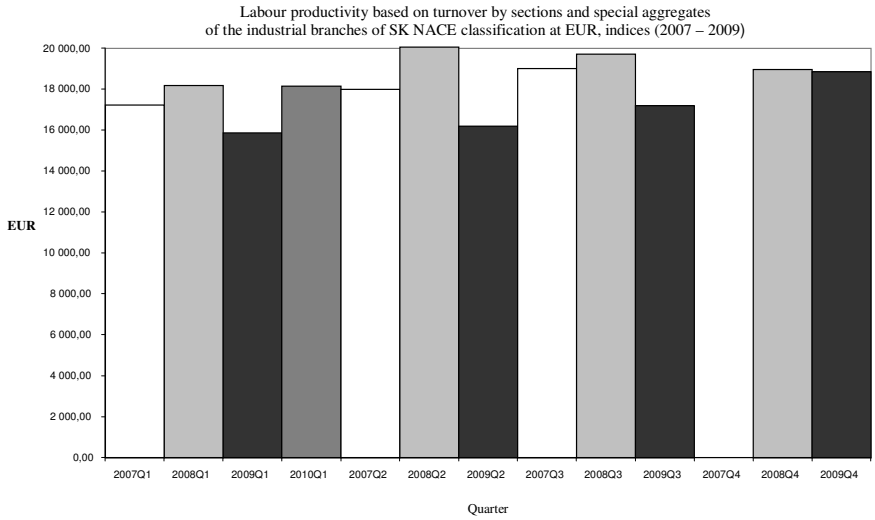

Fig. 1. Labour productivity based on turnover according to SK NACE - CC Manufacturing of wood and paper products, and printing, at EUR, indices.
Sources: http://www.statistics.sk

Business in wood industry in the Slovak Republic dropped in 2009 compared with 2008 up to 46 %. The prices of wood have also negative progress. Prices on world market fell down by 15 – 20 %. In the Slovak Republic, the price of wood decreased in average by 24 %. The global financial crisis and the current world wide recession detected flaw in wood industry enterprises in the Slovak Republic. Currently, we mine approximately 7 million cubic meters of wood per year. More than 20 % of this wood, what is approximately 1,5 million cubic meters, can not be processed. Hereby the production goes down. This situation causes decrease in number of jobs. However, in forestry in the Slovak Republic work 39 000 employees and in wood industry another 62 000 people. It means that 100 000 people are economically depending from this chain. In the wood industry, according to the Statistical Office of the Slovak Republic, labour productivity based on turnover by SK – NACE – CC Manufacturing of wood and paper products, and printing, at EUR, indices (Fig. 1) fell down in the first three quarter of 2009. In the fourth quarter of 2009 it was the same as in 2008. This trend continued in the first quarter of 2010.

Number of employed persons according to SK NACE – CC Manufacturing of wood and paper products, and printing, at person, incise according to the Statistical Office of the Slovak Republic is still decreasing, compared with labour productivity based on turnover (Fig. 2).

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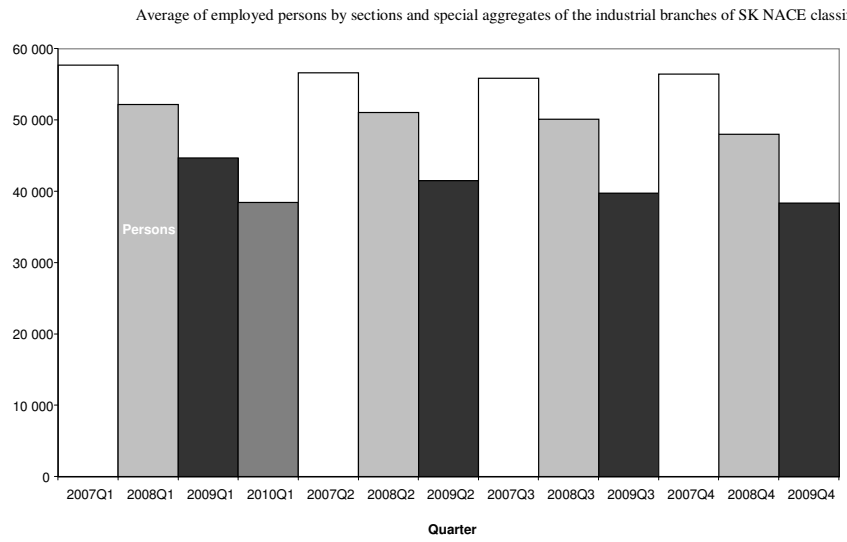

Fig. 2. Average of employed persons according to SK NACE – CC Manufacturing of wood and paper products, and printing, at person, indices.
Source: http://www.statistics.sk

Consequences of global financial crisis have also arisen in other EU countries. The most significant impact has been on prices of wood (about 10 – 20 %) and demand for wood. Recession of wood industry began already in 2007. The negative trend was continuing in 2008 and 2009. In the current period of the global worldwide recession, the situation has deteriorated. E.g. in the Baltic States the production softwood declined by 25 %, in Finland by 21 % and in Austria by 17 %.

1. WORLDWIDE RECESSION VERSUS THE PROJECT MANAGEMENT

Wood industry enterprises must ensure growth of labour productivity in the continued decreasing number of employees (as show Fig. 1 and Fig. 2). For these wood industry enterprises is important to apply the methods and forms of governance, which would help them increase labour productivity. One possibility is the application of project management.

The project management in recent decade has acquired important position in achieving corporate goals. Today it is also applied in the Slovak Republic. Wood industry enterprises therefore should focus on important activities that are crucial. Thus, developing of such projects, which will beneficial for wood industry enterprises and they boost the economy.

2. THE PROJECT MANAGEMENT AND METHODOLOGIES OF THE PROJECT MANAGEMENT

According to a recent study by Ernst & Young carried out in 2009 and 2010 in the Czech Republic, Poland and in the Slovak Republic, majority of enterprises realized the same number of projects than last year. Projects are still largely focused on the development and introduction of a new products and modernization of IT. For the first time the projects for reduce coast were foregrounded.

The study also indicates that for the last four years project quality has improved. It proved in an increase in the number of completed projects. The percentage of projects completed in time and within budget reaching 71 % in the Czech Republic. In the Slovak Republic this indicator reaches 62 %. Percentage of project completed after term reaching 23 % in the Czech Republic and 26 % in the Slovak Republic. Percentage of projects with exceeded budgets was 13 % in the Czech Republic and 25 % in the Slovak Republic.

Despite positive development (as show study), we can not underestimate the preparation and project planning including the calculation, which are the main cause of project failure.

The table 1 contains the main cause of project failure in the Czech Republic and in the Slovak Republic.

Table 1. Causes of project failure

	Czech Republic	Slovak Republic
1.	The change of project due to internal changes	The change of project due to internal changes
2.	The change of project because the project was incorrectly defined at the beginning	The change of project because the project was incorrectly defined at the beginning
3.	Insufficient of too optimistic budget / planning	Different expectations from the outlet of project
4.	Change of economic and macroeconomic environment	Poor staffing in project and coordination of team
5.	Poor management of project / unclear organizational structure	Insufficient or too optimistic budget / planning

Table 1 show that in the Slovak Republic is one of the main causes of project failure poor staffing in project and coordination of team. A considerable difference is in management of project. The function of the project manager is in the Slovak Republic most often hold by line manger (45 %) or head of the department (17 %). In the Czech Republic hold this function line manger and head of the department (12 %), bud in 45 % it is a real project manager.

This and other studies, including the researches conducted in the Slovak University of technology in Bratislava, Faculty of Materials Science and Technology, Department of Industrial Engineering and Management, highlighted the

needs to apply methods and tools of project management. These problems have continued in spite of international success in this area.

Already in the nineties was effort to promote international co-operation and standardization. The result was the emergence of the international methodologies. The most important are: PMBoK – Project Management Body of Knowledge, issued by PMI (Project Management Institute) used in the U.S.; ICB – IPMA Competence Baseline, issued by IPMA (International Project Management Association) used in Europe; Prince2 – Project In Controlled Environment2 used in UK.

In addition the Slovak Institute for Standardization issued the Slovak Technical Standard (STN) which is also applicable in project management. Very interesting is STN ISO 10006: Quality management systems – Guidelines for quality management in projects. Probably just this standard will be the most suitable for projects in the wood industry enterprises.

This International Standard gives guidance on the application of quality management in projects. It is applicable to projects of varying complexity, small or large, of short or long duration, in different environments, and irrespective of the kind of product or process involved. This International Standard is not guide to "project management" itself. Guidance on quality in project management processes is discussed in this International standard. Since this International standard is a guidance document, it is not intended to be used for certification, registration purpose.

Comparison of different methodologies for project management is very complex and difficult process. Each methodology is original, has a field of knowledge, techniques and tools. Therefore, it is very difficult to objectively compare its. One universal methodology for planning and managing projects does not exist and sometimes project managers have a big problem to determine which methodology is the best for their problem. All project management methodologies are based on equal footing. The main differences we can see particularly in the terminology and structuring. For large, complex and difficult projects we should choose sophisticated methodologies. Conversely, in smaller and simpler projects we should chose methodologies which will facilitate the project and will not do difficult.

According to the result of the survey in December 2009, conducted by Ernst & Young in cooperation with the economy weekly Trend, the most common methodology in the Slovak Republic is Prince2 (19 %). The second widely approved methodology is PMBoK (16 %), 11 % of enterprises use methodology rarely or never. In Poland dominate the PMBoK (53 %) and Prince2 (18 %). In the Czech Republic is the most common methodology PMBoK (35 %).

However many organizations mistakenly believes, that use of methodology means choose of methodology and its implementation. This method has a many pitfalls and usually does not lead to achieving the target. Therefore, for enterprises is very important to integrate the project management to everyday life. The methodology is only command not exact rule.

Wood industry enterprises should understand, that:

- one universal and the most common methodology does not exist;
- it is necessary to develop own methodology according to different standards of project management;
- created methodology need not to be the one complex for all.

In formation of methodology arise number of mistakes and we should avoid them. In particular: new methodology should not ignore the exist standards. This methodology should use standard terminology of project management. Methodology should not be abstract and complicated.

CONCLUSION

Wood industry has a specific position in Slovak economy. This industry is relatively little dependent on import of raw materials and wood industry is also able to form active balance of foreign trade. Given the raw materials resources it is significant factor of regional development, especially small and medium enterprises because they have good opportunities to utilize the change of production technology and the results of innovation processes. It can also promote development of employment. The impact of the worldwide recession and economic depression hit the wood industry, too. These enterprises must think strategically and try to use of wood resource. One possibility, how successfully to survive a period of recession in positive numbers and gradually to increase your sales, is engagement of project management. The project management in recent decade has acquired important position in achieving corporate goals. It is necessary to integrate the project management to everyday operations of enterprises, whether in wood industry, agricultural industry or in any other industry.

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DEVELOPMENT TRENDS IN MANAGEMENT DURING THE REFORM OF THE TAX ADMINISTRATION OF THE SLOVAK REPUBLIC

Abstract: The sources for the given subject research were preliminary organisational structures and systems of tax administrations that are currently in place in Slovakia as well as in Hungary, Poland, the Czech Republic and Slovenia. The basic presumption of the research is the increase of the system effectiveness en bloc. Based on the trends analysis we assume, that the upcoming reform of the Tax and Customs Administrations shall contribute significantly to the increase of the system effectiveness and at the same time bring along the improvement in positive perceiving of taxes, seen by public as socially unpopular obligations.

Key words: Taxes, tax reform, tax administration, effectiveness, competitiveness

INTRODUCTION

The management of the Tax Administration in Slovakia is governed by principles introduced after 1989. Despite the effort of recent years to decrease the number of employees, the system of administration of taxes in Slovakia can be considered as inefficient in terms of increasing competitiveness of the state. At present, the general tendency is to complain about the rigid, unfriendly bureaucratic apparatus, which brings about unwillingness of the citizens to comply with tax obligations and more and more strict regulations of the state. The final consequences of such conditions lead in to the mentioned decrease of competitiveness of the state and decrease of its credibility in the eyes of its citizens.

1. TRENDS IN THE MANAGEMENT OF THE TAX ADMINISTRATION IN THE SLOVAK REPUBLIC

The starting point of the up-coming trends in the Tax Administration of the Slovak Republic is the Programme Declaration of the Government[6] from 4 November 2002 which in its Section „Economic Policy" determines following objectives in the area of the administration of taxes: simplify tax legislation, amend parts of tax laws which allow for ambiguous interpretation, simplify the system of penalties in the tax area, decrease direct taxes, shift the tax burden from the direct taxes on to the indirect taxes, review and revaluate the application of property tax rates, unify income tax rates, analyse possibilities of introducing a single tax (rate), strengthen own tax incomes of municipalities, determine own tax incomes of higher territorial units, ensure strict, direct, just and efficient tax collection and decrease tax rates, reduce tax evasion, create new system of horizontal financial settlement.

The Slovak Republic, not only thanks to the last tax reform from 2004, introducing single tax rate, has joined the progressive states of the European Union and has significantly strengthened its attractiveness and competitiveness.

From the point of view of levels of managing taxes within the Slovak Republic, the current situation can be defined as official two-level management system; however, by transposing some of the competencies of the Tax Directorate of the Slovak Republic on to the Branch Offices of the Tax Directorate of the Slovak Republic (hereinafter "BO TD"), it actually is a three-level management system, based on the need of efficient management of 102 local tax offices which cannot be assured form one centre. Such organization of the Tax Administration is not optimal from several reasons, which follow:

- the performance of main business processes is scattered throughout the whole territory, when each local tax office (whether small, middle-sized or large) carries out all processes related to the administration, audit and enforcement of taxes, disabling thus the optimisation of the performance of these processes as well as costs for their performance from the point of view of the tax administration as a whole[7],
- the system of the distribution of local tax offices is not flexible enough because it does not enable to adjust the allocation of the main organizational units to the needs of the taxpayers,
- BO TD have become an administrative level of management within the current system of management, and for quite some time the need to concentrate the performance of certain processes (such as book-keeping, salaries) is becoming

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[6] *http://www-8.vlada.gov.sk/index.php?ID=918 – Programme Declaration of the Government 2002*
[7] *Rašner J., Rajnoha R.: Nástroje riadenia efektívnosti podnikových procesov (Instruments for Managing Effectiveness of Business Processes), Zvolen: Technical University in Zvolen, 2007.*

obvious as these are unnecessarily split between TD SR and BO TD and thus increase the administration and communication intensity (e.g. demand excessive administration and communication),

- in performing the work tasks of the employees of BO TD, some problems occur which are typical for those organizations who apply nother levels and types of management apart from the linear management (such as project, technical, methodological etc.).

Based on the above mentioned, the outline of the planned reform takes into regard the principle of justice, neutrality, simplicity and un-ambiguity, efficiency and elimination of double taxation. Analyses of the Institute of Financial Policy from years 2001 – 2004 show the reasons and obvious need for a reform:

- complicated tax legislation – intelligibility,
- too many exceptions, exemptions and allowances leading to social ineffectiveness because the production and consumption is not governed by the demand and offer but by the tax advantages,
- variability of setting tax base enabling optimisation on the side of the taxpayer is increasing administrative costs and decreasing the efficiency of control.

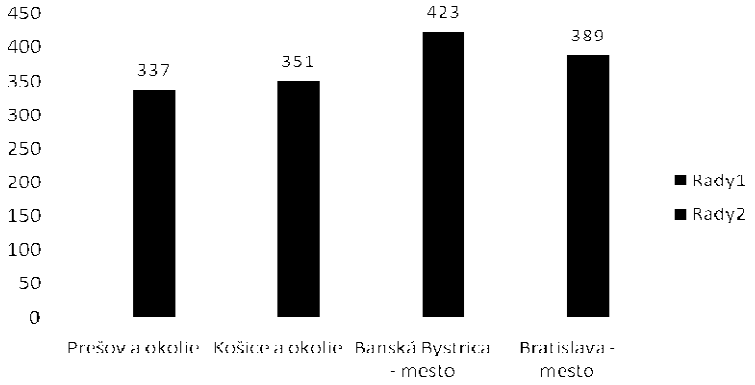
From the point of view of management and organization of the Tax Administration, further reasons can be:

- complexity of organizational structure – ambiguity and duplicity of the functions and competences on the central and regional level,
- costly administrative apparatus of the Tax Administration,
- non-transparent project management, decreased possibility of controlling processes,
- unwillingness of taxpayers to pay taxes.

The intention of the Government of the SR declared in the mentioned Programme Declaration of the Government of the SR is to carry out a reform of the Tax Administration in such a way which will make it more effective, with the aim of providing methodological assistance to the compliant taxpayers and detecting those taxpayers who are avoiding taxes. The objective is to create conditions for efficient co-ordination of the public authorities, to guarantee the access of the citizens to the internet and secure the interconnection of information systems of the public authorities. Another priority of the Ministry of Finance of the SR is the reform of the Customs Administration aiming at unification of the processes of collecting taxes, fees, customs and contributions. The reform should thus proceed in two phases, the first stage shall be the merger of the Tax and the Customs Administrations, the second stage will unify the collection of taxes, fees, customs and insurance contributions.

2. TAX REFORM AND ITS EXPECTATIONS – SELECTED RESULTS OF THE SURVEY

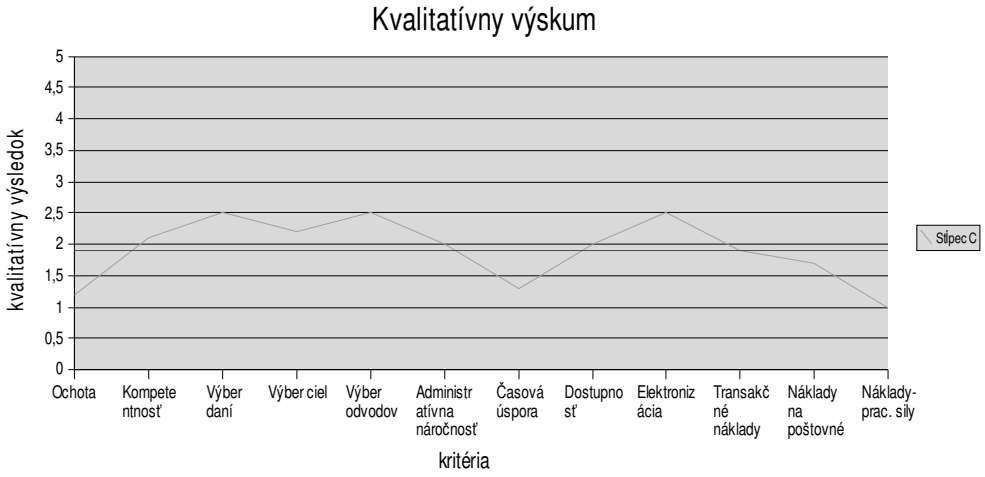
- time schedule of the carried out survey: 25/09/09 – 31/03/10
- geographical structure: Prešov and surroundings, Košice and surroundings, Banská Bystrica – township, Bratislava – township
- age structure of respondents: 18 – 60 years
- employed as: clerks, businessmen, students, some did not disclose their occupation
- representative sample: 1 500
- number of collected and completed questionnaires: 2187



Picture 1. Geographical structure of the respondents
Source: Own research based on the processed questionnaires

Qualitative Survey

willingness collection of taxes collection of contributions time saved electronisation mailing costs



competency collection of customs administrative burden accessibility transaction costs workforce costs

criteria

Picture 2: Results of the survey

Source: Own research based on the processed questionnaires

From the total number of submitted completed questionnaires, I have selected 1500 to constitute the representative sample so that the homogeneity remains maintained. The results from Picture 2 show an overall discontent with the tax and customs system in the SR; the most critical being the costs for the workforce dealing with the taxes and customs, as well as time needed to process this agenda.

Taking into account the expected benefits of the tax reform as provided in the document "Outline of the Reform of the Tax and Customs Administrations with the View of Unifying the Collection of Taxes, Fees, Customs and Insurance Contributions", elaborated by the Strategy Section at the Ministry of Finance of the SR, the planned reform should bring about improvement in the perception of all set criteria, and with the highest probability the current discontent will with the gradual introduction (of the reform) change for better.

CONCLUSION

Slovakia through the above mentioned process of tax reform approaches an effective tax system which will lead to the increase of effectiveness and competitiveness of our state amongst the EU member states. The impacts of the suggested changes can be divided into two main categories. The first category comprises the benefits of the reform of the Tax and Customs Administration in terms of saving the costs and time, growth of value added, efficiency of work etc. The second category is represented by the expenditures used for individual objectives of the reform of the Tax and Customs Administrations. Both of these categories can further be divided into the impact on taxpayer, that is the client / user, and impacts on the public administration. From the financial point of view, the highest importance have the impacts with permanent or repeated effect.

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PREFERENCES, ECO-FURNITURE AND ACADEMIC STAFF

Abstract: The paper deals with selected results of survey aimed at consumer preferences for eco-labelled furniture. Special purpose was to evaluate attitudes towards eco-products within specific target group – academic staff. Respondents of our sample consider eco-products rather for good, save and useful products although their price and lack of promotion are perceived negatively by most of respondents.

Keywords: eco-label, furniture, academic staff

INTRODUCTION

Environmental labelling – so called eco-labelling – is a voluntary, market-based approach to promote environmental conscious behaviour. It is based on the assumption that consumer interest in the environmental dilemma is strong, and that this interest will cause consumers to discriminate in favour of environmentally certified products. As such, companies who can prove that they are environmentally responsible by being certified will benefit by differentiating their products and increasing their products and increasing their share in the marketplace. The question is if environmentally sensitive consumers really exist. If yes, what the purchase power they have? Where to find such a market segment? The paper does not give direct answers, but some findings on this topic could be introduced.

OBJECTIVE AND METHODS

The main objective was to survey preferences for eco-labelled furniture within academic staff of Technical University in Zvolen. Considering fact that university is generally aimed at three components - forest, wood and environment – we supposed higher level of knowledge and positive attitudes towards such consumer article as eco-labelled furniture. Preferences of academic staff were surveyed by direct (personal) questioning. Questionnaires were distributed among staff of the following organizational parts: Faculty of forestry, Faculty of Wood Sciences and Technology, Faculty of Ecology and Environmental Sciences, Faculty of Faculty of Environmental and Manufacturing Technology and Rectorate. Respondents were chosen randomly. Regarding personal limits for data collecting, final sample size was created by 101 respondents.

Questionnaire composes of two main parts where first part contains identification data and second part six closed questions. Identification data was as follows: age intervals, gender, achieved education and appurtenance to organizational part. First question asked respondents if they ever meet some eco-labelled furniture. Second and third questions asked respondents if they would prefer furniture based on wood and if they would change the furniture in their offices. Structure of fourth question was different comparing others since the attitudes towards eco-labelled furniture were expressed by semantic differential. Following (fifth) question surveyed preferences for set of attributes connected to the object of study. The last question asked for attitudes towards furniture attributes, which could influence a mood of respondents.

RESULTS

Gender proportion was not equal in our sample since 74 % of women and 26 % of men were finally included. Three age categories contained the category of 15-30 years old respondents represented by 16 %, further 31-45 years old respondents represented by 45 % and over 46 years old represented by 39 % of the whole respondent sample. Dividing of respondents according to achieved education shows Table 1.

Table 1. Respondents and achieved education

Achieved education	Number of respondents
Primary school	0
Grammar / high school	30
University – 1st and 2nd degree (Bc., MSc.)	39
University – 3rd degree (PhD. and higher)	32
Sum	*101*

Organizational parts of the university were represented by the four faculties and two other units. The most of the respondents were from the Faculty of wood sciences and technology (34 %). Two respondents did not introduce the organizational part they belong to. Proportion of answers shows Table 2.

The proportion of respondents who already met furniture with eco-label comparing to those who did not meet any eco-labelled furniture yet was explored by first question. More than half of respondents (56,4 %) already recognised some eco-label on the furniture. We supposed, there were labels connected to the forest certification widely used at exterior (garden) furniture. Those eco-labels ensure consumers of wood products that the wood (of which the product is made) comes from the forest managed in an environmentally friendly manner.

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Table 2. Respondents and organizational parts of university

Organizational part	Number of respondents
Faculty of Forestry	18
Faculty of Wood Sciences and Technology	35
Faculty of Environmental and Manufacturing Technology	13
Faculty of Ecology and Environmental Sciences	6
Rectorate	21
Other units	6
Non marked	2
Sum	*101*

Interesting results brought answers on second question. Any respondent did not prefer other material (metal, glass, plastic etc.) than wood to furnish an office. Moreover, there were 76 % of respondents who marked answer "definitely yes" (I would prefer wooden furniture). Other answers (24 %) expressed their opinion as "rather yes".

Respondents assessed their attitudes towards an eco-furniture using semantic differential. Semantic differential contains 13 pairs of opposite adjectives (designed by researchers) which are expressed by the 10-points scale. The values of arithmetic means are introduced in Table 3.

Table 3. Attitudes towards eco-furniture expressed by semantic differential

Order	Pairs of opposite adjectives	Arithmetic mean
1.	good – bad	1,94
2.	cheap - expensive	6,4
3.	valuable – worthless	2,74
4.	advantageous – disadvantageous	2,89
5.	quality – inferior	2,67
6.	affordable – unattainable	5,26
7.	engaging – repugnant	2,93
8.	perfect – imperfect	3,41
9.	save – dangerous	2,23
10.	useful – unnecessary	2,42
11.	promoted – non-promoted	5,07
12.	truthful – mendacious	3,22
13.	necessary - unneeded	3,05
Overall mean		3,40

Academic staff assessed eco-furniture mostly by positive adjectives as good, save, useful. They consider it rather for valuable, advantageous, quality, engaging and even necessary. On the other hand, the most negatively were assessed attributes price since respondents perceived eco-furniture as expensive. In spite of fact that more than half of respondents already met eco-labelled furniture, they perceive it as unattainable. Moreover, furniture with some environmental attributes has a lack of promotion according to the respondents since it seems to be slightly non-promoted to them (Graph 1).

Graph 1. Attitudes towards eco-furniture expressed by semantic differential

Analysis of answers according to the demographical data did not showed any significant differences between groups of respondents except of fact that employees of Faculty of Ecology and Environmental Sciences assessed before mentioned promotion very negatively (arithmetic mean 7,83 – non-promoted) comparing employees of other organizational parts.

Selected purchase decision factors had been chosen to identify the most important for such a special target group. The evaluation was done within 5-point scale and the results are introduced in Table 3. The lower arithmetic mean is, the higher importance for respondents it means. Verbal assessment is as follows: 1 – always, 2 – yes, 3 – rarely, 4 – no, 5 – never.

Table 4. Assessment of selected purchase decision factors

Order	Preferences	Arithmetic mean
1.	Reputation as eco-product	2,43
2.	Producer with good environmental reputation	2,54
3.	High share of handwork	2,44
4.	Design	1,39
5.	High share of natural materials	1,81
6.	Low price	2,29
7.	Low share of chemical admixture	1,98
8.	Long life cycle	1,6
Overall mean		2,06

Probably not surprisingly as the most important factor was assessed design. This factor was followed by long life cycle, high share of natural materials and low share of chemical admixture.

CONCLUSION

The results of survey confirmed higher loyalty of academic staff (more than half of respondents) towards eco-labelled furniture as we expected. No significant differences between employees of organizational parts of Technical University in Zvolen occurred. Consumer attitudes towards certain attributes of eco-furniture (using semantic differential) were assessed similarly comparing previous research aimed at products generally.

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***Monika Fedorčáková, Peter Poór*[9]**

SYSTEM SOLUTION NEED OF CAR NUMBER GROWING IN SLOVAKIA

Abstract: This paper emphasizes the need of fewer cars use. With the help of current state and the optimal level of product engineering needs of the selected car comparison, setting its overproduction, environmental impacts are quantified, also environmental and economic benefits of fewer cars using are outlined. This paper is also looking for innovative analysis of vehicle downtime. With the help of simple calculations based on continuous recording of the selected parking area analysis value of stoppageness of product and selected phase of its life cycle was implemented. Description of its redundancy is based on stocks theory, for which assistance need for cars with aid of logistics chains for these products has been written.

Key words: stoppage, overproduction, car number, environmental impact, pollution.

INTRODUCTION

Growing number of cars on roads has resulted in increasingly high levels of downtimes. According to [1, 12, 13] in Slovakia, in 2006 were more than 1.3 million cars with an average age of 14 years / now it's more than 1.5 million/. If this trend continues, it is to be expected, even in situations of mild economy cooling, that each year 200,000 new cars will emerge in new: used ratio 1:1. According to [1] we can expect that by 2015, Slovakia reached the mobility at 2.3 to 2.5 what corresponds to increase in number of cars to about 2.2 million in 2015. Lets ask ourselves a question to what extent this situation will be acceptable? Growth in cars number is evident in national level and this trend is foreseeable also globally. It is necessary to introduce a system measure which would allow more efficient use of an increasing number of cars that would ultimately allow reduce overproduction of these products and reduce their high downtimeness.

1. LOWER CAR NUMBER NEED

Based on results of analysis carried out at Faculty of Mechanical Engineering TU of Kosice, with help of continuous recording according to [2] we can conclude that observed car set are used only for 25.88% of their potential usefulness. Assuming that the observed parking area will be a "stock" of cars. Stocks can be managed with assistance of well-known stock management models. Introducing the "P" inventory management system according to [3, 4, 5] it is possible to reduce the amount downtimes from current 74.12% to 32.17% (i.e. 56.60% to reduce the number of used cars), by which we could achieve significant economic and also environmental savings.

2. ENVIRONMENTAL IMPACT OF CAR NUMBER LOWERING

By reducing the number of cars about 56.60% to their present use, it would be possible to achieve significant economic and environmental savings in all stages:

- Need of less input materials, followed by lower environmental impacts on the environment,
- Saving of environmental components in production stage by influence of less cars production

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- Stage of disposal will be less difficult.

Crucial is also the impact on critical situation of parking in densely populated areas in present, due to planned use of smaller number of more efficiently used cars.

Tab. 1. A current state of car evidence in Kosice and Slovakia and their number when more efficient using [6]

	Number of cars using current system /year 2008/ 74,12 % downtimes	Number of cars using new system 32,17 % downtimes
Kosice Region	194 563 *	84 440
Slovakia	1 544 888 *	670 481

3. ENEFITS USING LOWER NUMBER OF CARS

Assuming a more efficient use of cars, their reduced number would mean a fall in their production, as the entities at this stage are adapted to requirements of their consumption. With decrease in production of various car parts related to lower quantity of raw materials extracted and processed, which is related to lower burden for the environment.

As in the material structure of the cars steel (body) is mostly represented (more than 50%), this would hit mainly the quantity produced, amount of extracted iron ore, generated wastes. In average European car with mass 1100 kg it would be involved more than 550 kg of steel (in average American car even more) [10].

With production of steel emergence of various waste types is related, both mining and processing of primary raw materials for its production - iron ore. Ore is classified as a non-exhaustible natural resource. If we focus only on the consumption of raw materials - iron ore to produce one tonne of steel, according to [10] can be stated that a tonne of steel consumes 1.725 tons of iron ore. For an average European car is consumed more than 950 kg of iron ore (for the U.S. even more). When this number is reflected in data about potential savings, they can be simultaneously used in the manufacturing of cars compared with proposed number of cars in their greater use in Slovakia, 830,687 tons of iron ore (Table 2).

Tab. 2. Number of saved cars and iron ore when better cars using

	Kosice	Slovakia
Number of saved cars (67,83% USE)	110 124	874 407
Number of saved IRON ORE (t)	104 617,8	830 686,65

Similarly, with the production of cars more energy-and material-intensive processes are related. An interesting look at the car manufacturing productivity in terms of material is provided by a German expert [11]. He prepared a concept of material intensity per unit of service that allows calculating the quantity of displaced material to ensure its production, production of a car. According to this expert, accompanied by the production of one car is accompanied by production of 15 t of solid waste, not including used and polluted water [11]. If this number is reflected in data on savings, theoretically we could save up to 13 105 tons of solid waste.

Tab. 3. Number of saved cars and solid waste

	Kosice	Slovakia
Number of saved cars (67,83% USE)	110 124	874 407
Number of saved solid waste (t)	1 651 860	13 116 105

As a result, our new approach of users, it could save tons of generated waste, it would be possible to avoid excessive mining of inexhaustible resources and prevent negative impact of automobile production on environment, including impacts on our health. Of course with every process of surplus production and extraction, as well as disposal, economic consequences relate. Our aim now should be a better use of existing cars. On the contrary, today we are witnesses of artificial demand for these products creation.

Positive impact of new management system use of cars due to a reduction in number will also be reduced the amount of cars prepared for disposal.

Currently, in relation to car wrecks processing we have three approaches:

- Selective removal (reuse undamaged parts)
- Complete removal (recycling material);
- And schredering (fragmentation of car wrecks and subsequent separation of materials).

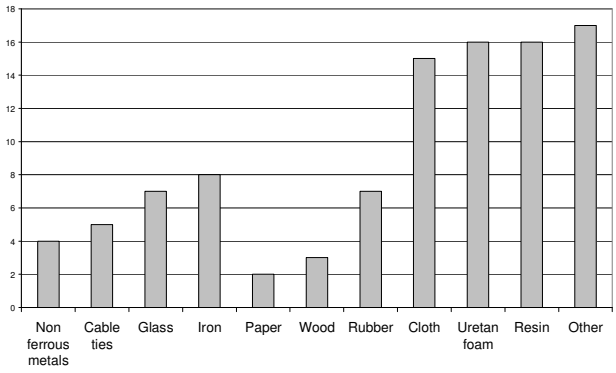

Fig. 1. Composition of schredered wreck (mass in %) [1]

It is expected that on waste sites in Europe, annually up to 2 millions tonnes of shreded waste from vehicles is put. In Slovakia, according to [1] in 2008, 21 old vehicles processors using technology of selective removal and technical schreding, more in [1]. By more efficient use of fewer cars, there is greater abrassion of them, so their number per would not be reduced by 56.60% than it is the number of used cars, but the number will still be significantly lower.

In the future it would be appropriate to particular, in our conditions relatively high proportion of "old cars" and continue to search for environmentally safe, technically feasible and economically viable means of disposal of current and future car wrecks but also unused components in their processing.

CONCLUSION

Marquand example of artificial overproduction and increasing demand for products is the car and the ambition of this contribution was to highlight the issue of idle cars in stage of car use and highlight the fact that high levels of downtime are source of significant economic, but mainly environmental losses, which can be prevent with targeted access. Based on the optimal use of specific product it is possible to analyze similar aspects in most of technical products and explore new methods of waste products and thus help to optimize product life cycle.

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STRATEGIC MANAGEMENT OF COSTS FOR THE DECISION-MAKING OF ENVIRONMENTAL MANAGEMENT

Abstract: Strategic management includes also the aspects of sustainable development as a strategy promoting ecological sustainability. Permanent concern in the environment protection and increasing pressure of involved groups (namely state administration, public and business partners) on the responsible approach to environment leads enterprises to introduce systems of environmental management. Implementation of these systems may imply enhanced competitive advantage in the form of reduced costs or a possibility of providing a differentiation on the market. To formulate meaningful strategic plans and strategies, one needs a number of initial data and prerequisites. An important source of information for decision-making processes within the strategic environmental management is environmental managerial accounting. The environment-oriented information system should also include data about environment-induced financial impacts on the enterprise management, especially about costs spent in connexion with environment protection (environmental costs). The paper deals with the characterization of tools applicable by environmental management in the formation of strategies leading to improved competitiveness of the enterprise under conditions of long-term economic recession.

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Keywords: strategic management, environment protection, environmental management, sustainable development, environmental managerial accounting, environmental costs

INTRODUCTION

Wood-processing industry in the Czech Republic is represented mostly by small and medium-sized enterprises. The recession which affected the wood-working industries due to essential decrease of demand both in the European Union and worldwide has impacted not only manufacturers with a high added value but all others too. In order to overcome the recession it is necessary that the company management choose a strategy, which would lead towards increased competitiveness of the enterprise.

At the present, management techniques gain ground, which introduce into the process of decision-making the environmental viewpoint at the same level as the other viewpoints such as commercial, entrepreneurial, manufacturing and developmental. These management systems are environment-oriented and represent a voluntary activity of the enterprise focused on the improved effect of corporate activities on the environment and on the provision of relevant information to public and other involved entities.

The company management needs for their decision-making as much information on actual costs as possible. For needs of environment-oriented enterprise management it is necessary to identify all crucial and for decision-making processes relevant environmental costs. It is therefore necessary to introduce the information system, which would complement the financial accounting with environmental costs, cost savings and non-financial scales characterizing impacts on the environment and environment changes. Although the complementation of the financial statements with selected measurable effects of environment and social development makes it possible to extend the measurement of financial efficiency and position of the enterprise in line with the requirements of financial accounting, it does not provide for a complex measurement of sustainable development of the enterprise. The quantification of environmental costs and gains commonly not displayed in accounting and related to externalities are relatively complicated; it presumes a material characterization of impacts on the environment and on the man, valuation of such impacts and allocation of common costs among independent accounting units. Important in assessing the informative capacity of environmental accounting data is their applicability in setting out long-term objectives and in their fulfilment (or non-fulfilment), in the assessment of optimum allocation of resources, in the coordination of corporate activities as well as in the establishment of performance efficiency as fixed points for orientation in the uncertainty of future development. Usable criteria of environmental accounting are tools of strategic managerial accounting.

The aim of the research is to analyze tools of environmental management that may lead to enhanced competitiveness of enterprise with a special focus on the characteristic of environmental managerial accounting, which deals with the identification, pricing and allocation of environmental costs and which provides information for the company management to properly recognize opportunities for their reduction.

MANAGEMENT STRATEGY

In current variable conditions, strategic management is a valuable tool to predict future development and prosperity in any organization. The attitude of enterprising entities to environment protection expressed by means of business plans and strategies will be increasingly important for enterprise competitiveness due to the following reasons:

- Enterprises will be forced to pay an ever more consistent attention to environment protection as to a strategic issue of competitiveness and they will be increasingly requested to individually contribute to the solution of environment protection so that it can be understood not only as a growth-limiting factor but also rather as a prerequisite of growth.
- Limitation of natural resources will lead to a situation in which corporate activities will have to show a certain environmental efficiency in order to secure the existing and to win a new potential for profit and profiling of enterprises.
- Consumers will increasingly demand environment-friendly products.
- The idea of corporate behaviour must be understood as an objective at decision-making. Therefore, environmental objectives must become a part of strategic corporate objectives and their inclusion means accommodation of all corporate activities to the environmental aspect.

The respecting of the environmental aspect in the corporate strategy may contribute in the achievement of competitive advantage provided if:

- the corporate strategy of environment protection is understood as integrated in all corporate functions,
- inward measures of the company are connected with market-oriented measures,
- company gains a timing advance by dealing with the environment protection ahead of competitors.

The decision on which of the basic environmental strategic concepts should be implemented depends on actual conditions of the enterprise. Strategies of sustainable development can be classified according to the character of competitive advantages, i.e. according to advantages based on costs reduction (strategy of price leader) or according to the provision of a possibility to differ on the market (strategy of differentiation).

We can differentiate the following types of strategies (Kocmanová 2003, modified):

- process-controlled strategies of sustainable development – are defined to give the company advantages on the part of costs through improved efficiency of environment protection. They serve to curb depletion of resources, to reduce the consumption of materials and energies, emissions and waste water being represented for example by changes in the control systems of pollution and waste production, changes of manufacturing processes, use of recycled materials from manufacturing processes and use of renewable energy sources.
- market-controlled strategies of sustainable development – give the company competitive advantages in enabling an ecological differentiation of their products from the products of their competitors, reflecting products management.

Environmental risks as well as costs for the entire cycle of products and services should be minimized. Some activities of which the strategies consist feature entrance onto new environmental markets or their parts, introduction of new environment-focused products, new design of products and packaging, sale of waste.

- development of the strategies of sustainable development – encompasses strategies for costs savings, differentiation on the market and products management. Competitive advantages are gained thanks to the decision of the company for the environment. For the decision-making within the strategic management, it is necessary that attention is paid to integrated products policy through the modification of product life-cycle characteristics.

Strategic cost management represents a result of the further development that has become necessary due to changed conditions in management – from the traditional calculation of costs through cost accounting up to the strategic management of costs. The objective of the strategic cost management is to optimize (minimize) the formation of cost-determining factors, i.e. to influence them with a focus on the objective timely in order to avoid emergencies. (Kocmanová 2003)

ENVIRONMENTAL MANAGEMENT

Government policy in the field of environment contains among other things various types of instruments and approaches that must be chosen with respect to environmental policy and its objectives. At that, one of the most important viewpoints is the risk level and time. In dependence on the character of problems resolved, available for use are "hard" or "soft" tools ranging from prohibitions through taxes, charges and tradable permits for environmental marking and enterprise management.

Environmental management represents the part of enterprise management, which is focused on environment protection. If the management of the company intends to focus on environment protection, they can voluntarily choose in the Czech Republic from a group of instruments whose aim is to improve the influence of corporate activities on the environment and to provide relevant information to public and other involved parties.

Voluntary tools of environmental policy can be defined briefly as formalized means applicable by entities (e.g. enterprises) in their environmental strategies but not enforced by legislation. Basic voluntary tools the promotion of which in the Czech Republic is fostered by approved national programmes are as follows: National programme of environmental marking (marking of environment-friendly products and services, the environmental statement itself, and environmental declaration about the product), environment control systems and systems of cleaner production. (Statistical Yearbook Environment 2009) Some of the tools are described below.

1. Labelling of environment-friendly products and services

The labelling of environment-friendly products and services represents one of indirect voluntary tools of environmental policy. It is an important element that builds on the principle of voluntary attitude and cooperation of manufacturers in entering tenders and decision-making process whose result is granting of the prestigious rating to a product or a service by the Ministry of the Environment. (Statistical Yearbook Environment 2009)

The National Programme of Environmental Labelling – the labelling of products with the registered trademark Environment-friendly product/service (EFP) and the European Programme for labelling products and services with the EU eco-mark (so-called Flower) provide a possibility to choose environment-friendly products on the market. According to the Statistical Yearbook Environment (2009), the Czech Republic had for the Czech eco-mark technical regulations established for 56 groups of products and 5 categories of services, 205 valid licences entitling for its use, which were used by 92 firms. Environment-friendly criteria for the European eco-mark were established for 22 groups of products and 2 categories of services with 18 licences granted for EU eco-mark use and 14 companies being holders of the EU eco-mark.

As to the wood-processing industries, we should also mention certificates of wood-based products, which are to guarantee environment-friendly manufacturing and trading procedures. Only two of numerous national and international forest certification systems are of practical importance in the Czech Republic – Programme for the Endorsement of Forest Certification Schemes (PEFC) and Forest Stewardship Council (FSC). The two systems have their logos to mark certified products and to help the consumer in learning that the product is made of wood originating from forests managed under sustainable development schemes.

2. Environment management systems

Environmental management systems are to lead enterprises to permanent improvement of corporate environment protection and to public performance of environmental policy and activities focused on environment protection. They can be defined as a part of the general system of company management the aim of which is incorporation of requirement for environment protection in the overall strategy of the organization and its daily activities. In the Czech Republic, economic entities of both manufacturing and non-manufacturing sphere apply two systems in the control of environment protection – the system of environmental management introduced according to ISO 14001 (EMS) international standard and the management system including the respect of environment protection according to EU directive (EMAS). State administration supports the introduction of environmental management systems particularly according to EMAS programme in line with the EU procedures in order to create conditions for Czech manufacturers to be competitive in this field on the Single Market of the European Union. The introduction of environmental management systems should lead to savings in the consumption of materials and energies and hence to the reduction of costs.

The ISO 14001:2004 standard Environmental Management Systems – Requirements with guidelines for use (published in the Czech Republic as CSN EN ISO 14001:2005) defines EMS as a "component part of management system of the organization used for the development and introduction of its environmental policy and management of its environmental aspects". It is an instrument of regulation and education since its goal is to introduce such a system of company management, which would ensure continual mitigation of negative impacts of corporate activities on the environment as well as continual education of company staff and relevant interest groups. (Remtová 2006) The Registry of

organizations with ISO 14001 publicized on the website of the Czech Information Agency for Environment includes 1 884 corporations now; however, the list is incomplete.

The EMAS programme was introduced in the Czech Republic pursuant to the Decree no. 466/1998 of Government of the Czech Republic on the introduction of eco-management and audit scheme. The updated version of EMAS II currently in force is characterized in the EU Directive no. 761/2001, which was adopted by the Czech Republic based on the Government Decree no. 651/2002 Sb. The directive defines EMAS as a "component part of the overall management system, which includes organizational structure, planning, responsibilities, techniques, procedures, processes and resources for the development, implementation, achievement, assessment and promotion of environmental policy". It is a preventive tool of regulation because its goal is to introduce such a system of management that will ensure the continual mitigation of negative impacts of enterprises on the environment and that will support preventive measures. (MŽP 2002, modified) According to the Statistical Yearbook Environment (2009), the number of granted EMAS registrations at the end of year 2008 was 32.

Depending on the company size and on environmental risks related to its operation, it is possible to choose from several different tools intended for the introduction of environmental management systems. The tools are meant not only for large multinational corporations but can be used also by small and medium-sized companies, public administration, service providers and even by small tradesmen. Environmental accounting may be one of the tools.

ENVIRONMENTAL ACCOUNTING

Environment protection is increasingly important for competitiveness of enterprises. Therefore, an information system must be available to support decision-making, which would contain data about the consequences of company's impact on the environment both in financial and alternative indicators.

Environmental accounting, which essentially connects with the requirement of increased corporate responsibility for the management of results of corporate activities not only in the narrow economic (financial) field but also in ecological and social fields, enables companies to resolve basic issues of measuring their performance efficiency. The goal should be sustainable development of the enterprise, i.e. attainment of its economic development at respecting requirements of environment protection, thoughtful exploitation of natural resources and people's needs. Important means for stakeholders to learn whether the company runs its policies, plans, products and processes towards a direction, which promotes the transition to sustainable development are available data about the company's activities. Environmental accounting should be a basis for the integration of data about the influence of the enterprise on the surrounding environment into the corporate accounting.

A key issue of management is the establishment of expected plans and objectives of future development of the company, including the establishment of criteria for the assessment of measure to which the objectives are fulfilled. The aim of environmental accounting information and criteria is not to replace the traditional financial criteria but rather to add to them further scales, which will make it possible to valuate and express the future development of the enterprise. The task of these additional criteria of not only monetary nature but particularly of in-kind character is to assess causal connections between the development of monetary indices and development in other fields of corporate activities. By this way, characteristics can be measured, which make it possible to evaluate the rate, reliability and innovation of internal processes, working conditions of employees, their loyalty and thus to reduce the measure of uncertainty about the future development of the enterprise. Essential in the creation of environmental accounting system of criteria is to learn characteristics that can be influenced by the company through its future activities, to set a certain amount of criteria and indicators based on the knowledge of causal relations of their influence on ecological and social environs of the company. By a suitable combination of monetary and natural criteria, standardization of their measurement, incorporation into corporate information systems, it is possible to develop information systems meeting the basic requirements for comparability, temporal continuity and conclusive evidence of data. (Fibírová 2009)

Considering different types of users and their requirements for information, the environmental accounting system can be divided into environmental financial accounting and environmental managerial accounting. With respect to decision-making processes within the strategic management, we describe below the environmental managerial accounting, which needs to be introduced if the company attempts at EMAS II implementation. Introducing the environmental managerial accounting, the company has to follow methodology issued by the Ministry of the Environment of the Czech Republic. The single methodology came into effect on 1 January 2003 as a "Methodological guideline for the introduction of environmental managerial accounting" (hereinafter Methodological guideline).

Environmental managerial accounting (EMA) is an integral part of management. It deals with the identification, collection, estimation, analyses, reporting and delivering of:

- information on material and energy flows,
- information on environmental costs,
- other information expressed in monetary terms that represent a starting point for decision-making in the concerned enterprise. (Methodological guideline 2002)

EMA comprises and integrates two fundamental blocks of the sustainable development – environment and economics as well as what role the aspects play in internal decision-making processes of the company.

Regarding the fact that in the traditional accounting system the data on environmental costs are hidden in aggregate cost items and some environmental costs are not recorded at all (externalities), the company management does not have available all necessary data for the decision-making and for the formulation and implementation of proposals and measures aimed at mitigation of the impacts of corporate activities, products and services on the environment and for the reduction of total costs. Projects focused on environment protection, which are to prevent emissions into the air, sewage water and waste

directly at the source, usually do not have correctly evaluated their economic and environmental benefits and are therefore many a time not realized.

EMA puts a special emphasis on accounting of environmental costs. It includes not only information on environmental costs and other data expressed in monetary terms but also information about material and energy flows and environmental benefits. (Methodological guideline 2002)

The EMA system always depends on the needs, concerns, objectives and resources of the enterprise. EMA can be applied at various extents and may encompass individual processes or groups of processes (e.g. manufacturing line); system (e.g. illumination, wastewater treatment, packaging); product or product series; plants, operation or all plants within a place; regional or geographic groups of operations; divisions, subsidiaries or entire company.

EMA gains valuable data that are very useful both at a level of company as a whole and at a level of individual units, processes and operations in the field of:

- environmental cost management,
- decision-making on prizing,
- planning and budgeting,
- decision-making on investments,
- calculation of costs, savings and gains of environment-related projects,
- planning and implementation of projects focused on cleaner production, prevention of pollution and other projects focused on environment protection,
- planning and implementation of environmental management systems,
- establishment of quantified environmental goals,
- evaluation of environmental profile, indicators and benchmarking,
- external reporting about the influence of the company on the environment,
- external financial reporting of environmental costs and liabilities,
- other environment-related accounts for statistic offices and local authorities.

ENVIRONMENTAL COSTS

Greatly important for environmental management and for seeking environment-friendly solutions that would be in line with economic goals of the enterprise as well as with the principle of sustainability is to identify costs related to environment protection and damaging. The sense of including environmental costs into decision-making is an effort to grasp all facts that would be beneficial for environment protection.

Corporate environmental costs are costs connected with the company shares (investment projects) and activities (disposal of waste, prevention of the production of wastes etc.) whose aim is mitigation of impacts on the environment. Within the environmental costs, we have to differentiate (Hyršlová, Vaněček 2002):

- environmental investment costs – i.e. financial means for the renewal, expansion and improved quality of manufacturing and non-manufacturing assets, which are expended with the aim to mitigate the negative influence of corporate activities, products and services on the environment (e.g. costs for the construction of sewage water treatment plants, solid waste incinerators, separators etc.).
- environmental costs of common nature – i.e. financial means expended in connexion with activities within the framework of common (both operational and financial) corporate activity, which are carried out with the aim to mitigate the negative influence on the environment (e.g. operating costs of sewage water treatment plants, incinerators, operating costs of recycling plants).

The significance of environmental costs should be seen in the following contexts:

- they make it possible to disclose positive and negative influences of the company, its activities, products and services on the environment,
- environmental cost data can be used in calculating the economic efficiency of investment plans,
- the dynamics of their development informs about the general level and effectiveness of the corporate environmental management system,
- they warn about factors and places (e.g. products, processes and activities), which take a particular part in the impairment of the environment,
- their analyses can be used as input data in the proposal of suitable strategies and policies of environmental management system in the company,
- environmental cost information is an inseparable part of reports on the impact of the company on the environment and is also used to inform stakeholders about the environmental behaviour of the company,
- monitoring and evaluation of environmental costs make it possible to compare the achieved goals in the field of environmental profile of the company with set out objectives,
- they serve as one of scales to appraise the performance efficiency of environmental management system,
- they uncover possibilities for reducing total corporate costs as well as possibilities for achieving higher profits.

Data needed for the management of environmental costs and for the analysis of the environmental impact of corporate activities on the financial situation of the enterprise and economic results are not registered and processed within the accounting system. Current accounting systems allow obtaining directly the information only about some environmental costs while a greater part of environmental information remains contained in aggregate cost items. Their differentiation within the accounting system can be provided for our purpose by incorporating into the chart of accounts a complementary analytical classification (in group of accounts 59 or in the independent accounting circle in account classes 8 and 9) in

respect of additional in-house criteria and needs, i.e. also in respect of environment-focused management. To be able to include the environmental aspect into the chart of accounts, it is necessary to identify material environmental costs that can be allocated to individual departments, activities and outputs, and environmental costs material with respect to the company as a whole.

Apart from environmental costs, there are also environmental gains that can be identified in the company such as receipts from the recycling of materials, sales of waste, grants and subsidies. Environmental gains also include all yield items related to items of environmental costs. Their monitoring calls for a certain modification of the chart of accounts (by extending group of accounts 69 or by using independent account classes 8 and 9).

CONCLUSION

In its strategic decision-making, the company is affected by the system of economic tools and business climate of the national economy, which is further influenced by the single strategy of economic development of the European Union. All companies logically try to survive on the market or to enhance their competitiveness within the country, member countries or at the worldwide level. The attitude to the environment may significantly affect the prosperity of enterprises. Factors enhancing competitiveness are especially seen in the improved management of the whole company, in the reduction of costs (savings of raw material and energies, improved waste management), improved quality of supplier-customer relations and a better position for negotiation with government authorities, banks and public (easier access to loans, public contracts etc.).

For being successful over a long time, the enterprise cannot proceed erratically but has to develop and adopt a certain long-term strategy. The incorporation of environment protection into the company practice requires implementation of the environmental approach in the entire system of corporate management. It is therefore necessary to introduce a functioning system of environmental management in order to enforce objectives and plans of environmental policy.

Provision of sufficient data for the needs of in-house environmental management is a task for environmental managerial accounting. Environmental managerial accounting records not only the financial situation but also environmental and social changes. It further contributes to highly qualified decision-making in order to provide for profitability and liquidity of the company combined with a tolerable environmental load and to give evidence about the sustainable behaviour of the company with respect to the environment. An important contribution of environmental managerial accounting is a possibility to find out, monitor, evaluate and manage environmental costs. For the establishment of environmental costs, cost accounts have to be additionally included in the corporate chart of accounts (in group of accounts 59 or in the independent accounting circle in account classes 8 and 9), by means of which material in-house costs can be differentiated. The purposeful differentiation by means of analytical accounts can be used not only for the monitoring of environmental costs but also for the control of environmental gains and other important environmental information. Environmental cost management can contribute to reduce total costs of the company and hence to improve its economic results, to increase the profit margin or to decrease prize of products and services in order to maintain or even increase the company's share on the market. The respect of environmental management may help to reduce costs for indemnities and to facilitate the access to financial resources, government contracts, long-term trade agreements or access to new markets.

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PROJECT MANAGEMENT CERTIFICATION IN THE COMPANY

Abstract: Project management becomes one of the key tools for achieving strategic business goals. Increasingly, it refrains from the classical model of „training" and focused on tools of computer-aided project management or project management methodologies. The systematic development of project culture in combination with long-term development of project management competencies with the international certification, and consulting comes to the fore. It points to a specific business solution. At present, the greatest interest in internationally accredited training programs, for example for the Europe IPMA® methodology, for the USA PMI® methodology, or for the UK PRINCE2® methodology. They bring a guarantee of quality and performance of the company – a project manager with the competencies and professional qualifications – the business professionals. The paper is focused on brief of the requirements of the project management knowledge – competencies for managing project or the equivalent from another accredited certification authority.

Keywords: Project management, Project, Company, Certification

INTRODUCTION

Severe competition and high demands of the open market allow only superior companies to survive.. One of the areas in which companies are lagging behind the progressive western companies, is the ability, to implement with certainty the planned objectives. To successfully meet these requirements, it is, necessary to use a clearly defined set of principles, methods and techniques leading to effective planning and, work control in projects. For this reason project management is used for ensuring a high success of new business activities. It is used for scheduling and implementation of complex, usually single activities to be carried out in due time with budgeted costs in order to achieve predetermined goals. Project management can be briefly described as effective and efficient achievement of change. The subject of project management includes the project and its purpose is to plan and implement the project in scheduled time and costs. The change is due to the implementation of project outputs. In addition, the project management applies the principles of teamwork and systematic work and supports the systemic approach to problems solving.

In practice, the reference of the supplier is first and foremost, followed by the whole range of other criteria, such as certification, standards and ultimately methodologies themselves. If a customer sees that the company or organization owns a certificate from a worldwide recognized international project management association IPMA®[12], PMI®[13] or PRINCE2®[14] methodology, or meets standards as ISO 9001, ISO 10006, it is obvious that the process of project includes a standardized and business-driven methodology based on some of issued standards or standardized methodologies.

The decision which certificate to use depends on several criterias such as the standard, or methodology used in the company. Conditions for obtaining individual certificates are very different. Also their purpose is different.

1. Project Management Certification in the Company

So long as no standardized methodology or standard project management is introduced in the company it is good to lay a cornerstone. Beginning of companies is often associated with self-educating staff involved in the preparation and implementation of projects. The next step involves a period of external education during which key employees are trained. They pass their theoretical and practical experience and skills acquired through mentoring or coaching (Ernst & Young and TREND, 2009). During this period there is a definition of processes and their subsequent formalization. In case of further growth this is usually followed by harmonization of existing processes largely in accordance with standardized methodologies (such as the PMBoK® Guide[15], ICB®[16] methodology, PRINCE2® methodology), incorporation of project management into the ISO standards and certification of staffs mostly to leaders of the project (Jelinek L ., 2010).

According to the survey (Ernst & Young and TREND, 2009) undertaken in 2009 by Ernst & Young and Trend in the Czech Republic, PMBoK® Guide methodology (35 %) and IPMA® certification were the most commonly used methodologies. In Slovakia, the PRINCE2® methodology (19 %) prevailed and 22 % of project managers worked on obtaining an official certification – often by PMI® and PRINCE2®. In Poland, the most commonly used methodology was similar to the Czech Republic; the methodology by PMI® (53 %) and certification by IPMA®. The large companies predominated in particular countries. They were part of a database of TOP 100 companies and worked in various sectors.

1.1 Certification by PMI®

PMI® association (Project Management Institute) is mainly known as the creator of the global project management standard called PMBoK® Guide (A Guide to the Project Management Body of Knowledge). It is the basic standard for certification of professionals in project management PMI®. It currently has five levels:

- Certified Associate in Project Management – CAPM®[17].
- Project Management Professional – PMP®.
- Program Management Professional – PgMP®.

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[12] *IPMA® is a registered trademark of the International Project Management Association.*

[13] *PMI® is a registered trademark of the Project Management Institute, Inc. in USA and other states.*

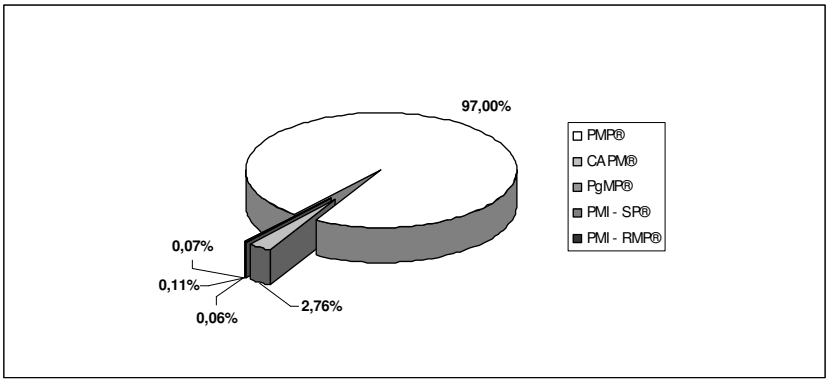
[14] *PRINCE2® is a registered trademark of the Office of Government Commerce in UK and other states and U.S. Patent and Trademarks Office.*

[15] *PMBoK® Guide is a registered trademark of the Project Management Institute, Inc. in USA and other states.*

[16] *ICB® is a registered trademark of the International Project Management Association.*

[17] *CAPM®, PMP®, PgMP®, PMI-SP® and PMI-RMP® are registered trademarks of the Project Management Institute, Inc. in USA and other states.*

- PMI® Scheduling Professional – PMI-SP® (another part of the certification levels).
- PMI® Risk Management Professional – PMI-RMP® (another part of the certification levels).

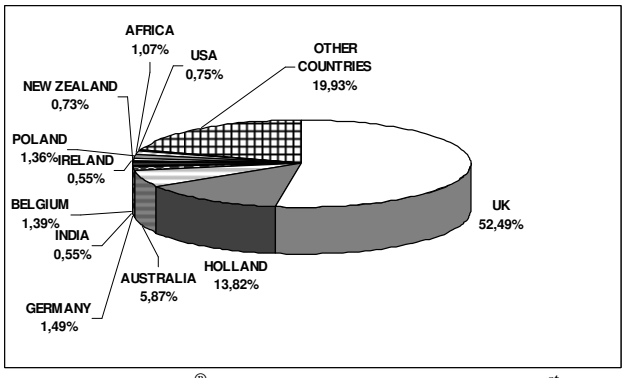


Graph 1. Number of certificates issued by PMI® to 30th June 2009 (processed by Staśto L. 2010)

There is a big difference between the CAPM® level and PMP® level. In addition to PgMP® all certificates are based on fulfilment of input assumptions (the required length of practice, training hours in project management, etc.) and passing a certification exam. PgMP® level is also subject to the Assessment Centre (Jakábová M., 2010). It is considered the highest quality, the most comprehensive and probably the most difficult obtainable certificate in project management in the global market. It is not strictly a part of the multi-level hierarchy, but the scattered certification diploma (Janáč R., 2010).

1.2 Certification by PRINCE2®

PRINCE2® (PRojects In Controlled Environments2®) is a process-oriented and generally applied methodology. It is translated into nearly 20 languages and is taught by more than 140 accredited training organizations around the world. PRINCE2® certificates have been issued for more than 559 000[18] project leaders throughout the world (Jakábová M., 2010).



Graph 2. Number of certificates issued by PRINCE® methodology in the world at 31st December 2009 (processed by Staśto, L. 2010)

To obtain a certification no previous experience is necessary. Certificate can be obtained for knowledge of this methodology at the basic level (PRINCE2® Foundation) or advanced level (PRINCE2® Practitioner). However, this knowledge is only a starting point when applied to practice. PRINCE2® methodology always requires the creating of your tailored version of the methodology for specific projects and the company. Both levels of certification relate to the same content. The difference is in level of encompassment (Janáč R. 2010).

The other additional components of the PRINCE2® methodology are ITIL®[19] (IT Infrastructure Library), MSP® (Managing Successful Programmes), MoR® (Management of Risk) and P3O® (Portfolio, Programme and Project Offices) (Janáč R. 2010, Jakábová M. 2010).

On 31st March 2010, about 3 500[20] certificates (with PRINCE2® Foundation and PRINCE2® Practitioner) were issued in Poland (Staśto L., 2010).

1.3 Certification by IPMA®

ICB® (IPMA® Competence Baseline) is a methodology comprising a four-level certification system of the international association of project managers in Europe – IPMA® (International Project Management Association):

- Certified Project Director – IPMA Level A®21.
- Certified Senior Project Manager – IPMA Level B®.
- Certified Project Manager – IPMA Level C®.
- Certified Project Management Associate – IPMA Level D®.

Each level of certification varies by level of attained, knowledge and complexity of projects or programs and portfolios managed by the candidates (Jakábová M. 2010). They are designed for people who want to formally confirm

[18] *At 31st December 2009 (Source: APM Group).*

[19] *ITIL®, MSP®, M_o_R® and P3O® are registered trademarks of the Office of Government Commerce in UK and other states.*

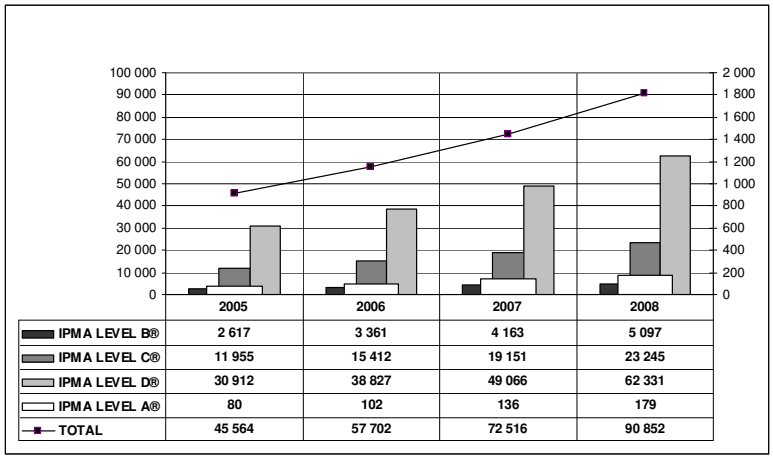
[20] *At 31st December 2009 (Source: APM Group).*

[21] *IPMA Level A®, IPMA Level B®, IPMA Level C® and IPMA Level D® are registered trademarks of the International Project Management Association.*

their knowledge and experience in managing project (Janáč R. 2010). To obtain certification, it is necessary to meet entry criterias (references, list of projects, self-evaluation, etc.) and pass the exam (Jakábová M., 2010).

IPMA® certifies a logical and organized approach to managing project to maximize the chances of success, but does not certify particular methodology and its application (Janáč R. 2010).

The number of certified project or program managers continues to grow. Since 2005, totally 55 664[22] certificates were issued (Jakábová M. 2010).



	2005	2006	2007	2008
IPMA LEVEL B®	2 617	3 361	4 163	5 097
IPMA LEVEL C®	11 955	15 412	19 151	23 245
IPMA LEVEL D®	30 912	38 827	49 066	62 331
IPMA LEVEL A®	80	102	136	179
TOTAL	45 564	57 702	72 516	90 852

Graph 3. Number of certificates issued by IPMA® at 31st December 2008 (proceed by IPMA® 2008)

Since 2010 the Slovak Republic and Poland are represented in the IPMA Level A® (1 project manager in the Slovak Republic[23] and 1 project manager in Poland) [24]). In the Czech Republic the IPMA Level A® is not represented, yet.

1.4 Other Certifications

In addition to above mentioned, there are also other important players in the field of, project management standardization. We can mention the certification by the Australian AIPM (Australian Institute of Project Management). It has its own three-level certification that is relatively unknown and unapplied in Europe: Certified Practising Project Practitioner – CPPP, Certified Practising Project Manager – CPPM, Certified Practising Project Director – CPPD. The AIPM certification is also used in New Zealand.

Another very interesting methodology is the Japanese P2M methodology (A Guidebook for Project and Program Management for Enterprise Innovation) and English APMBoK methodology (The Association of Project Management Body of Knowledge). Certification by P2M methodology is classified according to job descriptions and experience, distinguishing three levels of certification: Project Management Architect – PMA, Project Manager Registered – PMR, Project Management Specialist – PMS. APM activities are carried out by four IPMA® certification approach, which approves its content and professional levels: APM Project Risk Management Certificates, Certificated Project Manager – CPM – IPMA Level B®, Practitioner Qualification – IPMA Level C®, APMP – IPMA Level D®, Introductory Certificate (Jakábová M., 2010).

In the European Union PCM methodology (Project Cycle Management) and its supporting Logical Framework method (Logical Framework Approach/Logframe – LFA) are used for project preparation and management. The methodology promotes „Best Practices" and decision making in the project life cycle – from programming through the identification, formulation and implementation to evaluation. However it can not be talked about a knowledge base according to IPMA®, PRINCE2®, PMI® or similar certification (Janáč R. 2010, Jakábová M. 2010).

CONCLUSION

Individual certificates in accordance with methodologies PMBoK® Guide, PRINCE2®, ICB® are equivalent only in the vertical view from top to bottom. If the certification has a hierarchy (and almost each one has it), then certificate placed higher in the hierarchy has always more difficult conditions for obtaining and there is a lower number of occurrence among experts. Therefore it is clear and it should also be accepted that with a higher certification the requirements of the lower one can be met. For example, if the certification of IPMA Level C® is required, IPMA Level A® and IPMA Level B® are definitely accepted. If the conditions define PRINCE2® Foundation, they are certainly met by the PRINCE2® Practitioner certificate. Or in case of the request of CAPM®, a PMP® can certainly be submitted. It is essential that a company realizes that (Janáč R. 2010):

ICB® methodology provides only a basic knowledge of project management and soft skills, which a project manager managing people in projects should have. This part is left out in the PMBoK® Guide and PRINCE2®. PMBoK® Guide also shows how it looks in the project and what else from this area must be known. . It provides various techniques and tools that arise during the life of the project in stages, but it does not mention of how to work with people or what specific tasks must be realized for the project progress. PRINCE2® exactly says what and when must be done, when it is necessary to cancel the project, when proceed and so on. But no mention of how to treat and get along with people. Therefore, each individual using methodologies and obtaining a certificate should fulfil each level of certification of a particular

[22] *At 31st December 2008 (Source: IPMA Yearbook 2008®).*
[23] *At 31st July 2010 (Source: SPPR).*
[24] *Source: Biura Certyfikacji SPMP.*

methodology. Also a factor in the project management– risk management – is a good qualification for the project manager, because it forms an essential part of its functional duties.

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PLANNING IN PRACTICE OF SLOVAK COMPANIES

Abstract: The paper describes current situation regarding company planning in the Slovak Republic. More closely it specifies drawbacks and outlines improvement directions by means of adequate implementation of up-to-date managing tools.

Key words: company. planning. planning process. balanced scorecard. activity based costing. target costing. life cycle costing.

INTRODUCTION

Company success is conditioned by ability to utilize its available resources efficiently and adapt to changes occurring in its environment. Company planning basis lies especially in foreseeing potential changes and their inclusion into objective meeting within diverse time periods. Therefore planning represents valuable tool of company management. It creates an idea about the viable and nonviable issues, types of tools and „ways“ possible to be used to achieve the set objective. Positively “good“ planning contributes to safe management and dynamics of growth and generates stable and long-term company orientation towards the future.

At present companies are not able to forecast behaviour of competitors or their business concepts. Simultaneously product life cycles are becoming significantly shorter and customers dispose of possibility to shift to different business partner anytime they wish. In the situation mentioned above, companies lack power to plan and check their progress heading to the future effectively through incremental steps. Scientific approaches and modern management tools providing possibility to follow the company efficiency and effectiveness have gradually substituted traditional company management founded solely on empirism and experience of the owner or manager.

1. CURRENT PLANNING SITUATION IN COMPANIES OF THE SLOVAK REPUBLIC

Planning in the Slovak Republic is voluntary activity of the companies. It is not being amended by any legal standards, directives, regulations or principles. The plan use rests in the hands of managers or company owners. Structure, plan content as well as planning process complexity depend significantly on company size, manufactured production character, legal form, ownership relations, etc.

Nowadays planning, particularly in middle-sized and big companies, is being taken for granted yet very often is being implemented in a routine way. Planning premises representing resource for the plan creation are not always updated sufficiently and plans formed on such ground cannot make the company adapt to entrepreneurial environment. Deviations between plans and reality frequently reach great dimensions and do not reveal utilization of company production potential very accurately. In planning procedures combined and top down procedures prevail whereas bottom up approach is being used far less.

Improvement of current situation is possible to be achieved by change of approach towards planning process. Companies should shift their substantial orientation to past results which means that company managers have to amend detailed analysis of results achieved in the past by analysis of the actual market demands and competitive company position in the market. Consequently elaborated plans may become feasible and play motivation role. Formal transfer of trends from past to the future is less demanding indeed but on the other hand less beneficial for the company as well.

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Although planning minimizes non-productive work, decreases insecurity and improvisation and leads to safe management, still many imperfections are related to it. Imperfections in the frame of planning practice cause problems in companies solutions of which require much time and energy. The most frequent imperfections are as follows: (Grznár et al. 2009; Janek et al., 2008).

- Planning is not sufficiently influenced by strategy. Lot of companies only formally devote time to plan processing on the basis of elaborated strategy. In fact the aforementioned companies lack the ability to transfer strategy from written form into real life that is induced by limited personnel knowledge on specific tasks heading to strategy fulfilment.
- Vertical and horizontal integration are absent in planning and management and comparison of performance are not synchronized.
- Planning is not founded on concept of the company value increase. The fact is an outcome of incapability of executive employees on the particular levels to perceive the strategy and such employees focus on plans of own activities and strive to modify achieved results according to planned objectives.
- Low plan flexibility. Planning parameters are fixed and are not possible to be changed in the course of plan performance. The same is applicable in case of yields and costs that under conditions of changeable markets and constant changes in the entrepreneurial environment contradicts potential planning abilities to achieve dynamic development of the company.
- Preference of inadequate methods and procedures in case of plan creation that is visible chiefly in dominance of empirical methods at the expense of the exact and heuristic ones being more suitable under real conditions of insecurity and risk in which the plan is created.
- Insufficient quality of rendered information for planning process needs as well as for overall entrepreneurial process management. Currently a high number of companies is still being managed through financial indices stemming from financial accounting. Financial accounting is not suitable for flexible management with respect to its mode of history processing. For that reason not only information from financial accounting is advisable to be used but management accounting supported by company statistics and planning too.
- Underestimating the crisis planning. Overestimating the environment stability and potential signs of crisis development causes omission of negative development preparation in the planning.
- Insufficient utilization of information systems. Information system utilization in case of plan creation influences more flexible decision taking, swifter reaction to changes related to market conditions and at the same time increases company credibility in the eyes of shareholders, investors and regulation bodies.

2. UP-TO-DATE TOOLS USED IN THE SPHERE OF COMPANY PLANNING

Planning imperfections do exist not only in the practice of Slovak companies yet in developed countries as well. In the endeavour to enhance the planning process quality, to increase up-to-datedness and plan flexibility the tools and approaches with capacity to absorb market demands and flexible management principles in a larger extent have been used more frequently. To solve a higher amount of the problems mentioned above Balanced Scorecard method (BSC) is being implemented into the managing practice as well as management accounting development oriented towards strategic management of company, i.e. towards long-term regulation of costs, revenues, profit and other factors supporting company objective meeting.

Balanced Scorecard as a strategic company management system enables measurement of company performance in perspectives of financial, customer, and internal processes as well as in perspective of learning and improvement. It lays emphasis on identification and statement of strategic objectives, measuring tool selection (indices) inevitable for measuring the set objectives, objective value selection of individual measuring tools, activity selection needed for meeting the objectives. Following facts are possible to be deemed main reasons for implementing the BSC into the company practice:

- By setting the yield and growth objectives the company strategy is not formed. Vice versa – strategy has to clarify type of required products, type of approach towards market, and whether the employees dispose of adequate skills and competences and whether the right customer portfolio has been selected.
- Putting high stress on achieving and maintaining short-term financial outcomes may result in excessive investments into short-term resources generating the value and to the contrary, it might cause deficient investment into long-term value creation.
- It provides language inevitable for communication of company mission and strategy to all management levels.
- It backs possibility to restrain extremely high number of indices being monitored and evaluated by companies through which management process effectiveness increases.
- Exact definition of responsibility for measures taken, measuring tools, and objective factors offers operative strategy implementation.

On the basis of questionnaire survey results (Tóthová, 2009) it is possible to state that Slovak companies use the BSC method chiefly as the resource for operative planning and in case of strategic plan preparation, definition of financial and nonfinancial indices. Less frequently the method is applied in connecting the strategic and operative tasks. Significantly lower is the BSC utilization when elaborating strategic maps of company objectives and updating personal targets. Vague method contribution to the company, absent integration into the management system and missing company management support were declared by companies as frequent causes of insufficient application of the BSC in practice.

Scope of the BSC application in company practice in selected countries is shown in the table No.1.

Tab. 1. Overview of the BSC application in company practice of selected countries

Country	Scope of the BSC application in company practice
USA	over 75 %
Austria	54 %
Slovak Republic	49 %
Czech Republic	48 %

Source: elaborated according to (Tóthová, 2009; Zralý et al., 2005)

Process of the BSC preparation is demanding in terms of time and finances. Several studies have proved that overall costs of the standard BSC project are represented by time needed for involvement of internal sources (approximately 50%), external consultants of procedural and technical orientation (approximately 35%) and costs inevitable for software licence provision (approximately 15%).

Further problem the companies have to face is enormous pressure put on costs from part of the market. Effectiveness increase borders are limited therefore new approaches of effective cost management have been searched for. The aforementioned approaches enabling long-term cost regulation include the target costing, life cycle costing, activity based costing, zero based budgeting and other. Their basic characteristics and application scope are shown in the table 2.

Tab. 2**.** Some of the up-to-date tools applied in company planning

Characteristics	Application scope
Activity Based Costing	
Provides answers to questions: where, why and how did costs incur, who bears responsibility for them and what steps are necessary to be taken to increase company effectiveness.	In companies with high overhead expenses, high faulty goods rate, etc.
Target Costing	
Enables to specify customer requirements regarding the product and target market price on the basis of market survey. Target costs represent fundamental company check and planning limit.	In sectors putting great emphasis on high productivity and competitiveness (high-tech companies). In sectors with increasingly shorter product life cycle (automotive industry, domestic appliance production).
Life Cycle Costing	
Reflects product life cycle through economic factors (yields and costs), their transfer to the form of incomes and expenses (cash flow) as background for investment effectiveness evaluation.	In case of economic effectiveness evaluation of investment projects.
Zero Based Budgeting	
Appraises individual items in the period of plan (budget) preparation.	In centres providing repairs and maintenance.

Source: upon own elaboration

Pursuant to a questionnaire survey the extent of up-to-date tool application in planning process of slovak companies varies. Planning according to activity based costing and target costing are being used most. Yet the application of the aforementioned approaches is still insufficient. Far fewer companies use contributory profit and concept of zero based budgeting in case of plan elaboration. Approximately one quarter of queried companies applies minimally two and more tools out of this group. (Tóthová, 2009)

Facts given above point out low ability of companies to utilize offered potential of up-to-date tools possibly applicable in the planning process. Reasons for low up-to-date tool application in planning process are, for instance, absent integration into management system, wrong it support, missing input data, insufficient communication, etc.

CONCLUSION

The company plan represents intercompany standard on the basis of which managing activities leading to long-term objectives meeting are being implemented. At the same time, the fact that the company is exposed to sundry external influences in the course of planning cycle is very significant. It is mainly case of influence of inflation, drop in purchasing power and demand or offer increase in consequence of competition rise. Stated facts usually head to effectiveness (sale) decrease and deviations in fulfilling planned parameters of company as well as to company value decline. On the ground of the aforementioned information it is very important for companies to predict prospective plan parameters and thus prevent undesired development.

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FACTORS THAT IMPACT RATE OF RETURN ON ASSETS

Abstract: The contribution is aimed on the analysis of company's profitability especially on rate of return on assets – ROA indicator. The article is divided into two parts. In the first part is characterized indicator ROA and the ROA is disaggregating into two components: profit margin and total assets turnover. In the next part are analyzed the main factors that impact ROA and determine the level of the ROA. The main factors can be classified as operating leverage, cyclicality of sales and product life cycle.

Key words: rate of return on assets, financial statement analysis, operating leverage, cyclicality of sales, product life cycle

INTRODUCTION

The primary objective in most financial statement analysis is to value a company's equity securities. Most financial statement analysis examines aspects of a company's profitability and its risk. Examining the profitability of a company in the recent past provides information to help the analyst project its likely future profitability and expected return from investing in the company's equity securities. Evaluation of risk involves judgments about a company's success in managing various dimensions of risk in the past and its ability to manage risks in the future.

The main three measures of profitability are the rate of return on assets - ROA, rate of return on common shareholders equity - ROCE and earning per share – EPS. Key role in all three measures of profitability plays net income, or earnings. In this contribution we pay the most attention to ROA.

1. CHARACTERISTICS OF THE RATE OF RETURN ON ASSETS

The rate of return on assets measures a company's success in using assets to generate earnings independent of the financing of those assets. ROA takes as given the particular set of environmental factors and strategic choice that company makes and focuses on how well a company has used its assets to generate earnings for a particular period. ROA ignores, however, the mean and costs of financing the assets. The analyst calculates ROA as follows:

$$\textbf{ROA} = \frac{\text{Net Income} + (1 - \text{Tax Rate}) \times \text{Interest Expense} + \text{Minority Interest in Earnings}}{\text{Average Total Assets}}$$

The numerator of ROA is net income excluding the effects of any financing costs. Calculating the numerator is usually accomplished most easily by starting with net income. If a company has income from discontinued operations or extraordinary gains or losses, the analyst might start with income from continuing operations instead of net income if the objective is to measure a company's sustainable profitability.

The analyst obtains further insight into the behavior of ROA by disaggregating it into profit margin for ROA and total assets turnover components as follows:

ROA	=	**Profit Margin for ROA**	x	**Assets Turnover**
$\frac{\text{Net Income} + \text{Interest Expense} + \text{Minority Interest in Earnings}}{\text{Average Total Assets}}$	=	$\frac{\text{Net Income} + \text{Interest Expense} + \text{Minority Interest in Earnings}}{\text{Sales}}$	x	$\frac{\text{Sales}}{\text{Average Total Assets}}$

The profit margin for ROA indicates the ability of a company to generate earnings for a particular level of sales. The assets turnover indicates the ability to manage the level of investment in assets for a particular level of sales or, to put it another way, the ability to generate sales from a particular investment in assets.

2. ECONOMIC AND STRATEGIC FACTORS IN THE INTERPRETATION OF ROA

ROA and its components differ across industries depending on their economic characteristics, and across companies within an industry depending on the design and implementation of their strategies.

Economic theory suggests that higher levels of perceived risk in any activity should lead to higher level of expected return if that activity is to attract capital. The extra return compensates for the extra risk assumed. Realized rates of return derived from financial statement data for any particular period will not necessarily correlate perfectly with expected returns or with the level of risk involved in an activity as economic theory suggests if:

- Faulty assumptions were used in deriving expected ROAs.
- Changes in the environment after forming expectations cause realized ROAs to deviate from expectations.
- ROA is an incomplete measure of economic rates of return because it relies on acquisition costs for reliable measurement of assets and conservatism in measuring income.

Despite these potential weaknesses, ROAs based on reported financial statement data provide useful information for tracking the past periodic performance of a company and its segments, and for developing expectations about future earnings potential. Three elements of risk help in understanding differences across company and changes over time in ROAs:

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Operating leverage,
Cyclicality of sales,
Product life cycles.

2.1 Operating leverage

Companies operate with different mixtures of fixed and variable costs in their cost structures. Companies in the utilities, communications, hotel, petroleum, and chemical industries are capital intensive. Depreciation and many operating costs are more or less fixed for any given period. Most retailers and wholesales have high proportion of variable costs in their cost structures.

Companies with high proportion of fixed costs experience significant increases in operating income as sales increase, a phenomenon know as economies of scale. The increased income occur because the companies spread fixed costs over a large number of units sold, resulting in a decrease in average unit cost. Economists refer to this process of operating with high proportions of fixed cost as operating leverage. Companies with high level of operating leverage experience greater variability in their ROAs than companies with low levels of operating leverage. All else being equal, companies with high levels of operating leverage incur more risk in their operations and should earn higher rates of return.

Unfortunately, companies do not publicly disclose information about their fixed and variable cost structure. To examine the influence of operating leverage on the behavior of ROA for a particular company or its segment, the analyst must estimate the fixed and variable cost structure. One approach to such estimation is to study the various cost items of a company and attempt to identify items that are likely to behave as fixed costs. Company incur some costs in particular amounts, referred to as committed fixed costs, regardless of the actual level of activity during the period. Examples include depreciation, amortization, and rent. Companies can alter the amount of other costs, referred to as discretionary fixed costs, in the short run in response to operating conditions but, in general, these costs do not vary directly with the level of activity. Examples include research and development, maintenance, advertising, and central corporate staff expenses. Whether the analyst should classify these latter costs as fixed costs or as variable costs in measuring operating leverage depends on their behavior in a particular company.

2.2 Cyclicality of sales

The sales of certain goods and services are sensitive to conditions in the economy. Examples include construction services, industrial equipment, computers, automobiles, and other durable goods. When the economy is in an upswing, customers purchase these relatively high-prices items and sales of these companies grow accordingly. When the economy enters a recession, customers curtail their purchases and the sales of these companies decrease significantly. Contrast these cyclical sales patterns with those of grocery stores, food processors, nonfashion clothing, and electric utilities. These latter industries sell products that most consumers consider necessities. Their products also tent to carry lower per-unit costs, reducing the benefits of delaying purchases in order to realize cost savings. Companies with cyclical sales patterns incur more risk than companies with noncyclical sales.

A noncyclical sales pattern can compensate for high operating leverage and effectively neutralize this latter element of risk. Electric utilities , for example, carry high levels of fixed costs. Their dominant positions in most service areas, however, reduce their operating risk and permit them to achieve stable profitability.

2.3 Product life cycles

A third element of risk that affects ROA relates to the stage and length of a company's product life cycle. Products move through four identifiable phases:

- introduction,
- growth,
- maturity,
- decline.

During the introduction and growth phases, a company focuses on product development and capacity enlargement. The object is to gain market acceptance and market share. Considerable uncertainly may exist during these phases regarding the market viability of a company's products. Products that have survived into the maturity phase have gained market acceptance. Also, companies have probably been able to cut back capital expenditures on new operating capacity. During the maturity phase, however, competition becomes more intense, and the emphasis shifts to reducing costs through improved capacity utilization and more efficient production. During the decline phase, companies exit the industry as sales decline and profit opportunities diminish.

During the introduction and early-growth phases, expenditures on product development and marketing, coupled with relatively low sales levels, lead to operating losses and negative ROAs. As sales accelerate during the high-growth phase, operating income and ROAs turn positive. Extensive product development, marketing, and depreciation expenses during this phase moderate operating income, while heavy capital expenditures to build capacity for expected higher future sales increase the denominator of ROA. Thus, ROA does not grow as rapidly as sales. ROA increases significantly during the maturity phase due to benefits of economies of scale and learning curve phenomena, and to curtailments of capital expenditures. ROA deteriorates during the decline phase as operating income decreases, but may remain positive or even increase for some time into this phase. Thus, as products move through their life cycles, their ROAs should move to the upper right area, peak during the maturity stage, and then move to the lower left area as the decline phase sets in. This movement in ROA appears negatively correlated with the level of risk. Risks are probably highest in the introduction and growth stage, when ROA is low or negative, and least in the maturity phase, when ROA is high. Recall, though, that ROA measures realized accounting returns in a given period, whereas the usual risk-return trade-off metric refers to expected

returns. Taking a weighted average of ROAs over several years will reflect more accurately the economic returns generated by high-growth companies.

CONCLUSION

This article describes several commonly used financial statement ratio for analyzing profitability, which is known as rate of return on assets – ROA. We focus on the main factors that impact the level of achieved ROA.

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SELECTED INNOVATIVE METHODS AND TECHNIQUES OF THE LEAN MANUFACTURING

Abstract: The contribution is focused on selected innovative methods and techniques of the lean manufacturing. There is characterized the lean manufacturing and the main differences between two conceptions of production strategies the American "Buffered" and the Japanese "lean." In the article are listed methods and measurable quantities of lean manufacturing. Special attention is paid to visual factory, which is based on method of 5S.
Key words: lean manufacturing, methods and techniques of lean manufacturing, visual factory, 5S

INTRODUCTION

Simply, in today's turbulent times, its customers, constantly coming up with new ideas, completely new products or product innovations to keep his interest, it is difficult and requires continuous improvement of its own processes, manufacturing technology, equipment and workers. And the requirements for the manufacture of high productivity coupled with its high flexibility, while low-cost, high quality and not least the extensive requirements for environmental protection in current times, placed on each plant that wants to succeed with their product competitive. The increasing globalization increases the need for continued excellence, but to be administered in a constantly changing environment. Searching for different strategies and ways to achieve this performance and continually improve on their performance.

1. LEAN MANUFACTURING

Lean Manufacturing or Lean Production is a complex system whose primary objective is to eliminate the losses and wastage. It is a proven method that is well known especially in enterprises that produce something and trying to improving processes to increase their competitiveness in the market.

In the process of lean manufacturing has proved to be a fundamental difference between the two production strategies, namely, while the American and European automotive industry could be characterized as "Buffered Production System", "The customer has to take what you get, the Japanese automobile industry can be described as "lean production", "The customer receives what they require." In particular, it was hiding the knowledge that the Japanese at least comparable to the quality of production were able to produce significantly more efficient, which is mainly based on much smaller volumes of stock ("Buffer"). Fundamental differences between the two production strategies mentioned Table. 1.

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Tab. 1 Comparison of production management methods: the American "Buffered" vs. the Japanese "lean"

"Buffered"	*"Lean"*
Operators of manufacturing and assembly are not motivated to seek the maximum quality of their work, because there are inspectors on the line, sampler and workers performing repairs rejects The maintenance of machines are responsible specialists performing only those activities Material inventories are located throughout the production capacity of its plant cover loss or quality problems. Separate workplaces are largely anonymous. High absence is offset by no preventive deployment of replacement workers Departments and staff for the repair of scrap are present in sufficiently large, which reduces the awareness of workers to produce products "at the first" right.	Operators of manufacturing and assembly are responsible for the quality of their work, as well as for the continuous improvement of manufacturing processes The maintenance of machinery operators themselves are responsible. It is a system of Total Productive Maintenance (TPM) Work organization is based on teamwork, in transparent small groups, where each worker feel important. In the absence of a replacement by another member of the group. The production system is based on a Just-In-Time (JIT). It is necessary to constantly produce only 100% quality. Each product has a customer who is entitled to a flawless product. In areas and staff for repairs does not count at all, rejects repairs are not part of planning.
Summary *All production is in every way, i.e. material buffer stores, quality controllers, workstations for the repair, replacement staff for absent workers, secured against disturbances and rejects. This system, while ensuring security, but is associated with high costs.*	Summary *This system is strongly dependent on the ability and willingness of workers. It is therefore necessary to build a conducive working conditions of workers lead to teamwork and ownership, train, motivate and encourage. Ensure JIT-production and delivery.*

An illustration of the system in the form of the house bears the basic symbolism. It is clear that the house is stable only when it is built on solid foundations, has strong load-bearing walls and solid roof. It is possible to build a solid roof and at the end, when held together by strong walls standing on solid ground. Solid foundation of this house is a balanced production, heijunka. This means that all production must be harmonious and balanced, without large fluctuations and jumps, taking into account the diversity of production and minimum stock levels. The foundation for achieving this balance is stable and standardized operating procedures, supported by visual control. On this basis, it is possible to build two essential pillars already mentioned above, JIT and Jidoku.

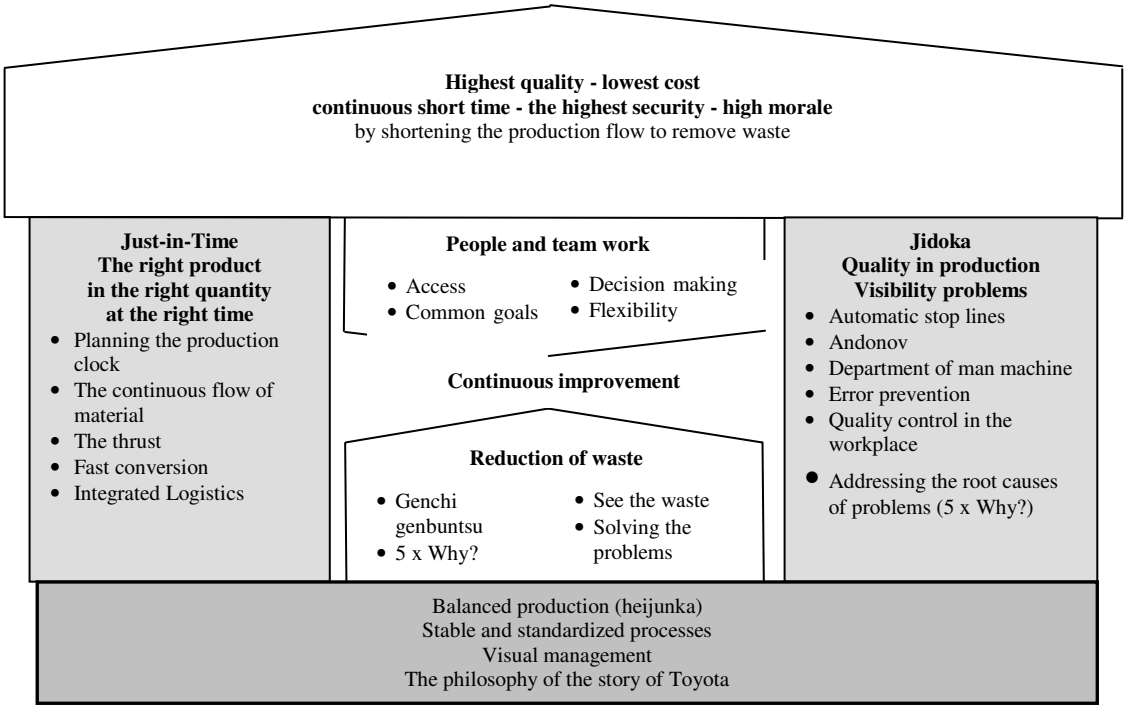

Fig. 1. House of the lean manufacturing

The whole system is to achieve the highest quality at the lowest cost, the fastest intermediate times, high security and high morale. However, it is clear that the system could not function without people. It is in that since its inception, TPS differed from conventional management system. The most important person responsible for the quality of their work, supported by a team working towards common objectives. You people come with constant improvements, thereby stabilizing the system.

2. LEAN MANUFACTURING TOOLS

Lean manufacturing offers for each of the categories of losses and downtime tools that help eliminate waste and also a measurable quantity, which can monitor the efficiency and functioning of the entire production system. It uses easy to use different techniques to establish standards for structured analysis and troubleshooting. Individual instruments are closely linked and their implementation can achieve significant improvements to business goals. They offer a solid foundation for excellence in all sectors - whether the products of mass production, services, or complex technical systems. Desired results

and a complete production system, however, can only be achieved if these tools are used in the right place and in proper order. Of course, the measure of customer requirements, which are then subject to specifications derived a new system of governance. Only then can identify weaknesses in the various production processes and at their disposal specific tools to use lean manufacturing. Table 3.1 summarizes the most common and most frequently used methods and variables.

Tab. 1. Methods and measurable quantities of lean manufacturing

Waste	Visual tools of lean manufacturing	Measurable quantities
Downtime	• Quick Change Over (QCO/SMED) • Total Productive Maintenance (TPM)	• Jobs Per Hour (JPH) • Overall Equipment Effectiveness (OEE)
Overproduction	• KANBAN • Simultaneous Material Flow (SMF) • Pull system	• Dock To Dock (DTD)
Corrections	• Poka-Yoke / Error Proofing (EP) • Visual Factory (VF) • Quality Control Circles (QCC)	• First Time Through (FTT) • Parts Per Million (PPM)
Movement	• 5 S • Visual Factory (VF) • Lean Layout • Quality Process System (QPS) • Yamazumi	• Jobs Per Hour (JPH)
Unnecessary actions	• Quality Process System (QPS) • Visual Factory (VF)	• Jobs Per Hour (JPH) • Dock-To-Dock (DTD)
Stocks	• KANBAN • Simultaneous Material Flow (SMF) • Pull system • Visual Factory (VF)	• Dock-To-Dock (DTD)
Transport	• Lean Layout • Visual Factory (VF)	• Dock-To-Dock (DTD)

3. VISUAL FACTORY

Visual factory is an application of visual display and controls that allow each worker to immediately recognize the references and any departure from it. Everyday examples of different labels, signs, traffic signs, graphics and installation instructions below. As is the visual factory tools lean manufacturing, pursues the same objective as a whole and the strategy is to eliminate waste. In addition brings other benefits such as:

- Increase safety in the workplace - visual representation of Hazard.
- Improving the quality of work - visual indicators for measuring and control devices immediately drawn to a deviation from the required specifications.
- Increase productivity - the exact arrangement of the workplace and visualized prevent losses due to job search tools, utensils and other equipment.
- Improving communication in the workplace and accelerate traineeships new staff - a picture is worth 1,000 words.
- Increased staff motivation - Recovery work.

As one of the fundamental methods of lean manufacturing factory is a complete visual basis for continuous process improvement. In itself, it forms the basis for the correct organization of work, which can gradually build two more levels, which are the visual representation, designed to detect errors and disseminate information. Up one level followed by visual inspection, which seeks the prevention of errors.

The successful operation of a particular organization as the most perfect work. For its implementation to the fore one of the key components of a visual factory and that is the 5S program. This program is a systematic method to achieve high productivity, quality and safety and continuous improvement in all production and non-manufacturing fields. It is a comprehensive philosophy and way of organizing and organization of work, the benefits of using visualization. The advantage of this method is that it can be implemented without incurring major costs. Costs are largely associated with the training of employees on this method, it can also be the cost of such purchase. of labeling equipment, etc.. The 5S is to minimize losses caused by searching for things to do in time not in place, are deferred in the wrong place at the workplace or missing entirely. Often these situations are caused by crowded workplaces objects for which the work activities are not at all necessary, though only accumulate over time and the workers themselves losing track of what the job actually is available and what is not. This method helps to identify immediately if something is not at the site, it's damaged or missing. 5S label comes from the initials of five Japanese words (Fig. 2).

- **SEIRI - Riddle**

Order is the first step to making the workplace is cleaned and made it essential for the procedure. This grading applies to all areas, such as the separation of instruments in the cabinets, drawers, as well as floors, work areas or in storage. Sort means to separate the unwanted items needed for the workplace. Material, tools or any other equipment which are rarely used, should be placed separately, for a specified location and objects in the workplace do not ever completely removed from the workplace. It is necessary to avoid storing objects in the workplace just because they can be used once. The work should be included only those subjects that add value to the end product. Another advantage of this "cleaning" is that an overview of the overall equipment and find work, for example. damaged tools or job aids that you can still correct and there is no need to buy new. It is the continuous storage of various objects and proof of surplus stocks is becoming crowded workplace, reduces the working space, thus reducing job security increases the unproductive loss of motion. They are for

the excess inventory and unnecessary items in addition to other costs are often hidden problems that surfaced in those moments najnevhodnejších. It is very important to place great emphasis on just the first step of 5S.

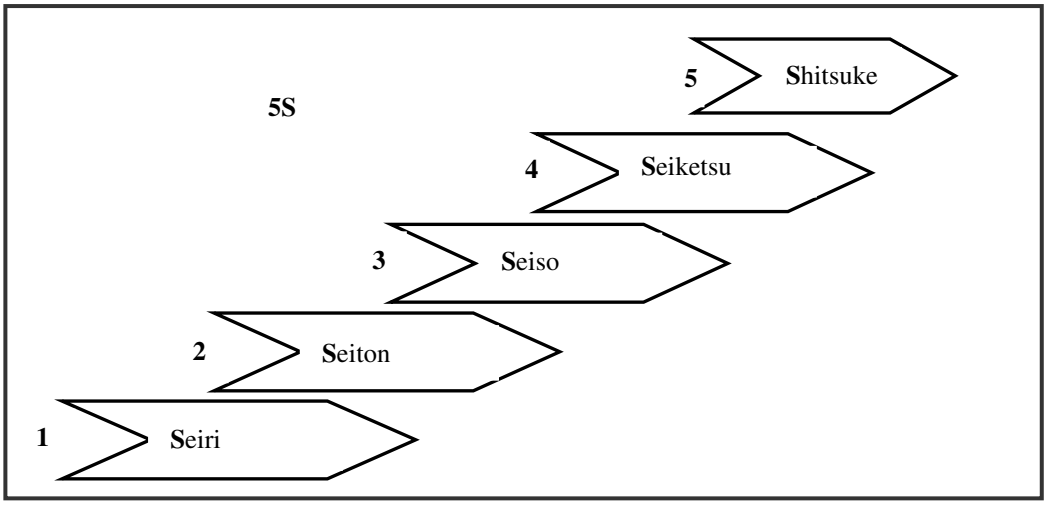

Fig. 2. 5S

- **SEITON – Order**

Sorted items that are essential in the workplace is necessary to organize so that they can easily and quickly find, use and return to their place. This means that it is necessary to create a place for everything and have everything in place. Department must be arranged so that the commonly used tools were easily and quickly accessible. It is very important that the space for storage, cabinets, shelves, but also floors, communications are clearly marked and is easily recognizable, where the object belongs. This makes it possible to save a lot of time spent looking for and can immediately recognize if some of the tools, working on a device. missing or not returned to their place. Proper labeling should be but not limited to work items correctly identified should include machines, cars, control panels, ducts, pipes. The same applies to the non-productive sphere, namely office space, desks, files and so on.

- **SEISO – Clear**

After the sorting and arrangement of objects in the workplace is necessary to work and cleaned it up for order and cleanliness. If you are not complying with the regular, usually daily, cleaning, and cleaning work very quickly return to its original state. It is very important to understand that cleaning and cleaning is also a control and inspection, since these activities are possible and can reveal possible failures and deficiencies in machinery, equipment, tools and other parts of the workplace, avoiding unwanted downtime caused by later disorders, as well as to provide continuously high level of safety. Such cleaning should be an essential part of everyday work, if done regularly and long lasting positive results are long-term

- **SEIKETSU – Standardize**

The standardization is to achieve stability and to ensure that the grading, sorting and cleaning is still respected and thereby prevent being developed worsening of their condition. Standardization means broadly the working process, which encourages new activities and helps to become a daily routine. It is therefore necessary to establish standards for visualization of the entire plant that every employee understands the procedure and given instruction and knowledge to recognize when there is a deviation from this standard. Without standards, there is no improvement. Thanks to the standards of every worker knows exactly what is responsible for. Over time, the necessary standards to perpetuate, improve and simplify, try to ponímali their staff as a significant aid in their work and thereby obtain awareness of the individual and the previous steps of 5S.

- **SHITSUKE - Maintain**

Once the previous 4S were made, it becomes necessary self-discipline that still met the standards established and continues to improve. We maintain and improve standards is the path to continuous improvement. When introducing new equipment, new products or such. new work rules that affect the already established standards, those standards appropriately modified and then retrain workers for these changes. Similarly, it is necessary to note that all 5S relates to each worker at all levels of society and that it will not just mindlessly modalities to carry out, but they need to live.

CONCLUSION

Lean manufacturing is based on simple and robust techniques. Does all levels of the organization to make work efficient and structured way and they are constantly focused on quality. Lean organization allows the company to succeed in a difficult competitive fight with fewer employees at smaller production area, with smaller investments, with making top quality products.

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***Jozef Kováč, Edita Szombathyová*[29]**

THE USAGE OF SELECTED WORK ACTIVITIES STUDIES IN PRACTICE

Abstract: When reviewing the work demand factor on human it is necessary to consider the analyses of requirements on locomotive organs, mental processes and also requirements on human sensual functions. The document points out possibilities of usage selected methods of work activity studies in particular conditions. It shows that by realizing precautions, which are a result of the workload analysis it is possible to achieve workload decrease and also work productivity increase.

Key words: work activities, time studies, motion studies, working procedure diagram

INTRODUCTION

When planning the work activities, it is necessary to consider that working conditions must ensure optimal working comfort for a person.

To reach the optimal situation, measures are taken, based on implementation of some of the methods of the work activities research.

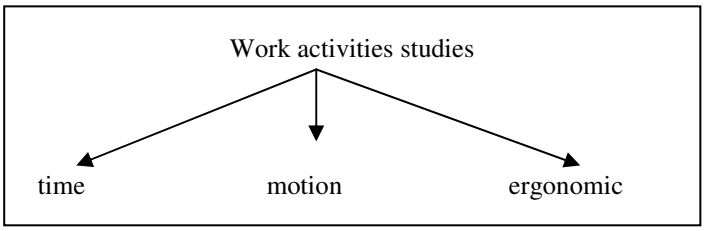
WORK ACTIVITIES RESEARCH METHODS

Importance of studying the work activities follows from the fact that science and technology development brings more and more complex relations between the individual elements within the work system Man – Machine – Environment; working conditions and work activities requirements on a person are changing as well.

The following parameters are especially examined within the analysis of the work activities from the point of view of quantifiable parameters:

- time - motion
- space - effort

Considering these parameters it is possible to divide the studies on the work activities into three basic groups:



Time studies are concentrated on examination of the time parameter regarding the work activities. Their objective is to examine the structure and the size of individual time consumption components.

Time studies classification by the method of work activities observation is shown in Table 1, prepared according to [3], [4] and [7].

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Tab.1. Time studies classification

Time studies		
Permanent observation		Interrupted observation
Working day record of	- an individual - a group of workers - one's own	Momentous observation
Operation record	- work course record - chronometry	Two-sided observation

Motion studies are concentrated on examination and quantification of the following parameters:
motion trajectory
- motion direction (direction change)
- speed (speed change)

Motion studies classification is shown in Table 2, prepared according to [3] and [7].

Tab. 2. Motion studies classification

Motion studies			
Micro-motion	Motion trajectory studies	Graphic methods	
MTM (Methods Time Measurement)	Cyclography	Procedural diagram of the operation	- technological - manipulation - controlling
VPA (Video Process Analysis)	Chrono-cyclography	Working procedure diagram	
MOST (Maynard Operation Sequence Technique)			
Other secondary methods			

Ergonomic studies are concentrated on examination of physical and psychological load of a person at work, as well as examination of the impact of physical factors of the working environment on one's work and performance.

Basic types of ergonomic studies are shown in Table 3.

Tab. 3 Basic types of ergonomic studies

Ergonomic studies		
Physiologic	Psychological	Working environment studies
carried out using the methods identifying the physical load	carried out using the methods identifying the psychological load	- measuring and evaluation of the lighting
		- measuring and evaluation of the noise
		- measuring and evaluation of the vibrations
		- measuring and evaluation of the micro-climate elements
		- measuring and evaluation of the other physical factors

Choice of the method for the work activities analysis depends especially on:
- type of the examined work activity,
- availability of input data,
- costs on problem solution using the selected method,
- time available for solving the problem,
- expected benefit obtained by the solution.

EXAMPLES OF USING THE SELECTED METHODS IN PRACTICE

Within the grant task VEGA no. 1/0679/08 "Integrated System for Innovative Design, Planning, and Organizing of the production" solution, the work activities analysis has been carried out, using the selected methods of examination, particularly the working procedure diagram and the working day record. Using the working procedure diagram in case of car door locks disassembly.

The working procedure diagram was applied in the car repair shop during the work activity „car door lock disassembly". In the article we present the application of this diagram on a partial work activity / disassembly of car door locks.

Compilation of the working procedure diagram can be divided into the following steps:
1) *working procedure selection* - can be also carried out for example on the basis of the working day record,
2) *sequential record of individual work activities using the respective symbols* – separately for the right hand and the left hand,
3) *evaluation of performed movements considering their structure* – proportion of hand inactivity and holding objects in one hand are especially monitored (static load),
4) *evaluation of logical sequence of individual movements,*
5) *identification of irrational working movements* and suggested measures to eliminate them,
6) *compilation of the working procedure diagram after measures are taken and the benefit evaluation.*

In the working procedure diagram shown in Table 4 there is a description of individual activities necessary for car door locks disassembly; this diagram shows utilization of the right and the left hand. [1].

Tab. 4 The working procedure diagram

Left hand	Symbol	Right hand	Symbol
Unbolting a screw	○	Holding a screw	○
Placing a screw	⇨	Grabbing a screw	⇨
Dismounting an elevation glass knob	○	Supporting a door filling	○
Taking out the label and a pad	⇨	Holding the fixing spring	⇨
Shifting the upholstering	○	Pushing down	○
Removing the lock blocking	⇨	Taking the knob out	⇨
Unscrewing the lock button	⇨	Inactive	D
Disconnecting the tow bar	⇨	Inactive	D
Taking the knob out of the arms	⇨	Inactive	D

Meaning of symbols:

○ - technological productive activity

⇨ - hand repositioning

D - inactivity

The diagram shows that door lock disassembly requires three activities for the right and for the left hand. Other hand movements have the relocation character, or inactivity.

On the basis of this diagram the measures were taken (involving both hands in the activity), result of which is a balanced distribution of work activities to both hands. This will bring more balanced distribution of physical load, and, at the same time, the so-called „dead periods" will be eliminated.

Benefit of the taken measures is not only to eliminate the loss sources but also reduce the risk for a worker, as well as the possibility to increase the labour productivity and quality.

Use of the working day record of the car repair shop workers

Two workers were selected to be applied the working day record of the car repair shop workers. They perform the identical activity. Solution procedure is as follows:

1. Observation of the work activity and measuring the time consumption.
2. Recording all operations carried out and their duration in a prepared observation form. Proposal of the observation form is shown in Table 5.

Tab. 5. Proposal of the observation form

Working day record				
Observation period:	**Date:**	**Work place:**	**Worker:**	**Observer:**
No.	Duration [min]	Observed operation	Symbol	Note

3. Time consumption analysis
4. Evaluation

Evaluation of the filled observation forms has shown time reserves, as well as subsequent causes of the loss:

- unsystematic working procedure,
- frequent breaks,
- large physical effort,
- unsuitable technical equipment [5].

First two reasons of the loss were eliminated by the means of personal consultation with the worker; in order to facilitate the physical effort an elevation system has been suggested to enable more work operations to be carried out by both workers at the same time.

Benefit brought by introduction of the selected elevation system, price of which is € 2,316, represents the increase in the average monthly profit in € 624, representing the investment return within 3 months and 7 days. The equipment in question can be installed during the full operation.

Based on the above mentioned, we can state that application of the working day record in this specific case proved to be substantial.

CONCLUSION

The working day record together with the working procedure diagram belong to methods of work activities research, by using of which it is easy to find out the problematic sections of the work activities. Suggestions, usually representing simple rationalization measures, bring not only saving of time necessary to perform the work activity but also facilitation of the work as such. They thus contribute to better safety at work and health protection for the workers.

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***Leszek Kozioł, Zenon Muszyński, Jacek Muszyński*[30]**

SELECTED PROBLEMS OF ENVIRONMENTAL PROTECTION AND OCCUPATIONAL NUISANCE IN WOOD INDUSTRY ENTERPRISES

Summary: The paper presents ecological and ergonomic issues which must be faced by wood industry enterprises in order to conform with European Union regulations. Special attention was drawn to the problem of selected factors which affect occupational safety in wood industry. Occupational nuisance should be, if possible, eliminated or at least considerably limited. As the most common irreversible occupational diseases in Europe are those connected with hearing damages caused by noise, basic facts on this subject are presented.

Key words: wood industry, occupational nuisance, health hazard, noise and mechanical vibrations, environmental protection

Wood industry in Poland is obliged to follow European Union regulations on mechanical and chemical wood processing in order to limit its harmful influence on environment. The following aspects are taken into consideration: atmospheric air, water and sewage management, lowering of subsoil water levels, mechanical vibrations, noise, utilization of post-production waste and so on. A separate set of issues concerns social potential management strategy and modernization of work conditions. It is especially associated with occupational safety as well as ergonomics which fully embrace new directions in employment. Thereby, not only economical, but also ecological and social aspects of work environment should be considered.

Recent growth in concern about environmental protection is undoubtedly caused by the society's comprehension of its dependence on nature. It is also due to common awareness of direct and indirect threats caused by industry which may bring about not only strenuous but sometimes irreversible damage to the environment.

Wood raw material market in European Union allows only trade in wood originating from forests certificated according to FSC (Forest Stewardship Council) standards.

All these factors do not mean that Polish wood industry has no chances of surviving on EU markets. Recently in Poland there has been a dynamic development of small and medium enterprises, which concerns also the woodworking sector. However, they have to be modernized to conform with EU regulations by, among others, obtaining required certificates for particular enterprises.

Another important challenge facing wood industry enterprises is rising occupational safety standards. Taken into consideration that the most common irreversible occupational diseases in Europe are those connected with hearing damages caused by noise, one should notice that in wood industry enterprises, especially in mechanical woodworking works, most of the employees are exposed to temporary or even continuous noise and mechanic vibration who's levels have a detrimental effect on health.

When taking into consideration safety, health protection and ergonomics, workers in wood industry enterprises are under threat in raw wood yards as well as during its preliminary processing inside production rooms. However, the degree of menace varies and in no case is it comparative.

Both Polish recommendations and European Union directives oblige employers to improve the standards of occupational safety and to apply ergonomic recommendations [1]. These actions should not conform to economical reasons only.

Employees' health should not be endangered by noise or mechanic vibrations, which may cause accidents, loss of health as well as chronic and incurable occupational diseases which lead to invalidity. Their effect on human's health and ability to work reveals itself in many ways. The noise of about 45 to 70 dB causes among others a feeling of untimely tiredness and general exhaustion as well as lowers perceptiveness, work efficiency and intellectual skills. Therefore it may lead to an increase in accident threat and frequency of suffering from headache and giddiness. In many cases it may cause feelings of anxiety and irritation. Finally, noise hinders physical and psychical relaxation and thus may lead to insomnia. Noise especially hampers mental work as well as other works which burden sense organs and central nervous system. For example, an operator of remote control machines may have difficulties with reception of signals and thus be incapable of making proper decisions [6].

Noxious effect of noise on human depends not only on its volume, but also on its frequency, duration of exposure as well as whether the noise is continuous or pulsating and so on. There is a number of solutions, which depend on the above factors. For example, on posts where the noise level exceeds 85 decibels(A), workers should be equipped with effectively working hearing protection devices. Whereas when daily exposure to noise exceeds 90 decibels(A), an employer is obliged to prepare and take preventive measures which would include technical and organization changes.

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In order to eliminate or considerably lessen risk in the process of mechanical woodworking on posts where permissible noise or mechanic vibration norms are exceeded, an employer should diminish the so called time of exposure, which would enable employees to work in safer and less stressful conditions [5,6,7].

It is a duty of an employer to protect life and health of the employees by ensuring safe and hygienic workplaces, including not only the rooms, but also technical equipment, i.e. outfits, tools, machines and so on. Therefore, when organizing a workplace, one should focus on protecting the worker both from potential accidents and occupational diseases. Moreover, the employer is obliged to inform the employees about any condition of a job that can result in illness or injury and about rules of protection against the hazards. The employee should also be aware of contraindications for performing particular parts of his or her job. One should also limit employment on particularly burdensome posts, but most of all exact from the workers abidance by adequate rules and regulations.

Apart from complying with established safety rules and regulations, an employee is obliged to follow his or her superior's health and safety recommendations in particular situations. It is also the employee's duty to mind the state of machines, equipment and tools attended by him. One must also inform his superior immediately about arisen life or health hazard, whether it would concern the employee himself or his workmate. If working conditions do not meet health and safety regulations, and especially if they cause direct threat to life or health, it is the employee's right and duty to keep from performing the job, immediately informing of it his superior [3,5]

CONCLUSIONS

- Work in wood industry is considered not only strenuous, but very often dangerous, mostly because of common exposure to noise and mechanical vibrations.
- Strenuous work conditions rise psychophysical burden and thus lower safety and effectiveness of work.
- Wood industry enterprises need to focus not only on economical aspect of their activity, but also take into consideration ecological and ergonomic conditions, aiming at rising occupational safety standards and conforming with EU regulations.
- When managing and organizing production process, one should define level and scope of occupational risk involved.

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Tomasz Krystofiak, Barbara Lis, Stanisław Proszyk[31]

ECONOMIC-TECHNOLOGICAL ASPECTS OF FINISHING OF WOOD BASED MATERIALS SURFACES IN PRINTING TECHNOLOGIES

Abstract: On the basis of literature data and the technical information from producers, both of lacquer products and equipment industry, considered the problem of finishing of wood based materials (MDF and HDF) surfaces in solution of printing technology. Short brief of printing technology, analogue and digital (SINGLE- and MULTI-PASS) printing with fundamental economic-technical data was presented.

Key words: MDF board, HDF board, surface finishing, printing technology, analogue printing, digital printing, economic data

1. INTRODUCTION

In the scope of finishing of wood and wood based materials surfaces with lacquer products, are initiated in successive manner proecological products and new technologies, which should provide suitable aesthetical-decorative and functional

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effects. It belongs to them among others lacuer printing technologies, which on the space of many years surrendered to significant modernizations consequential first of all from the technical progress [6, 10, 13].

Mentions concerning of the printing of furniture-board elements appeared in publications from year's 70. of XX century. At this time, results of investigations aiming to the qualification of reasons of the formation the printing defects on the surface of wood based materials were published. It was stated among others, that decisive factors about the printing quality had been in the first instance the technical state of roller of devices printing, and especially the distance between the feeder roller and spreading system of printing inks, method of the preparation of gathering knives and physicochemical properties used lacquer products [7].

In following years the deepening deficit of natural veneers favoured to the initiation of methods of the imitation of nobles wood species on the substrate about the less attractive structure and colours. Thanks to use of the printing technology it can at the correct execution of each operations obtain the finishing with the appearance not as usual nearing to the original. There exist many methods of the imitation, considerably disagree with the quality of obtained finishing. From older methods on the attention deserve methods of graining and the scumbling, as the typical example of craftsman's techniques and the printing in the analogue version as advanced technologically industrial solution, which is still numbered to modern methods of the imitation of wood, making possible the obtainment of different decorative effects [12].

On LIGNA 2007 fair BÜRKLE company presented the technology of digital printing, creating unparalleled till now possibilities concerning of the widely understood imitation of the surface, embracing effects both colourings as and structures of the substrates, and on the last edition of this entertainment already several leading producers of devices to finishing of wood based materials surfaces (BARBERAN, BÜRKLE, WEMHÖNER) achievements in this range were presented.

It belongs to add, that the dominant position, determining the development of printing technology occupy lacquer systems hardened with the energy of UV radiation [2, 3, 5, 11], practical both as putties, sealers, undercoat layers, paints and printer's inks and top products too.

In the light of above presented contents herein to the elaboration printing technologies of board-elements surfaces together with chosen fundamental economic-technical aspects were presented.

2. ANALOGUE PRINTING

Finishing of the MDF and HDF surfaces in the analog printing technology are applied spreading and printer's rolleres and specialist lacquer products. The full mechanization of the operations in printing technologies with relevance to putty and undercoat layers, and also drying-up and hardening system, lets on the composition of production lines of finishing of board's elements [8, 12]. The transmission of different decorative effects, in this imitative wood makes possibility the realization of the practically every project-idea [4].

In the technology of the imitation of noble wood species are multi layers systems (usually 7-8 layers), embracing both UV hardened lacquer products, which assumes fundamental functional properties and resistance of obtained coatings, and special paint inks for printing (both of waterborne and intended to the hardening with UV radiation technic), which decisived about values aesthetical-decorative. Into her composition they enter in order of: apparatus to the preparation of the substrate to finishing, fights to the putting of layers products of substrate and top, printing devices, UV bulbs helped with dryers of tunnel equipped into air-jet and NIR or MIR systems. The finishing processes generally consists of three stages. First from them assumed the preparation of the HDF and MDF surfaces to finishing and applied the putties. In turn in second follows the application of undercoats pigmented products and printing imitative drawing of wood, and the process finally applying of top lacquer layers. Within the enrichment and assimilation of the wood structure, especially with relevance to grains and porosities, before the top layer is spreading on within the framework of chemical embossing special lacquer (1.0÷1.5 g/m2) with the participation of disperged silanes. Spreading on then the top layer does not wetting places with the participation of particle of silanes, assuring perfect imitations [17].

To advantages of the analogue system of printing it can be accept number of the considerable limitation of the quantity of applied lacquer products, which is course on level 30÷45 g/m2 at 5÷7 layers. Thanks to the use of modern technological lines the process takes place at significant velocity of the conveyer exceeding 100 m/min. Over the recent years producers of lacquer products and finishing devices aim to the initiation of the analogue systems of printing, in which clearly one limited the participation of each modules in the technological line. For example the producer of lacquer products (3H LACKE) in cooperation with the producer of finishing devices (WEMHÖNER) proposed the technological line in length within the range 15÷40 m (at till now practical to 120 m). The decrease of the length of the production line creates the possibility of the reduction of the number of operating personnel of the processing to 2÷3 persons [9].

3. DIGITAL PRINTING

On Ligna 2007 fair, Bürkle company in cooperation with the producer of printers - Durst Phototechnik AG demonstrated the system of finishing of wood based materials surfaces in the technology of digital printing in Single-Pass version. In this method the technique of printing practical universally in traditional colour printers to paper in the CMYK system with the participation 4 cartridges with colours inks of cyjan, magenta, yellow and black was adopted [16].

Offered in the industrial scale devices printing became equipped also into the option „drop on demand", which creates significant possibilities of the enrichment and arranging of the pattern designing.

A not as usual essential matter is the suitable quality of intended to the printing of MDF or HDF boards both with relevance to surface structures, as and their measurements. With reference to measurements of boards were introduced fitting system, aiming outwardly to the tolerance ± 0.1 mm, while in technological lines were introduced the different kind of solution among other things crosses and lamps centering and positioning systems for conveyers and the reporting prints. Boards surfaces before printing can be veneered with natural or artificial veneers on the paper-carrier. Then on boards

surfaces or veneered materials is spreading the layer of acrylic putty (20÷30 g/m2) hardened with UV radiation, on which after precise polishing performs the digital printing with the use of waterborne inks or hardened in UV radiation, then is spread of acrylic top UV lacquer (1.0÷1.5 g/m2). In the case of flooring materials or working surfaces of furniture's instead of the top layer performs laminating with films on the basis of MUF resins (CPL technology).

To advantages of the digital printing belongs the considerable shortening of the processing. For that both rearming, as and the initiation of the new picture or design takes place from the computer, the time of all operation is comparable with the reproduction of photos on the classical computer. Thanks to this, the technology of digital printing can find the use especially at the individual production for individual orders. Thanks to this in the system of the one shift work is possible the obtainment of the capacity to 1 million m2 a year. Instead presented in 2009 MULTI-PASS solution makes possible the extension of the productive palette especially within the range pattern designing. To defects of this technology can be ought her costs which for the MULTI-PASS system, contain themselves within the range 250 000 ÷ 400 000 Euro. In Table 1 systems of the digital printing in SINGLE- and MULTI-PASS versions was compared.

Table 1. Comparison of digital printing systems

Specification	Printing system	
	SINGLE-PASS	MULTI-PASS
Solution idea	4 heads situated for keeps in the corps one beside second, on the all width of the device	single printing head moves in progress of the printing many times after the width of the element (step by step version)
Printing width [mm]	to 630	to 2500
Resolution [dpi]	fully adequate to the imitation of the structure of basic wood species along the element 577 crosswise the element 200	very high, for wood species about the complicated drawing, equal, regardless of the direction 600 - 1200
Conveyer velocity [m/min]	to 40	to 10
Capacity [m^2/h]	1000	50 ÷ 120

Thanks to the use of digital printer's devices users obtain essential advantages, because need not store pecks of practical materials to the production [1, 14].

The technology of digital printing is a so interesting alternative for the analog printing and universally practical methods of finishing of wood based materials surfaces at the use of veneers on the paper-carrier and the finish foil. In the Table 2 were compared costs of chosen methods of finishing of the MDF and HDF board surfaces.

Table 2. Comparison of costs of selected finishing methods of surface of board elements [15]

Specification	King of finishing technologies			
	Printing		Veneering	
	analogue	digital	laminates	foils and finish veneers
Production area [m^2]	5.800	3.500	2.600	1.500
Devices costs [€]	2.900.000	2.100.000	2.600.000	2.200.000
Number of workers [-]	4	4	3	3
Costs of thermal and electric energy [€/year]	345.000	225.000	255.000	188.000
Production costs without materials [€]	2.640.000	2.150.000	2.170.000	1.905.000
[€/m^2]	0.09	0.48	0.24	0.10
Costs of substrates and finishing materials [€/m^2]	2.54	3.32	2.84	2.73
Capacity [m^2/year]	30.000.000	4500000	9200000	18.200.000
Total costs [€/m^2]	2.63	3.80	3.08	2.83

On the basis of data from the Table 2 it can be stated, that the digital printing is dearest on the present state of technique finishing system of wood based materials surfaces. Belongs however to pay attention that in the composition did not take into account connected costs with the transport and storage of each material. Besides at the digital printing producers do not carry-connected costs with the usage of conventional lacquer products and connected with this of the matter of solvents and VOC emissions.

4. RECAPITULATION

Board elements from wood based materials finished in the analog printing technology determine universal material both of facing, as and decorative. Lacquer coatings obtained in this technology are characterized with the high aesthetics and the functionality.

Instead the digital printing considerably widens the palette of offered examples, creating possibilities of their uses first of all in the cabinetmaking and the equipment of the different kind of interiors. This technology makes possible also the diminution of warehouse-states for one third and the simultaneously elastic responsiveness on expectations of customers within the range orders. Belongs to suppose, that in following years will be undertaken intensive works over the initiation of this technology.

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MARKET OF LACQUER PRODUCTS FOR WOODWORKING INDUSTRY ON THE EXAMPLE OF GERMAN PRODUCERS

Abstract: On the first place on European lacquer products market is Germany. On the basis of literature data and informations from producers of lacquer products applied in woodworking industry, market of lacquer product was performed. In article actual trends, selected lacquer products of its components and cost relations of coating substances, pigments, and solvents were presented too.

Key words: woodworking industry, lacquer product, market, German producer, basic component, relative cost

1. INTRODUCTION

In the scope of surfaces finishing of wood and wood based materials with lacquer products, are initiated technologies and proecological products, from which high functional values and the resistance of obtained finishing are required. Taken action includes the establishment of lacquer products of the new generation, effective and energy-saving techniques of the applying, and hardening, and the minimization of lacquer waste materials.

In connection with the globalization is necessary the unification of requirements and legal regulations, concerning mostly the VOC emission from lacquer products. In Europe and U.S.A. within the framework of the CEPE and NPCA organizations are carried out intensive works over the unification of regulations and requirements which have to assure a further improvement of the environmental protection and simultaneously will fulfill expectations of users in respect of the quality and the price of lacquer products [1, 21].

To distinguishing solutions in woodworking industry is counted ecological lacquer products, especially waterborne, pulver, oil-waxes and the HS type intended to the hardening with EBC, IST and UV radiation techniques [15, 19].

Within the range of lacquer products to application in woodworking industry the leading part perform firms from Germany, Italy and Scandinavian. Krystofiak et al. [17] introduced the market of paints and lacquers for woodworking industry on the example of producers from Italy, the country wherein except many works generative lacquer products is found also firms offering devices to the application of lacquer products on the greatest scale in the world. Germany is an uncontested leader in Europe, in the scope of the production of lacquer products, among other things for woodworking industry. It is proper to add, that firms from Germany adapted the production pattern to requirements of the European Union Directions within the range the VOC emission - 1999/13/EC and 2004/42/WE [5].

In the article general characterization representatives German lacquer producers with the regard of chosen assortment segments offered for various directions of woodworking industry were presented. Besides practical raw materials to the production of lacquer products together in relations within the range their costs were presented.

2. MARKT PRODUCERS

With the beginning of XXI century with the production and the distribution of lacquer products it saw about in the world approx. 10 thousand firms, from which the most employed 20 to 250 workers. Belongs to add, that in this branch

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many small firms employing only just several persons. For example in China in 2005 year registered was and worked approx. 8 thousand of the different kind of firms. However approx. 60% the local market was provided by only just 20 firms. A greatest market (37.7% the world sale) is North and South America, and highest earnings assure producers of covering products (45.9% the market).

In the year 2006 in West Europe 6.6 Tg of lacquer products was produced. Greatest in these participations had: Germany (24%), Spain (16%), Italy (15%), France (13%), Great Britain (11%), Scandinavian (7%) and Benelux countries (5%). On remaining states of West Europe happened approx. 9%. The greatest participation in the production (63%) had lacquer products about the decorative character. Instead raw materials to paints and lacquers were produced over 7.5 Tg, however considerable their part, similarly as final goods, was exported, especially to East and Middle Europe.

The year 2006 was for the German industry of lacquer products very profitable. The production increased about 2.7%, to the level 2.22 Tg about the value 4.9 milliards euro. The absolute import increased about 23.5% (to 210 Gg), achieving 630 millions euro. Value of exports exceeded 1.93 milliard euro [4]. Analysts awaited stable market tendencies and the growth of lacquer products production in 2011 to the level 3.55 Gg (increase about 20.9%). However in following years for the worldwide economic crisis was observed the fall in value of the production. On the ground passed data analysis finally 2009 was ascertained, that to with the year 2008 the quantity of made of lacquer products in Germany had dropped about 8%. Particularly the further fall was noted down within the range solvent products [9]. Whereat it is proper to add that fixative themselves trends became due not only a worldwide economic crisis, but also to these that in Germany already in the half of years 90-these of XX century, began in a great way the production of waterborne products with the cost of the prominent decrease of solvent systems (Table 1).

Table 1. Sale of chosen industrial lacquer products in countries of West Europe in 1995 year [2]

Country	Kind of products	
	Waterborne	Solvent
Germany	93	7
Portugal	90	10
Holland	72	28
Switzerland	70	30
Finland	68	32
Great Britain	66	34
Sweden	62	38
Italy	60	40
Belgie	60	40
France	52	48
Norway	46	54

On the ground of data contracted in the Table 1 it can be stated the very large differentiation. Waterborne products determined 93% sales of decorative products in Germany, and only 46% in Norway. Proves this, that about the application of the kind of lacquer products decide not only consideration of the environmental protection, but also customs of consumers.

Belongs also to remember, that German concern are found in the compact leader party of producers of lacquer products in the world (Table 2).

Table 2. Greatest producers of lacquer products acc. to Coatings World [6]

Concern (country)	Position in the ranking		Sale (in million USD) in years			
	2006	2005	2006	2005	2004	2003
Akzo Nobel (Holland)	1	1	7800	6974	6529	5900
Henkel (Germany)	2	2	6921	6236	5270	4610
ICI Group (Great Britain)	3	3	6387	5817	5378	4790
Serwin Williams (USA)	4	4	6348*	5728	4910	4360
PPG Indrustries (USA)	5	5	6324	5566	5275	4830
DuPont de Nemours (USA)	6	6	4095	3870	3650	3500
BASF Coating (Germany)	9	7	2935	2714	2515	2820
DAW (Germany)	20	22	1130	952,7	945,3	734
Altana (Germany)	42	48	277	218	267.4	293.2
Grebe Grup (Germany)	48	51	210*	201.8	124	123

* *estimates data*

3. OFFER OF LACQUER PRODUCTS FOR WOODWORKING INDUSTRY

Producers of paints and lacquers undertake large undertakings aiming to the initiation of lacquer products of the new generation fully proecological, effective and energy-saving techniques of the applying and the hardening and the minimization of lacquer waste material and rational of their farm implements. To equal to requirements of EU Directions conventional lacquer products, especially from the NC and SH group, is replaced in a great way with waterborne products and hardened , particulary with the UV radiation. These modern systems are better both from the point of view of costs of materials, ecological aspects, and also allow to obtain coatings about high functional values and resistances [13, 16, 18, 19, 20].

Within the range of lacquer products production for woodworking industry in respect of the application of proecological products, Germany occupies the uncontested first in Europe. Below in brief chosen lacquer products offered by German firms was presented, which work on the Polish market offer for many years, offering lacquer products for different scopes of woodworking industry.

The greatest participation on the market of ecological products has waterborne systems about very low VOC emission. Technologies of the application of these products were spread among other things in the industrial production of furniture, the builder's woodwork and the equipment of interiors, finding the more and more greater application in craftsman's workshops. The promotion of these products is determined also legislative consideration within the range warnings of safety law and fire-fighting and more and more higher quality of obtained lacquer coatings [10, 11, 12]. In waterborne products to innovative solutions belongs accept resistant of finishing's on the scratch, lacquers with the participation of nanocomposites. The interest araise also water ultramat lacquers, which visually simulate characteristic effects for oil surfaces. An assortment supplementary above-solutions is the large assortment of products, basing itself on natural raw materials, most often in the form both transparent, as and pigmented oils and waxes, intended to the protection and care of wood conditioned external and internal [14]. These systems are intended both to the manual applying, as also automatized. Oils can be used also in the combination with waterborne products [7].

The offer is supplemented by agents to the mordanting the defect of finished surfaces, such among other things as: soft waxes, retouching pens and waterborne putties to wood [8].

Interesting solution are antibacterial lacquer products to wood which works as specific antibiotic, making impossible the metabolism of the different kind to bacteria, and also to numerous fungi and viruses. Usually in these products a basic antibacterial component are prepared relationships of silver, both in the ionic form, as and colloidal. Coatings on the basis of these lacquers find a wide use, first of all to the safing of the surface of equipments, different kind of offices and laboratories medical, pharmaceutical, small feeding troughs, playschool, hospitals and agencies industrial and investigative connected with the biotechnology.

4. PRICE RELATIONS OF COMPONENTS OF LACQUER PRODUCTS

In Tables 3÷5 was took down relations of price of chosen basic components of lacquer products, expressing each costs in the relative system to the most cheaper product. Compositions were prepared on the ground source data from June 1999, but in spite that elapsed already 10 years, relations of price between each component did not surrender to greater changes. In turn in cards of characterizations of dangerous matters contracted in lacquer products is usually given quantitative participation of components in the given product and on this base one can generate costs.

Table 3. Relations of price of the coatings substances for production of lacquer products [3]

No.	Coatings substances	Relative costs relations	
		from	To
1.	Alkyd resins		
	Version "thin"	1.35	2.00
	Version "average fat"	1.16	1.94
	Version „fatty"	1.10	2.19
	Withoutoils (60% s.c.)	2.45	3.68
	Waterborne (70-80% s.c.)	2.90	3.81
	Waterborne (60-70% s.c.)	2.71	3.42
2.	Polyester resins		
	Saturated	2.13	6.65
	Unsaturated	3.10	3.20
3.	Polyurethane based on		
	Aliphatic polyisocyanate	7.87	10.97
	Aromatic polyisocyanate	2.90	4.52
4.	Acrylic resins		
	Acrylic (to 50% s.c.)	2.32	2.84
	Acrylic-styrene (50-60% s.c.)	2.06	2.13
	Resins with OH groups to polyurethane systems (60% s.c.)	2.39	3.23
	Selfcuring	3.29	3.29
5.	Dispersions		
	Acrylic unmodified (to 50% s.c.)	1.68	1.87
	Acrylic-styrene (to 50% s.c.)	**1.00**	
	Vinyl-acetate copolymers (50-60% s.c.)	1.10	1.23
	Polyurethane (to 40% s.s.)	5.13	5.81
	Hybrid acrylic-polyurethane (40-50% s.c.)	3.29	3.79
6.	Resins to pulver paints		
	Hybrid polyester-epoxy	2.55	3.23
	Polyester cured with TGIC monomers	2.77	3.87
	Polyurethane	3.03	3.48
7.	Oligomers to coatings cured with UV radiation		
	Unsaturated polyesters in styrene	3.48	3.68
	Polyester-acrylic	4.13	4.33
	Epoxy-acrylic	4.94	5.24
	Polyether-acrylic	5.81	5.99
	Urethane-acrylic	7.74	9.35

Table 4. Relations of price of chosen pigments and fillers for production of lacquer products [3]

No.	Pigments and fillers	Relative costs relations	
		from	To
1.	Pigments		
	Titanic oxide	32.08	40.42
	Lithopone	11.67	13.75
	Iron yellow	21.17	35.00
	Iron red	8.83	33.33
	Carbon soot	16.67	233.33
	Aluminium paste (to 65% s.c.)	51.67	51.67
	Pearly pigments		
	- conventional, silver	208.33	291.67
	- conventional, coloured	333.33	500.00
	- specialistic silver (resistant to atmospheric condition)	625.00	666.67
	- specialistic coloured (resistant to atmospheric condition)	833.33	1166.67
2	Fillers		
	Mica	5.83	12.50
	Talc	3.33	5.92
	Silica	625.00	266.67
	Precitalde silica	9.17	95.83
	Calcium carbonate	1.00	
	Kaolin	2.92	8.17

Table 5. Relations of price of chosen solvents and lacquer thinners for production of lacquer products [3]

No.	Solvents and thinners	Relative costs relations	
		from	To
1.	Aromatic and aliphatic hydrocarbons		
	Xylene	1.05	1.46
	Toluene	1.02	1.34
	Extraction naphtha	1.00	
2.	Alcohols and esters		
	Butanol	1.83	2.44
	Ethanol	2.80	3.29
	Isopropanol	2.27	2.80
	Ethylacetate	2.27	2.93
	Butyl acetate	2.02	2.68
3.	Glycol ethers and glycol ethers acetate		
	Butylene glycol	2.80	3.66
	Butylene glycol acetate	4.80	4.88
	Methoxypropanol acetate	4.46	4.88
	Ethoxypropanol	5.98	6.10
4.	Ketone		
	Methyl ethyl ketone	3.54	3.74
	Methyl isobutyl ketone	3.24	4.15
	Cyklohexanone	5.12	5.24

The possibility of the effective decrease of the VOC content in existing solvent of lacquer products without the influence on the property of coatings has irrefutable advantages economic and market. Though do not be in doubt regarding ecological advantages of these products this all the time appear certain qualitative such problems as: excessive foaming, the inadequate humectation difficult will put and the fluxion and the elevated susceptibility on the degradation with microorganisms. Producers of lacquer products insert a great much the effort into making some thorough study of these problems. As result of intensive research works one worked out the generation of aids of which an assignment is the overcoming of these problems [1, 18].

5. RECAPITULATION

On the ground analyses of the offers of producers from Germany it can be stated, that the significant part perform solvent products and waterborne systems. Belongs to suppose, that in following years will follow the further gradual development of these two systems. In testing laboratories of producers of lacquer products are undertaken large works over formulating of ecological products assuring profitable functional parameters and you lasted are obtained finishings and profitable price relations.

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THE IMPACT OF CORPORATE CULTURE ON THE SATISFACTION OF THE EMPLOYEES

Abstract: In the papers are characteristic informations about corporate culture, communication and motivation of the employees. In the next part of feature it describes and compares two plants in non-profits sphere and their communication and motivation between employees.

Key words: corporate culture, communication, motivation, non –profit plant, employee.

INTRODUCTION

Questions of the corporate culture in conditions of our country were not for long time favor of the consideration. In present time this problem survives boom and managers in the firms must accept its importance. Interaction between corporate culture and potential of the employees many psychologists and sociologists confirm. Accordingly in present questions of corporate culture are elements in strategic plan for development of the organizations too.

THEORETICAL SOURCE

The definitions of the corporate culture are in many articles. For illustrations we present definitions of some authors.

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Author Ubreži[4] uses definition of the E.A.Schein: „Corporate culture is scheme of basic and decisive ideas which some group designed and expanded, in point of view this scheme solves internal and external problems and they are accepted as rules. New members of the organization must accept this formula or abide.

Zorkóci [5] uses definition of authors A.D. Brown and G. G. Gordon.

A.D. Brown: "Corporate culture is scheme of terms, values and learnt methods of situation solution, based on experiences, which were developed along firm history and which are characteristically in material aspects and members behavior."

G .G. Gordon: Corporate culture is specific system with widely accepted preconditions and values, which are base for typical behavior rules.

By analyses of mentioned definitions it is possible to say, that corporate culture is based on the tradition, ideas of managers and abilities organization members to accept them and to use them. It is non written rule for employees.

In the history the large organizations have leaders and their charisma showed the way for development of corporate culture. For example: Henry Ford, Werner von Siemens etc.. In conditions Czechoslovak republic there are those examples: F. Křížik, J. Škoda and Tomáš Baťa.

Mains factors, which have influence on the corporate culture, are: time, language, space and social status.

In context with corporate culture it is very often mentioned ethics or business ethics. Ethics has its rules and principles. Business ethics is collection written and non - written rules and norms too, which say what is ethical or non ethical. These standards are developed too and very often are in organizations presented as „ethical code", which is in that organization „basic norms of conduct".

Corporate culture and business ethics is very near related to image of firms, which together design as if „synergic effect". Elements of the synergic effect are too – motivation, production, communication etc.. In the literature in the relation with motivation there are many different schemes according the different authors. Well - known authors in this field of activities are C.C. Pinder, Maslow, Vroom, Adams, McLelland etc. In this context it is well known japanese sentence: „Nobody finds better way to do something till he is not doing it".

ANALYTICAL PART

Next part shall be oriented to the problematic of corporate culture and motivation in the non – profit organization – with accent to the health services.

As research objects there were chosen two health - service organizations localized in East of Slovakia. First health - service organization is organization of public sector, second organization belongs to private sector.

Research goals:

- perception of corporate culture by employees in tertiary branch, who are working in public and private sector,
- motivation of employers in these sectors to higher efficiency,
- comparison of achieved results.

Organization in public sector is marked as organization „VS", organization in private sectors is marked as organization „SMS".

Organizations are located in towns. In town of organization „VS" live about 80 thousands citizens, in town of organization „SMS" live approximately 35 thousands citizens. Both towns have approximately comparable sphere of citizens because in bigger town there are more health service organizations.

Research unit is for both items 120 members – people. Questioner has 16 questions. Questions 1-7 were oriented on the problematic of corporate culture, questions 8-16 to problems with motivation and attitude to work.

Tab. 1. Respondents by sex

	VS		SMS	
	Number	Per cent	Number	Per cent
Men	16	25,81	8	10,53
Women	46	74,19	68	89,47
Together	62	100	76	100

Answers were evaluated as 5 degrees scale. The best answers were evaluated by degree 5 – „maximum" as too very good and the worst as too „absolutely no" - minimum.

By research next hypothesis were checked:

1. Best corporate culture will be in the non-profit organization
2. Employees want to improve the corporate culture in their job.

Marginal answers are in the next tables.

Tab. 2. Question 1. How is quality of your work life (QWL)?

	VS		SMS	
	Number	Per cent	Number	Per cent
Minimum	3	4,84	4	5,27
Maximum	3	4,84	4	5,27

Tab. 3. Question 2. What is level of satisfaction of your needs in your job?

	VS		SMS	
	Number	Per cent	Number	Per cent
Minimum	6	9,68	19	25,00
Maximum	1	1,61	1	1,31

Tab. 4. Question 3. How do you feel in job?

	VS		SMS	
	Number	Per cent	Number	Per cent
Minimum	2	3,22	2	2,63
Maximum	3	3,22	3	3,93

Tab. 5. Question 4. Do you have feeling you are member of team in job?

	VS		SMS	
	Number	Per cent	Number	Per cent
Minimum	2	3,23	6	7,98
Maximum	7	11,29	6	7,89

Tab. 6. Question 5. How do you evaluate your relation with other subcultures in your job?

	VS		SMS	
	Number	Per cent	Number	Per cent
Minimum	4	6,45	2	2,63
Maximum	0	0	4	5,27

Tab. 7. Question 6. How do you perceive your working environment?

	VS		SMS	
	Number	Per cent	Number	Per cent
Minimum	5	8,06	1	1,31
Maximum	0	0	7	9,21

Tab. 8. Question 7. Does your employer inform public about your credit and by this he increases your working value?

	VS		SMS	
	Number	Per cent	Number	Per cent
Minimum	35	56,45	43	56,58
Maximum	0	0	1	1,31

Tab. 9. Question 8. Are your satisfied with your financial evaluation for jour active job?

	VS		SMS	
	Number	Per cent	Number	Per cent
Minimum	3	4,84	4	5,27
Maximum	3	4,84	4	5,27

Tab. 10. Question 9. How would you evaluate motivation from employer side?

	VS		SMS	
	Number	Per cent	Number	Per cent
Minimum	11	17,74	29	38,16
Maximum	0	0	2	2,62

Tab. 11. Question 10. Does your employer organize out of work activities to increase of motivation and team building?

	VS		SMS	
	Number	Per cent	Number	Per cent
Minimum	26	41,94	39	51,32
Maximum	0	0	3	3,93

Tab. 12. Question 11. Does your employer support possibility for your next learning and increase of your qualification?

	VS		SMS	
	Number	Per cent	Number	Per cent
Minimum	12	19,35	12	15,79
Maximum	2	3,23	8	10,53

Tab. 13. Question 12. Do you feel enough of moral satisfaction from employer side?

	VS		SMS	
	Number	Per cent	Number	Per cent
Minimum	25	40,32	35	46,05
Maximum	0	0	3	3,93

Tab. 14. Question 13. Does your employer have effort to improve usually used system of work for your benefit?

	VS		SMS	
	Number	Per cent	Number	Per cent
Minimum	27	43,55	37	48,68
Maximum	0	0	1	1,31

Tab. 15. Question 14. Are your suggestions related to job accepted and realized by employer?

	VS		SMS	
	Number	Per cent	Number	Per cent
Minimum	21	33,87	35	46,05
Maximum	0	0	0	0

Tab. 16. Question 15. How do you evaluate an extension of corporate culture?

	VS		SMS	
	Number	Per cent	Number	Per cent
Minimum	6	9,68	10	13,10
Maximum	0	0	2	2,62

Tab. 17. Question.16 Related to question 15. It permits to classify feelings connected with answers in the question 15 options.

	VS		SMS	
Options	Number	%	Number	%
Anywise it is not essential	3	4,84	3	3,95
It is not essential, but improvement would be good	6	9,68	17	22,37
I will think about it, but I mean there will be no change	37	59,68	35	46,05
For sure I will think about it	10	16,13	3	3,95
For sure I will think about it and will try to enforce importance of corporate	1	1,61	3	3,95
Together	57	100	61	100

RESULTS OF RESEARCH

1. Hypothesis, that in private health – service organization there will be increased corporate culture, is not confirmed. Not confirmed is also hypothesis, that employees have effort to improve a corporate culture in their job.
2. Research shows, that corporate culture is in both organizations approximately equal.
3. Many respondents evaluate their quality of working life as neutral.
4. Relation with another subculture is good in both organizations. Extremes – very bad and very good are extraordinary.
5. Working environment in the organization VS is felt as very bad, in the organization SMS is working environment felt as very good.
6. Research confirms that motivation is on the good level.
7. Moral aid from employer side is inadequate.
8. Financial evaluation of job is felt as very negative.
9. Out of work activities from employer side are almost unrealized. It can have negative impact on the employees satisfaction.
10. Inadequate or average is satisfaction of employees about increasing of qualification.

CONCLUSION

More than half of employees mean that their impact on the change of corporate culture is minimal. Research results show, that more than half of employees are apathic and in next future is needed to think about change their mind. About the change of corporate culture management must be thinking on too. Research was realized in health - service organizations – tertiary sphere. On the base of authors' experiences similar situation is in production sphere including wood processing enterprises too.

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REMUNERATION VERSUS DISCRETIONARY INCOME

Abstract. The aim of the article is to show the possibilities of increasing the effectiveness of employees remuneration usage as discretionary income.

Key words: renumeration, income, tax

INTRODUCTION

Remuneration term is very widely understood. The most crucial is remuneration for work and the principles governing its payment.

The term remuneration for work has not been formally defined especially by the Labour Code (2010). In some Labour Code regulations (for example article 22 § 1, article 78 and 80) there are statements which allow to assume that remuneration is the benefit which the employer is obliged to pay its employees periodically for work performed. The level of this remuneration must be adequate to the type of work done as well as its quantity and quality.

When defining remuneration for work one might find helpful the judgment of the Highest Court which in the Act from 30th April 1986 (file III PZP 42/86 OSNCP number 8, point 106 from 1987) stated what follows: 'remuneration for work is a necessary reward of beneficial and financial character which the employer is obliged to pay its employees periodically in exchange for work performed by them on the basis of legally binding work contract between the employer and the employee'.

Remuneration, in accordance with Employer Manual (2010) is both basic salary, its additional elements such as bonuses, rewards, overtime, holiday pay, and various compensations such as retirement leave, financial leave, jubilee premium, financial equivalents, and compensations etc.

DETERMINANTS OF REMUNERATION SYSTEM

Ever changing economic conditions, versatile structure of staff qualifications, and most importantly adopted hierarchy of significance at work result in the evolution of evaluation criteria of various tasks, positions and professions. The ever on-going processes in the area of remuneration, are very frequently and usually differently evaluated and perceived by individual professional groups. Probably each employee and each group of employed professionals have their own vision of remuneration policy, which they consider to be adequate, rational and fair. This vision is mainly determined by their own benefit, which does not have to be, and in fact rarely is, in line with the interests of other professional groups. Therefore, remuneration policy in macroeconomic scale, within one business and even department, branch or smaller production unit belongs to the most difficult and the most controversial spheres of socio-economic life (Armstrong 2010).

One of the methods making the creation of necessary order in remuneration policy, easier, one that would satisfy individual professional groups or at least facilitate common agreement, compromise or consensus is determining the rules and criteria of work evaluation as well as implementing rational system of measuring work value. This is most frequently the task of group work agreements (Labour Code 2010).

The systems of evaluating work consist of the following documents:
- methods of work evaluation,
- remuneration charts,
- remuneration tables.

Significant element in work evaluation is so called right of balance. Which means that the more undervalued some work features are the less attractive and socially prestigious the more value has to be given to them in a form of higher salary.

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Permanent (structural) deficit of employees engaged in some less attractive tasks is always a sign of high discrepancy between subjective evaluation of that work and the remuneration offered for it by potential employees and school graduates who should perform it and the social evaluation of that work.

FACTORS INFLUENCING REMUNERATION LEVEL

The level of remuneration is determined by the following criteria:

1) work volume - measured by the amount of time spent at work (number of hours, shifts, days, weeks, months or the level of realized workload),
2) work quality - determined by employees' qualifications (practically defined in remuneration tariffs or professions and work tariffs) and reaching or exceeding quality work norms,
3) work inconvenience – premiums are used for work in onerous or harmful conditions, overtime, night shifts, holiday and unpopular days (days preceding holidays, important sport events, local celebrations etc.),
4) level of complexity and responsibility – higher rates for precision work, responsibility for people and property, wok demanding stamina and intellectual power as well as more extensive professional experience.

REMUNERATION SYSTEMS

Quite apart from the basic yardstick of work value those systems should also fulfill the following functions encouraging employees to:

1) enhance skills – which determines getting a more complex and therefore better paid jobs,
2) undertake jobs requiring larger intensity, effort and attention,
3) improve the quality of work and production - enabling remuneration increase at work post for quality enhancement

FORMS OF REMUNERATION

The most popular forms of remuneration are (Ścibiorek 2010):

1) remuneration in accordance with the time worked (time-based remuneration) – remuneration level is determined by the time worked for example monthly, hourly, daily or weekly remuneration
2) remuneration in accordance with work results (piecework remuneration) – combines remuneration with the quantity of work done realized in a form of piecework, commission or task-oriented remuneration,
3) premium remuneration. The above mentioned forms of remuneration might be used separately for example remuneration based on sales results, assembled products or accomplished tasks. Yet they might also be mixed for example link time and premium remuneration and determine employee remuneration – 15pln an hour plus monthly Premium of 20% to 40%; monthly remuneration plus sales commission etc.
4) remuneration measured by point system (work points remuneration) – they are based on allocating adequate number of points for each task. The total points gathered within a certain period of time determines remuneration level.

REMUNERATION IN POLAND BETWEEN 2009 – 2010

Table 1 presents the impact of education level and the profile of studies on remuneration level in our country in 2009. Given data (gross monthly income) is the result of National Remuneration Survey carried out by Sedlak & Sedlak (Wynagrodzenia.pl). The remaining figures have been calculated in accordance with the following relations:

- annual income = monthly income * 12 months,
- daily income = annual income / 365 days,
- weekly income = daily income * 7 days each week,
- hourly income = weekly income/ 40 hours a week.

Net income was calculated assuming that the taxes and fees paid on average by an employee currently amount to 28,08 %. It can be deducted from table 2, which presents average income and expenditure in Poland in 2009 (original data in accordance with OECD research and the Department of Life Conditions of Central Statistical Office) as well as in the second quarter of 2010 (original data of Central Statistical Office – average gross and net remuneration).

Table 1 also provides the calculations of academic staff remuneration (lecturer; assistant; senior lecturer; assistant professor; reader; professor and full professor and doctor hab.**,** in accordance with then binding for original data (gross monthly income) attachments for the directive of Minister of Education and Sports from the 26th of April 2005 changing the directive concerning the changes in remuneration for state schools academic staff (Book of Acts dated 6th May 2005). For analysis maximum rates have been adopted.

From table 1 it may be deduced that maximum public school assistant remuneration equals average income of people with secondary education employed in Poland. People with higher education earn slightly less (100pln monthly) than the highest assistant professor rate at public schools. The lecturer earns as much as the person who graduated from education department and the best paid IT specialists earn 100pln less than the maximum rate of basic remuneration for professor or doctor hab.

In tables 1 and 2 the income and expenditure for tax-free interest deposits have also been calculated which has been further analyzed in article: 'Tax-free interest deposits as the source of efficient investment of discretionary income and current assets' in the current issue of Intercathedra Yearbook.

Table 1. Dependence average income from education and position in 2009 and 2010 years

Education influence at reward level	Education / position	Net income					Gross income					Deposits number	Minimum amount on non-tax deposits in zł		
		day	year	month	week	work hour	day	year	month	week	work hour		deposits interest		
		calendar					calendar								
	calculations data	28,08	tax and insurance premium				365	12	primary	7	40		5,5	4,5	4,05
Education level	primary	56,75	20 712,96	1 726,08	397,23	9,93	78,90	28 800	2 400	552,33	13,81	23	379 301,51	463 590,76	515 100,64
	secondary	61,48	22 439,04	1 869,92	430,34	10,76	85,48	31 200	2 600	598,36	14,96	25	412 284,25	503 903,00	559 892,00
	licentiate	65,02	23 733,60	1 977,80	455,16	11,38	90,41	33 000	2 750	632,88	15,82	27	431 486,82	527 372,78	585 969,76
	higher	75,66	27 617,28	2 301,44	529,65	13,24	105,21	38 400	3 200	736,44	18,41	31	502 099,19	613 676,78	681 863,09
	university (MSc or Eng.)	94,58	34 521,60	2 876,80	662,06	16,55	131,51	48 000	4 000	920,55	23,01	38	627 632,28	767 106,12	852 340,13
University profile	electronics/ informatics	118,22	43 152,00	3 596,00	827,57	20,69	164,38	60 000	5 000	1 150,68	28,77	48	784 548,64	958 892,78	1 065 436,42
	mechanics / industry	102,86	37 542,24	3 128,52	719,99	18,00	143,01	52 200	4 350	1 001,10	25,03	42	682 553,00	834 231,45	926 923,83
	economic	100,49	36 679,20	3 056,60	703,44	17,59	139,73	51 000	4 250	978,08	24,45	41	666 861,37	815 052,78	905 614,20
	medical	95,41	34 823,66	2 901,97	667,85	16,70	132,66	48 420	4 035	928,60	23,22	39	633 124,35	773 818,65	859 798,50
	sciences	86,30	31 500,96	2 625,08	604,13	15,10	120,00	43 800	3 650	840,00	21,00	35	572 711,55	699 980,78	777 756,42
	humanities	82,76	30 206,40	2 517,20	579,30	14,48	115,07	42 000	3 500	805,48	20,14	34	549 174,10	671 212,78	745 791,98
	agricultural	78,03	28 480,32	2 373,36	546,20	13,65	108,49	39 600	3 300	759,45	18,99	32	517 790,82	632 855,45	703 172,72
	artistic	73,30	26 754,24	2 229,52	513,10	12,83	101,92	37 200	3 100	713,42	17,84	30	486 407,55	594 498,12	660 553,46
	sport/ rehabilitation	66,21	24 165,12	2 013,76	463,44	11,59	92,05	33 600	2 800	644,38	16,11	27	439 332,64	536 962,12	596 624,57
	pedagogic	62,66	22 870,56	1 905,88	438,61	10,97	87,12	31 800	2 650	609,86	15,25	26	415 795,19	508 194,12	564 660,13
Academic position	Lecturer														
	Teaching Assistant	61,48	22 439,04	1 869,92	430,34	10,76	85,48	31 200	2 600	598,36	14,96	25	407 949,37	498 604,78	554 005,31
	Senior Lecturer	75,66	27 617,28	2 301,44	529,65	13,24	105,21	38 400	3 200	736,44	18,41	31	502 099,19	613 676,78	681 863,09
	Reader	96,94	35 384,64	2 948,72	678,61	16,97	134,79	49 200	4 100	943,56	23,59	39	643 323,91	786 284,78	873 649,76
	Assistant Professor	106,40	38 836,80	3 236,40	744,82	18,62	147,95	54 000	4 500	1 035,62	25,89	43	706 090,46	862 999,45	958 888,28
	Associate Professor	120,59	44 015,04	3 667,92	844,12	21,10	167,67	61 200	5 100	1 173,70	29,34	49	800 240,28	978 071,45	1 086 746,05
	Professor	132,41	48 330,24	4 027,52	926,88	23,17	184,11	67 200	5 600	1 288,77	32,22	54	878 698,46	1 073 964,78	1 193 294,20
	Full Professor	144,23	52 645,44	4 387,12	1 009,64	25,24	200,55	73 200	6 100	1 403,84	35,10	58	957 156,64	1 169 858,12	1 299 842,35

source: own elaboration – data: Central Statistical Office, Ministry of National Education and Sport

Table 2. Mean incomes and expenses in Poland in 2009 – 2010 years

Measurement	Calculation basis	Mean income				Per 1 person in family		
		net	tax and services	gross	% of tax	available income	nominal expenses	% of income
2009 year	OECD - Taxing wages 2009 - income (single)					Department of Life Conditions Central Statistical Office		
year	€	6 698	2 150	8 848	24,30	3 342	2 871	85,91
	zł	26 792	8 600	35 392		13 368	11 484	
month	12	2 232,67	716,67	2 949,33		1 114	957	
week	365/7	513,82	164,93	678,75		256,37	220,24	
per 1 work hour	365/7/40	12,85	4,12	16,97		6,41	5,51	
per 1 calendar day	365	73,40	23,56	96,96		36,62	31,46	
non-tax deposits number	calendar days	30	9	39	23,08	15	13	86,67
II quarter 2010	Central Statistical Office data - average income							
year	€	6 900	2 694	9 594	28,08			
	zł	27 600	10 774	38 374				
month	12	2 300,00	897,85	3 197,85				
week	365/7	529,32	206,63	735,94				
per 1 work hour	365/7/40	13,23	5,17	18,40				
per 1 calendar day	365	75,62	29,52	105,13				
non-tax deposits number	calendar days	31	12	43	27,91			

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

CONCLUSION

Remunerations in the majority of cases constitute the source of employees discretionary income. They are usually too small to meet both employees' aspirations and expectations. Therefore they have to be meticulously protected against inflation, tax office and banks. The process may be facilitated via savings accounts and term deposits especially the so called tax-free interest deposits.

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TAX-FREE INTEREST DEPOSITS AS THE SOURCE OF EFFICIENT INVESTMENT OF DISCRETIONARY INCOME AND CURRENT ASSETS

Abstract. The aim of the article is the analysis of the impact of so called tax-free interest deposits on the efficient investment of current assets of small companies and discretionary income of individuals. Capital income tax drastically lowered the attractiveness of savings accounts and tem deposits at the same time increasing operational costs especially affecting small companies. It also visibly diminished the size of individual discretionary income. Legally introduced method of round the tax base (also the interest from capital gains) and taxes themselves – create an opportunity for increasing income via more fair distribution of that income among tax office, banks and individuals as well as enterprises saving their money at deposits with daily calculated and added interest rates.

Key words: deposit, interest, asset, income, tax

INTRODUCTION

Savings accounts with daily capitalized interest might in many cases be treated as an efficient source of individual disposable income. Then they become an equivalent of company circulating assets. Simultaneously they are a specific response to capital income tax introduced in 2001. Deposits and tax-free interest savings accounts have appeared rather late that is in the first months of 2009 as the result of then significant recession and slump in economic situation. Since then they have become triumphant attracting to the banks which have them on offer not so small capital.

The basis of its construction is rounding method for tax purposes introduced in 2006. 19% Belka tax on deposits does not have to be paid when it is lower than 0.5pln. To keep it low banks use daily capitalization of interest from their savings accounts and deposits. As a result one may keep a deposit of a few dozen thousands of Polish zloty and not pay any tax on it. It only needs to be controlled that the tax level cannot exceed 0.5pln and the interest itself stays lower than 2.49pln within the period in which a bank capitalizes that interest and gives it to the clients disposal.

Capital income tax (colloquially known as Belka tax – from the name of the Minister of Finance who introduced it in Poland) – is a form of flat-rate income. The rules of its calculation and execution are determined by article 30a and 30b of the Personal Income Tax Act of 26th of July 1991 concerning income tax from natural persons.

THE INTRODUCTION AND THE LEVEL OF TAX ON INCOME FROM SAVINGS ACCOUNTS AND BANK DEPOSITS

Belka tax has initially embraced those investments and funds at the disposal of individuals which were transferred onto bank accounts and deposits as of the 1st of December 2001. At the moment when it was launched the tax amounted to 20%. In the last months of 2001 before its execution so as to evade it at least temporarily, investors inspired by profit-driven banks in great numbers relocated their savings onto long-term bank deposits. The majority of deposits from that period were one-year deposits. In the first year of its existence Belka tax generated 800mln pln for Polish budget simultaneously reducing bank savings by 8 billion pln and increasing mutual funds assets by a few billon pln.

After a year when the interest of the majority of the first anti tax deposits matured (those deposits until their maturity were exempt from Belka tax), mutual funds and banks began to compete for those resources again. The tax did not yet embrace income from investment in security market. It allowed banks and mutual funds to form the instruments which made possible investments without an obligation to pay tax. Hence anti-tax deposits of second type, namely bank bonds and close-end fund investment certificates were created.

The end of its era came with the introduction of tax from capital gains in January 2004. Simultaneously tax rate on income from capital investments was lowered to 19% to make it equal to the first tax rate on personal income tax (PIT), which from 1998 also amounted to 19%. (First personal income tax execution took place in 1993 and related to income from 1992 – its first rate was 20% and then it was increased and for the period between 1994 and 96 –amounted to 21%, subsequently it was lowered three times. For 1997 it amounted to 20%, for the period between 1998 and 2008 – 19%, and as of the 1st of January 2009 –it has been 18%).

TAX ON CAPITAL GAINS

In 2004 the process of gradual introduction of tax on capital gains in Poland was completed. However the process of evading that tax did not finish yet. As the third type of tax-free investment so called anti-tax insurance policies also called deposit insurance policies appeared. They have been introduced by banks co-operating with insurance companies. So as to successfully avoid tax duty they use a loophole in tax legislation, which exempts from Belka tax benefits generated by life insurance policies. The third type of anti-tax deposits is therefore life insurance where insurance company is obliged to pay

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after a specific period of time (usually six months or one year) benefits equal to the sum previously invested increased by interest.

The drawback of insurance deposit policies is their low interest rate and significantly lower national guarantee level. Regular deposits guarantee via Bank Guarantee Fund (in case of bank financial problems) the return of total savings up to the limit of 50 thousand euro. Insurance deposit policies offer a similar guarantee of Insurance Guarantee Fund yet the refund amounts to only half of the sum that has been deposited .

The background of the fourth type of anti-tax deposits is currently prevailing method of rounding tax base and taxes themselves.

There is also the fifth type of anti-tax deposits namely contract of commodity deposit (for example gold, silver or platinum) offered by an adequate company for example Amber Gold Ltd. Deposit in noble metals via such companies is done similarly to bank deposits even though Amber Gold is not a bank. In accordance with its concession it deals with safekeeping and turnover of commodities (for example gold, silver or platinum) on its clients behalf. Investing in noble metals means that the client becomes an owner of the contract for example for gold produced in Mint of Switzerland PAMP plc equal to the value of invested spare funds. Gold which is the subject of such storage contract is marked by the mint as gold of the highest purity (hallmark 999,9). During the length of the contract metal whose owner is the company's client is stored at Treasury of Polish banks either PKO BP and BGŻ. Towards the termination of the contract the client gets a refund of invested capital along with negotiated profit.

THE RULES OF ROUNDING THE TAX BASE AND THE TAXES THEMSELVES

By rule civil law liabilities are not rounded off only to the nearest full grosz unless there is some other solution directly linked to the content of the contract between the parties involved. If it had not been precisely specified in the contract each interest base, all interest and each liability are calculated based on rounding to 1 whole grosz.

For tax obligations – until the end of 2005 tax base was rounded off to the whole zloty and the tax, delay fines and prolongation fees were rounded off to whole grosz tens. It has been regulated by the directive of Minister of Finance dated 24th of December 2002 concerning interest for late payment and prolongation fees rounding procedures as well as the level of information which had to be provided in calculations (Book of Acts Number 240, point 2063). In other words in tax base sums lower than 0.5pln have been omitted and the sums of 0.5 and more were rounded to the nearest whole zloty. While in taxes, interest for late payment, and overpayment, remuneration for payers and meter readers as well as prolongation sums amounting to less than 5 grosz were omitted and those of 5 grosz and more were rounded up to the nearest full tens of grosz. Such regulation did not allow for tax avoidance which would be profitable both for banks and their clients.

Such opportunity was created as of the 1st of January 2006 along with the Act dated 30th of June 2005 concerning the change of Act on Tax Statute and the change of some other acts as well as additionally the letter of Undersecretary of State in the Ministry of Finance from the 7th of October 2005 number SP1/694/8012-132/2334/05/AA concerning rounding of tax base and taxes. In accordance with those regulations: tax base, taxes , interest for late payment, and overpayment, remuneration for payers and meter readers as well as prolongation sums are rounded off to whole zloty in such a way that the remnants amounting to less than 0.5pln are omitted and the remnants of half pln and more are rounded up to the nearest whole zloty.

This regulation resulted in maximum Belka tax of 4o not 19%. It concerns the interest of tax base equal to 2,50pln, which has to be rounded to 3pln. Tax from that sum equals 57 grosz which has to be rounded up to 1pln. 1pln constitutes 40% of 2,50pln tax base (table 1). This is therefore current maximum tax rate on capital gains being the result of an obligation for 4 stage tax calculation (table 1): first step 1. Interest calculation in accordance with interest rate, then step 2. Interest rounding to whole zloty, then step 3 calculation of 19% Belka tax and finally step 4 where tax is rounded to whole zloty.

In line with that rule up to the sum of 2,49pln of interest on tax base due tax equals 0pln, as 19% tax from 2,49pln amounts to 0,47pln that is less than 0,5pln. And from the sums smaller than 0,5pln tax is not executed.

Tax from interest of 4pln equals 25% (table 1), from 7,49pln - 13,35%, while tax from 7,50pln equals 26,67%, and from 13,50pln it amounts to 22,22%. Calculations for other sums have been presented in table 1.

Table 1.Tax rate of interest of capital profit

1. Charged interest	2,49	4,00	5,26	7,49	9,00	13,49	18,49	23,49	28,49	34,49	39,49	44,49	49,49	102,49	202,49	302,49	402,49	502,49
2. Rounded interest	2	4	5	7	9	13	18	23	28	34	39	44	49	102	202	302	402	502
3. Charged tax	0,38	0,8	0,95	1,33	1,71	2,47	3,42	4,37	5,32	6,46	7,41	8,36	9,31	19,38	38,38	57,38	76,38	95,38
4. Tax from interest	0	1	1	1	2	2	3	4	5	6	7	8	9	19	38	57	76	95
Interest tax rate	0	25	19,01	13,35	22,22	14,83	16,22	17,03	17,55	17,4	17,73	17,98	18,19	18,54	18,77	18,84	18,88	18,91
1. Charged interest	2,50	5,00	7,00	7,50	10,00	13,50	18,50	23,50	28,50	34,50	39,50	44,50	49,50	102,50	202,50	302,50	402,50	502,50
2. Rounded interest	3	5	7	8	10	14	19	24	29	35	40	45	50	103	203	303	403	503
3. Charged tax	0,57	1	1,33	1,52	1,9	2,66	3,61	4,56	5,51	6,65	7,6	8,55	9,5	19,57	38,57	57,57	76,57	95,57
4. Tax from interest	1	1	1	2	2	3	4	5	6	7	8	9	10	20	39	58	77	96
Interest tax rate	40	20	14,29	26,67	20	22,22	21,62	21,28	21,05	20,29	20,25	20,22	20,20	19,51	19,26	19,17	19,13	19,10

source: own elaboration

ANTI-TAX DEPOSITS OF 2,49PLN BASED ON ROUNDING

Interest and tax rounding rule to 1pln, produced tax exempt sum of 2,49pln and triggered the creation of deposits and accounts where banks capitalize interest daily.

In table 2 it has been shown what is the minimum sum allowing to achieve interest of 2,49pln depending on the deposit interest rate. For example for interest rate of 5% it is 18140,50pln and for 4,5% interest rate it is 20156,12pln. It has also been given what minimum sums may be deposited in order to obtain multiple interest of 2,49pln. For example to get

13 5.5%- interest rate anti-tax deposits one must have in savings accounts at least 214387,81pln. 30 5% -interest rate deposits require the capital of 544215pln. Daily, it generates 74,70pln that is 27265,50pln in one year. It corresponds to full time employment at an hourly gross rate of 18,18pln (where remuneration taxes and contributions amount to 28,08% - compare 'Remuneration and discretionary income' in this issue of Intercathedra Yearbook).

Table 2. Incomes and amounts on non-tax deposits

Deposits number	Net income					Gross income					Minimum amount on non-tax deposits in zł				
	day	year	month	week	work hour	day	year	month	week	work hour					
	calendar					calendar					deposits interest				
Calculations data		365	12	7	40	28,08	tax and insurance premium				6	5,5	5	4,5	4,05
1	2,49	908,85	75,74	17,43	0,44	3,46	1 263,70	105,31	24,24	0,61	15 117,09	16 491,37	18 140,50	20 156,12	22 395,68
2	4,98	1 817,70	151,48	34,86	0,87	6,92	2 527,39	210,62	48,47	1,21	30 234,18	32 982,74	36 281,00	40 312,24	44 791,36
3	7,47	2 726,55	227,21	52,29	1,31	10,39	3 791,09	315,92	72,71	1,82	45 351,27	49 474,11	54 421,50	60 468,36	67 187,04
4	9,96	3 635,40	302,95	69,72	1,74	13,85	5 054,78	421,23	96,94	2,42	60 468,36	65 965,48	72 562,00	80 624,48	89 582,72
5	12,45	4 544,25	378,69	87,15	2,18	17,31	6 318,48	526,54	121,18	3,03	75 585,45	82 456,85	90 702,50	100 780,60	111 978,40
6	14,94	5 453,10	454,43	104,58	2,61	20,77	7 582,17	631,85	145,41	3,64	90 702,54	98 948,22	108 843,00	120 936,72	134 374,08
7	17,43	6 361,95	530,16	122,01	3,05	24,24	8 845,87	737,16	169,65	4,24	105 819,63	115 439,59	126 983,50	141 092,84	156 769,76
8	19,92	7 270,80	605,90	139,44	3,49	27,70	10 109,57	842,46	193,88	4,85	120 936,72	131 930,96	145 124,00	161 248,96	179 165,44
9	22,41	8 179,65	681,64	156,87	3,92	31,16	11 373,26	947,77	218,12	5,45	136 053,81	148 422,33	163 264,50	181 405,08	201 561,12
10	24,90	9 088,50	757,38	174,30	4,36	34,62	12 636,96	1 053,08	242,35	6,06	151 170,90	164 913,70	181 405,00	201 561,20	223 956,80
11	27,39	9 997,35	833,11	191,73	4,79	38,08	13 900,65	1 158,39	266,59	6,66	166 287,99	181 405,07	199 545,50	221 717,32	246 352,48
12	29,88	10 906,20	908,85	209,16	5,23	41,55	15 164,35	1 263,70	290,82	7,27	181 405,08	197 896,44	217 686,00	241 873,44	268 748,16
13	32,37	11 815,05	984,59	226,59	5,66	45,01	16 428,05	1 369,00	315,06	7,88	196 522,17	214 387,81	*235 826,50*	*262 029,56*	*291 143,84*
14	34,86	12 723,90	1 060,33	244,02	6,10	48,47	17 691,74	1 474,31	339,29	8,48	211 639,26	230 879,18	253 967,00	282 185,68	313 539,52
15	37,35	13 632,75	1 136,06	261,45	6,54	51,93	18 955,44	1 579,62	363,53	9,09	226 756,35	247 370,55	272 107,50	302 341,80	335 935,20
16	39,84	14 541,60	1 211,80	278,88	6,97	55,39	20 219,13	1 684,93	387,76	9,69	241 873,44	263 861,92	290 248,00	322 497,92	358 330,88
17	42,33	15 450,45	1 287,54	296,31	7,41	58,86	21 482,83	1 790,24	412,00	10,30	256 990,53	280 353,29	308 388,50	342 654,04	380 726,56
18	44,82	16 359,30	1 363,28	313,74	7,84	62,32	22 746,52	1 895,54	436,23	10,91	272 107,62	296 844,66	326 529,00	362 810,16	403 122,24
19	47,31	17 268,15	1 439,01	331,17	8,28	65,78	24 010,22	2 000,85	460,47	11,51	287 224,71	313 336,03	344 669,50	382 966,28	425 517,92
20	49,80	18 177,00	1 514,75	348,60	8,72	69,24	25 273,92	2 106,16	484,71	12,12	302 341,80	329 827,40	362 810,00	403 122,40	447 913,60
21	52,29	19 085,85	1 590,49	366,03	9,15	72,71	26 537,61	2 211,47	508,94	12,72	317 458,89	*346 318,77*	380 950,50	*423 278,52*	470 309,28
22	54,78	19 994,70	1 666,23	383,46	9,59	76,17	27 801,31	2 316,78	533,18	13,33	332 575,98	362 810,14	399 091,00	443 434,64	492 704,96
23	57,27	20 903,55	1 741,96	400,89	10,02	79,63	29 065,00	2 422,08	557,41	13,94	347 693,07	379 301,51	417 231,50	463 590,76	515 100,64
24	59,76	21 812,40	1 817,70	418,32	10,46	83,09	30 328,70	2 527,39	581,65	14,54	362 810,16	395 792,88	435 372,00	483 746,88	537 496,32
25	62,25	22 721,25	1 893,44	435,75	10,89	86,55	31 592,39	2 632,70	605,88	15,15	377 927,25	412 284,25	453 512,50	503 903,00	559 892,00
26	64,74	23 630,10	1 969,18	453,18	11,33	90,02	32 856,09	2 738,01	630,12	15,75	393 044,34	428 775,62	471 653,00	524 059,12	582 287,68
27	67,23	24 538,95	2 044,91	470,61	11,77	93,48	34 119,79	2 843,32	654,35	16,36	408 161,43	445 266,99	489 793,50	544 215,24	604 683,36
30	74,70	27 265,50	2 272,13	522,90	13,07	103,87	37 910,87	3 159,24	727,06	18,18	453 512,70	494 741,10	544 215,00	604 683,60	671 870,40
35	87,15	31 809,75	2 650,81	610,05	15,25	121,18	44 229,35	3 685,78	848,23	21,21	529 098,15	577 197,95	634 917,50	705 464,20	783 848,80
40	99,60	36 354,00	3 029,50	697,20	17,43	138,49	50 547,83	4 212,32	969,41	24,24	604 683,60	659 654,80	725 620,00	806 244,80	895 827,20
45	112,05	40 898,25	3 408,19	784,35	19,61	155,80	56 866,31	4 738,86	1 090,59	27,26	680 269,05	742 111,65	816 322,50	907 025,40	1 007 805,60
50	124,50	45 442,50	3 786,88	871,50	21,79	173,11	63 184,79	5 265,40	1 211,76	30,29	755 854,50	824 568,50	907 025,00	1 007 806,00	1 119 784,00

source: own elaboration

Some banks in case of taxes and anti- Belka tax deposits determine the minimum deposit. In table 3 the relation of, in such way determined, thresholds from interest rate has been presented. For example for the threshold of 500pln at 4,5%interest rate two deposits of 527,23pln each give 2*7=14 grosz. One deposit of double the sum 1054,46pln allows to generate from its interest 13 grosz. This 13 grosz one may get depositing 1013,89pln. This difference of over 40pln generates profit for the bank at which the deposit was kept. Rounding is for banks quite substantial source of easy profit as incidental selection of optimum deposit is rather improbable. While each difference generates profits for banks.

For example at 4,5% interest rate and minimum threshold of 500pln: 38 deposits of 527,23pln each, amounts to the investment of 20034,74pln generating 2,66pln; investing that sum in total generates 2,47pln, which is irrational as obtaining 2,47pln interest requires minimum sum of 19993,89pln; locating at savings account with daily capitalization the sum of 20075pln allows to earn daily interest of 2,48pln (table 3).

Generally, in case of implementing by banks minimum deposits it is more beneficial to invest in a number of smaller deposits than one bigger deposit. It is the result of the fact that generating the first grosz on the account with daily interest capitalization is always three times cheaper than obtaining the second grosz. Gaining each subsequent grosz always means additional double cost of possessing the first one, compare table 4 for example at 5% interest generating first grosz necessitates depositing 36,50pln. Each subsequent grosz costs 73pln more hence the second demands depositing 109,50pln and the third 182,50pln. 1pln generated by daily interest requires the investment of 7263,50pln; in order to gain 2,49pln at tax-free deposit one has to retain the sum of 18140,50pln (table 2, table 4). Such investment may remain tax free for 28 days – following that time that is on the 29th day the deposit is worth 18212,71pln and the maximum sum on which Belka tax will not be calculated is 18213,49pln (table 4). For the tax on capital gains not to be executed the sum on the account on the preceding capitalization cannot exceed 18211pln and rational sum after 28 days on the account with daily capitalization amounts to 18210,22pln.

Table 3. Dependence compound interest from amount of annuities (deposits) and theirs quantity

4,5				500								1000								2000			
0,07	1	527,23	0,07	446,12	0,06	608,34	0,08	0,13	1	1013,89	0,13	932,78	0,12	1095	0,14	0,26	1	2068,34	0,26	1987,23	0,25	2149,45	0,27
0,14	2	1054,46	0,13	1013,89	0,13	1095	0,14	0,26	2	2027,78	0,25	1987,23	0,25	2068,34	0,26	0,52	2	4136,68	0,51	4096,12	0,51	4177,23	0,52
0,21	3	1581,69	0,2	1581,67	0,2	1662,78	0,21	0,39	3	3041,67	0,38	3041,67	0,38	3122,78	0,39	*0,78*	*3*	*6205,02*	*0,77*	*6205,00*	*0,77*	*6286,12*	*0,78*
0,28	4	2108,92	0,26	2068,34	0,26	2149,45	0,27	0,52	4	4055,56	0,5	4015,00	0,5	4096,12	0,51	1,04	4	8273,36	1,02	8232,78	1,02	8313,89	1,03
0,35	5	2636,15	0,33	2636,12	0,33	2717,23	0,34	0,65	5	5069,45	0,63	5069,45	0,63	5150,56	0,64	1,3	5	10341,70	1,28	10341,67	1,28	10422,78	1,29
0,42	6	3163,38	0,39	3122,78	0,39	3203,89	0,4	*0,78*	*6*	*6083,34*	*0,75*	*6042,78*	*0,75*	*6123,89*	*0,76*	1,56	6	12410,04	1,53	12369,45	1,53	12450,56	1,54
0,49	7	3690,61	0,46	3690,56	0,46	3771,67	0,47	0,91	7	7097,23	0,88	7097,23	0,88	7178,34	0,89	1,82	7	14478,38	1,79	14478,34	1,79	14559,45	1,8
0,56	8	4217,84	0,52	4177,23	0,52	4258,34	0,53	1,04	8	8111,12	1	8070,56	1	8151,67	1,01	2,08	8	16546,72	2,04	16506,12	2,04	16587,23	2,05
0,63	9	4745,07	0,59	4745,00	0,59	4826,12	0,6	1,17	9	9125,01	1,13	9125,00	1,13	9206,12	1,14	2,34	9	18615,06	2,3	18615,00	2,3	18696,12	2,31
0,7	10	5272,30	0,65	5231,67	0,65	5312,78	0,66	1,3	10	10138,90	1,25	10098,34	1,25	10179,45	1,26	2,6	10	20683,40					
0,77	11	5799,53	0,72	5799,45	0,72	5880,56	0,73	1,43	11	11152,79	1,38	11152,78	1,38	11233,89	1,39	2,86	11	22751,74					
0,84	*12*	*6326,76*	*0,78*	*6286,12*	*0,78*	*6367,23*	*0,79*	1,56	12	12166,68	1,5	12126,12	1,5	12207,23	1,51	3,12	12	24820,08					
0,91	13	6853,99	0,85	6853,89	0,85	6935	0,86	1,69	13	13180,57	1,63	13180,56	1,63	13261,67	1,64	3,38	13	26888,42					
0,98	14	7381,22	0,91	7340,56	0,91	7421,67	0,92	1,82	14	14194,46	1,75	14153,89	1,75	14235	1,76	3,64	14	28956,76					
1,05	15	7908,45	0,98	7908,34	0,98	7989,45	0,99	1,95	15	15208,35	1,88	15208,34	1,88	15289,45	1,89	3,9	15	31025,10					
1,4	20	10544,60	1,3	10503,89	1,3	10585	1,31	2,08	16	16222,24	2	16181,67	2	16262,78	2,01	5,2	20	41366,80					
2,1	30	15816,90	1,95	15776,12	1,95	15857,23	1,96	2,21	17	17236,13	2,13	17236,12	2,13	17317,23	2,14	7,8	30	62050,20					
2,66	38	20034,74	2,47	19993,89	2,47	20075	2,48	2,47	19	19263,91	2,38	19263,89	2,38	19345	2,39	10,4	40	82733,60					
5,5				500								1000								2000			
0,09	1	564,10	0,09	497,73	0,08	630,46	0,1	0,16	1	1028,64	0,16	962,28	0,15	1095	0,17	0,31	1	2024,10	0,31	1957,73	0,3	2090,46	0,32
0,18	2	1128,20	0,17	1095,00	0,17	1161,37	0,18	0,32	2	2057,28	0,31	2024,10	0,31	2090,46	0,32	0,62	2	4048,20	0,61	4015,00	0,61	4081,37	0,62
0,27	3	1692,30	0,26	1692,28	0,26	1758,64	0,27	0,48	3	3085,92	0,47	3085,91	0,47	3152,28	0,48	0,93	3	6072,30	0,92	6072,28	0,92	6138,64	0,93
0,36	4	2256,40	0,34	2223,19	0,34	2289,55	0,35	0,64	4	4114,56	0,62	4081,37	0,62	4147,73	0,63	1,24	4	8096,40	1,22	8063,19	1,22	8129,55	1,23
0,45	5	2820,50	0,43	2820,46	0,43	2886,82	0,44	0,8	5	5143,20	0,78	5143,19	0,78	5209,55	0,79	*1,55*	*5*	*10120,50*	*1,53*	*10120,46*	*1,53*	*10186,82*	*1,54*
0,54	6	3384,60	0,51	3351,37	0,51	3417,73	0,52	0,96	6	6171,84	0,93	6138,64	0,93	6205	0,94	1,86	6	12144,60	1,83	12111,37	1,83	12177,73	1,84
0,63	7	3948,70	0,6	3948,64	0,6	4015	0,61	1,12	7	7200,48	1,09	7200,46	1,09	7266,82	1,1	2,17	7	14168,70	2,14	14168,64	2,14	14235	2,15
0,72	8	4512,80	0,68	4479,55	0,68	4545,91	0,69	1,28	8	8229,12	1,24	8195,91	1,24	8262,28	1,25	2,48	8	16192,80	2,44	16159,55	2,44	16225,91	2,45
0,81	9	5076,90	0,77	5076,82	0,77	5143,19	0,78	1,44	9	9257,76	1,4	9257,73	1,4	9324,1	1,41	2,79	9	18216,90					
0,9	10	5641,00	0,85	5607,73	0,85	5674,1	0,86	*1,6*	*10*	*10286,40*	*1,55*	*10253,19*	*1,55*	*10319,55*	*1,56*	3,1	10	20241,00					
0,99	11	6205,10	0,94	6205,00	0,94	6271,37	0,95	1,76	11	11315,04	1,71	11315,00	1,71	11381,37	1,72	3,41	11	22265,10					
1,08	12	6769,20	1,02	6735,91	1,02	6802,28	1,03	1,92	12	12343,68	1,86	12310,46	1,86	12376,82	1,87	3,72	12	24289,20					
1,17	13	7333,30	1,11	7333,19	1,11	7399,55	1,12	2,08	13	13372,32	2,02	13372,28	2,02	13438,64	2,03	4,03	13	26313,30					
1,26	14	7897,40	1,19	7864,10	1,19	7930,46	1,2	2,24	14	14400,96	2,17	14367,73	2,17	14434,1	2,18	4,34	14	28337,40					
1,35	15	8461,50	1,28	8461,37	1,28	8527,73	1,29	2,4	15	15429,60	2,33	15429,55	2,33	15495,91	2,34	4,65	15	30361,50					
1,8	*20*	*11282,00*	*1,7*	*11248,64*	*1,7*	*11315*	*1,71*	2,56	16	16458,24	2,48	16425,00	2,48	16491,37	2,49	6,2	20	40482,00					
2,25	25	14102,50	2,13	14102,28	2,13	14168,64	2,14									9,3	30	60723,00					
2,61	29	16358,90	2,47	16358,64	2,47	16425	2,48									12,4	40	80964,00					

source: own elaboration

Table 4. Gaining one grosz cost on the deposit with the day interest capitalisation and non-tax deposit value

Gaining 1 grosz			Non-tax deposit				Gaining 1 grosz			Non-tax deposit			
%	1 day	K	min	days	2,49	<- max	%	1 day	K	min	days	2,49	<- max
5,50	33,19	66,36	16 491,37	26	16 556,11	16 557,72	4,00	45,63	91,25	22 675,63	36	22 765,27	22 766,87
5,45	33,49	66,97	16 642,67	26	16 707,41	16 709,63	3,95	46,21	92,41	22 962,66	37	23 054,79	23 055,06
5,40	33,80	67,59	16 796,76	27	16 863,99	16 864,35	3,90	46,80	93,59	23 257,06	37	23 349,19	23 350,64
5,35	34,12	68,22	16 953,74	27	17 020,97	17 021,96	3,85	47,41	94,81	23 559,10	38	23 653,72	23 653,89
5,30	34,44	68,87	17 113,68	27	17 180,91	17 182,54	3,80	48,03	96,05	23 869,08	38	23 963,70	23 965,13
5,25	34,77	69,52	17 276,67	27	17 343,90	17 346,19	3,75	48,67	97,33	24 187,34	39	24 284,45	24 284,66
5,20	35,10	70,19	17 442,79	28	17 512,51	17 512,98	3,70	49,33	98,65	24 514,19	39	24 611,30	24 612,83
5,15	35,44	70,87	17 612,14	28	17 681,86	17 683,00	3,65	50,00	100,00	24 850,00	40	24 949,60	24 949,99
5,10	35,79	71,57	17 784,81	28	17 854,53	17 856,37	3,60	50,70	101,39	25 195,14	40	25 294,74	25 296,52
5,05	36,14	72,28	17 960,90	29	18 033,11	18 033,16	3,55	51,41	102,82	25 550,00	41	25 652,09	25 652,81
5,00	36,50	73,00	18 140,50	29	18 212,71	18 213,49	3,50	52,15	104,29	25 915,00	41	26 017,09	26 019,28
4,95	36,87	73,74	18 323,74	29	18 395,95	18 397,47	3,45	52,90	105,80	26 290,58	42	26 395,16	26 396,37
4,90	37,25	74,49	18 510,72	29	18 582,93	18 585,20	3,40	53,68	107,35	26 677,21	43	26 784,28	26 784,55
4,85	37,63	75,26	18 701,55	30	18 776,25	18 776,80	3,35	54,48	108,96	27 075,38	43	27 182,45	27 184,32
4,80	38,03	76,04	18 896,36	30	18 971,06	18 972,39	3,30	55,31	110,61	27 485,61	44	27 595,17	27 596,21
4,75	38,43	76,84	19 095,27	30	19 169,97	19 172,10	3,25	56,16	112,31	27 908,47	45	28 020,52	28 020,76
4,70	38,83	77,66	19 298,41	31	19 375,60	19 376,06	3,20	57,04	114,06	28 344,54	45	28 456,59	28 458,59
4,65	39,25	78,49	19 505,92	31	19 583,11	19 584,40	3,15	57,94	115,87	28 794,45	46	28 908,99	28 910,31
4,60	39,68	79,35	19 717,94	31	19 795,13	19 797,28	3,10	58,88	117,74	29 258,88	47	29 375,91	29 376,61
4,55	40,11	80,22	19 934,62	32	20 014,30	20 014,83	3,05	59,84	119,67	29 738,53	48	29 858,05	29 858,19
4,50	*40,56*	*81,11*	*20 156,12*	*32*	*20 235,80*	*20 237,22*	3,00	60,84	121,67	30 234,17	48	30 353,69	30 355,83
4,45	41,02	82,02	20 382,59	32	20 462,27	20 464,60	2,95	61,87	123,73	30 746,62	49	30 868,63	30 870,33
4,40	41,48	82,95	20 614,21	33	20 696,38	20 697,15	2,90	62,94	125,86	31 276,73	50	31 401,23	31 402,58
4,35	41,96	83,91	20 851,15	33	20 933,32	20 935,05	2,85	64,04	128,07	31 825,44	51	31 952,43	31 953,50
4,30	42,45	84,88	21 093,61	34	21 178,27	21 178,48	2,80	65,18	130,36	32 393,75	52	32 523,23	32 524,10
4,25	42,95	85,88	21 341,77	34	21 426,43	21 427,64	2,75	66,37	132,73	32 982,73	53	33 114,70	33 115,45
4,20	43,46	86,90	21 595,84	34	21 680,50	21 682,73	2,70	67,60	135,19	33 593,52	54	33 727,98	33 728,70
4,15	43,98	87,95	21 856,03	35	21 943,18	21 943,97	2,65	68,87	137,74	34 227,36	55	34 364,31	34 365,09
4,10	44,52	89,02	22 122,57	35	22 209,72	22 211,58	2,60	70,20	140,38	34 885,58	56	35 025,02	35 025,96
4,05	*45,07*	*90,12*	*22 395,68*	*36*	*22 485,32*	*22 485,80*	2,55	71,57	143,14	35 569,61	57	35 711,54	35 712,74
4,00	45,63	91,25	22 675,63	36	22 765,27	22 766,87	2,50	73,00	146,00	36 281,00	58	36 425,42	36 426,99

source: own elaboration

When there is no minimum threshold for a deposit dividing invested sum into individual smaller deposits is meaningless. At the same number of deposits generated interest stays the same.

Table 5 presents how in practice one may obtain desirable income from interest depending on the interest rate and restrictions used by various banks in our country. Calculations have been done on the basis of the offer of three banks marked in table 5 by the following letters: P, M i E. Apart from the minimum value of the deposit (for bank M it is 1000pln at 4,5% interest, below that sum interest amounts to mere 2%) there are also: number of deposits kept by the same client (bank P – 6 deposits, bank E – 15 deposits, bank M – no restrictions to the number of deposits), practical interest capitalization (P – working days as interest for Sunday and holidays is added following the end of the nearest working day, M – once a month there are free withdrawals from the account even though interest is added every day, E – there are no restrictions).

Table 5. Deposits number and amount enable required income

amount	nominally	practically									amount	nominally	practically	
month	957	971,10									month	1 500	1568,70	
day	31,9	32,37									day	50	52,29	
0,01	2,49			interest				per 1 day			0,01	2,49		
3 190	13	6	7	deposits number	capitalisation practically	days	0,01	2,49	%		5 000	21	6	15
105 876,10	214 387,81	98 948,22	98 948,22	6	P bank	work day	26	33,19	16 491,37	5,5	165 950	346 318,77	98 948,22	98 948,22
129 386,40	262 029,56	141 092,84	0,00		M bank	month	32	40,56	20 156,12	4,5	202 800	423 278,52	302 341,80	0,00
143 773,30	291 143,84		156 769,76	15	E bank	calendar day	36	45,07	22 395,68	4,05	225 350	470 309,28		335 935,20
		240 041,06	255 717,98										401 290,02	434 883,42
0,01	2,49			interest				per 1 day			0,01	2,49		
4 334	18	6	12	deposits number	capitalisation practically	dni	0,01	2,49	%		10 000	41	6	35
143 845,46	296 844,66	98 948,22	98 948,22	6	P bank	work day	26	33,19	16 491,37	5,5	331 900	676 146,17	98 948,22	98 948,22
175 787,04	362 810,16	241 873,44	0,00		M bank	month	32	40,56	20 156,12	4,5	405 600	826 400,92	705 464,20	403 122,40
195 333,38	403 122,24		268 748,16	15	E bank	calendar day	36	45,07	22 395,68	4,05	450 700	918 222,88		335 935,20
		340 821,66	367 696,38										804 412,42	838 005,82
amount	nominally	practically									amount	nominally	practically	
month	1 300	1344,60									month	3 000	3062,70	
day	43,33	44,82									day	100	102,09	

source: own elaboration

For example in order to gain monthly the sum of 957pln which corresponds to the average nominal expenditure per person in family (compare: - in this issue of Intercathedra Yearbook), what is practically equal to optimum sum of 971,10pln one has to invest in 13 maximum anti-tax deposits which daily generate a profit of 2,49pln each. In bank P at 5,5% interest it requires keeping on deposits 214387,81pln and the participation of 3 people; respectively 262029,56pln and 291143,84pln should be deposited in banks M and E. Practically one person should have 6 deposits in bank P and 7 deposits in bank M having at disposal the sum of 240041,06pln or 7 deposits in bank E which equals the investment of 255717,98pln.

CONCLUSIONS

Tax-free deposits and savings accounts are very good methods for safe-keeping of current assets of small enterprises and individuals discretionary income. Their efficient management makes using Polish bank system more beneficial. It may also contribute to the more fair distribution of sums resulting from the current system of rounding tax base and taxes from capital gains to 0,5pln among tax office, banks and their clients.

Banks have not used them yet but at currently prevailing interest rates not exceeding 5,5%, 2-day, 3-day and so forth anti-tax deposits are also possible. It is yet another challenge for banking sector in case of an attempt to tighten tax system via total elimination or taxing of one-day deposits.

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Marta Lorenc-Michalska[36]

WOOD BIOMASS FOR ENERGY PURPOSES AS A CHANCE FOR WOOD SECTOR COMPANIES

Abstract: The last world financial crisis has had a noticeable impact on the wood sector in Poland. As a result companies have to deal with difficulties that have arisen in foreign trade and on labour market. One solution is to introduce some new activities into company and create a new image which may lead to an increase in competitiveness. For wood sector companies such solution can be the use of wood biomass for energy purposes. Wood waste which is a side product of wood processing may be used for energy purposes in the company that creates it or may be sold as this company's product to power stations.

Keywords: wood biomass, renewable energy source, legislation, wood sector, enterprises, world financial crisis

THE USE OF WOOD BIOMASS AS A CONSEQUENCE OF INTERNATIONAL COMMITMENTS

The discussion about issues connected with climate change and excessive exploitation of natural environment by men has been going on for a few dozen of years. However, nowadays set legal requirements concerning greenhouse gases emission as well as possibilities of the use of renewable energy sources (RES) are to a great extent a result of pro-ecological actions started at the turn of 1980s and 1990s. In 1992 during the Earth Summit the *United Nations Framework Convention on Climate Change* was signed. The consequence of that event was drawing up of the Kyoto Protocol in 1997[37].This subject was continued in the following years; however in recent years this matter has been discussed more and more often and in a broader and broader group. This leads to creation of new international and national directions[38]. The European Union Directive *on the promotion of the use of energy from renewable sources*[39] is one of the most important EU documents concerning this subject. The Directive orders that by 2020 the share of energy from renewable sources in overall energy consumption is to be 20% for the European Union and 15% for Poland. In December 2008 EU adopted the climate and energy package (abbreviated to 3x20) which assumes that by 2020 all greenhouses gases are to be reduced by 20% (in relation to 1990), the share of renewable energy sources is to be increased to 20%, and energy efficiency is to be improved by 20%.[40] It should be stressed that the European Union policy on the use of renewable sources is also carried out in relation to particular types of renewable sources, including biomass. Such actions are reflected for instance in the document called *Biomass Action Plan*[41] which considers the potential, availability and possibilities of the use of this energy source (biomass from so-called "energy plantations", forest, waste, and animal by-products).

CHANGES IN THE POLISH LEGISLATION CONCERNING THE USE OF WOOD BIOMASS FOR ENERGY PURPOSES

In Poland lines and possibilities of the use of wood biomass for energy purposes to a great extent are set by the executed energy policy. One of this policy's goals is to fulfil EU commitments concerning an increase in energy production from renewable sources, reduction of greenhouse gases emission and also of energy consumption in economy. A key document regulating possibilities of energy generation from wood biomass is the Regulation of the Minister of Economy of 14 August 2008[42]. In accordance with the assumptions presented therein, if wood biomass is to be a source of "green energy", by 2015 it should mainly come from agriculture, so from "energy plantations" (trees, bushes and plants of short growth rotation). It means that starting from 2015 the energy produced from „*waste and residues coming from forest production, and also from the industry processing forest products*" will not be considered "green energy"[43]. Waste produced during wood processing may be used for energy purposes only on site where it is created and in production units of electric power lower than 5 MW[44].

CHOSEN ISSUES OF THE WOOD SECTOR: LABOUR MARKET AND FOREIGN TRADE

The economic and financial condition of the Polish wood sector has been relatively good in recent years. In the period 2004-2008 sold production of individual industries of the wood sector was on the rise, although there was a decline in

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[37] *Poland ratified the Protocol in 2002.*

[38] *Based on: A. Szostak, E. Ratajczak, M. Lorenc-Michalska, G. Bidzińska. Analiza źródeł biomasy drzewnej na cele energetyczne ze szczególnym uwzględnieniem drewna z plantacji drzew szybkorosnących. Wood Technology Institute. Poznan 2008, p. 11.*

[39] *Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC. Official Journal of the European Union L of 2009 No 140, pp. 16-62.*

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[41] *Biomass Action Plan COM(2005) 628.*

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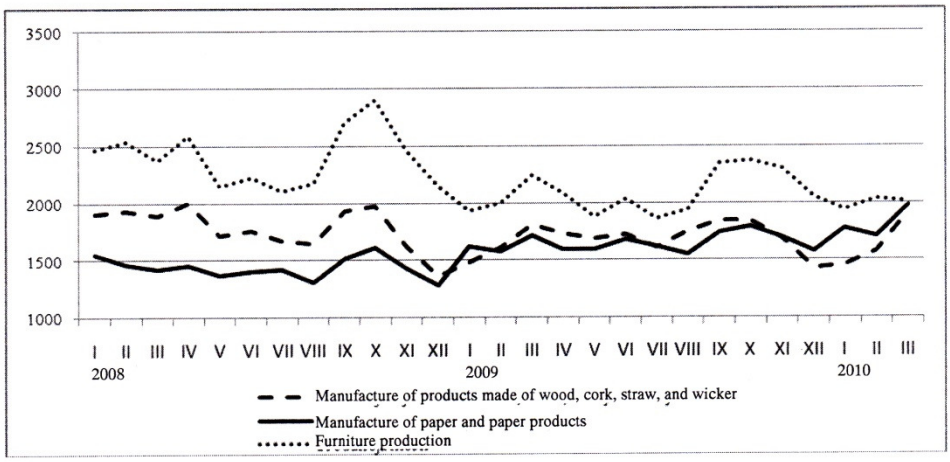
[43] *Concerns burning of biomass in installations of electric power higher than 5 MW. In the case of installations of electric power higher than 20 MW and hybrid systems of electric power higher than 20 MW it is to be 40% in 2015.*

[44] *Based on: Poland. Statement on the wood market review and prospects. Economic Commission for Europe Timber Committee. 67th Session. October 2009. p. 3.*

wood and furniture industry in 2008[45]. One of main factors that had a bearing on worse results of sold production in the last quarter of 2008 was the world economic crisis. In 2009 the level of sold production in the wood sector industries was stable, although in the case of furniture industry the level was lower than in 2008 (Fig. 1).

Fig. 1. Sold production in the wood sector in the period 2008-2010 – by months [a]

[PLN M]



[a] *concerns business entities in which employment exceeds 9 people; Q1 2010*

Source: Statistical Bulletin. Central Statistical Office. Warsaw 2009. no 12. p. 143-144; Statistical Bulletin. Central Statistical Office. Warsaw 2010. no 3. p. 157-158.

The economic situation of industry also is depicted in a synthetic way by profitability indices. For the whole industry year 2008 was a time when the profitability of net turnover decreased. The same was observed in the whole wood sector as well. The biggest drop (from 6.9% in 2007 to 1.3% in 2008) was in wood industry, especially in the production of sawmilling products (from 5% to -2.1%) and wood-based panels (from 10% to 1.6%). In the other sectors of wood industry the fall was also noticeable but less drastic – in the production of wood pulp, paper and paper products net turnover profitability dropped from 7.8% to 5.6% and in furniture production from 3.6% to 1.2%. In the analysed period similar trends were also observed as regards sale profitability. The slump of 2008 resulted in deterioration of sale profitability compared to 2007, while the wood sector industries had worse results than industry in general (a drop from 6.9% in 2007 to 5.8% in 2008) and industrial processing in total (a fall from 6.5% to 5.3%). And so, sale profitability in furniture production fell from 4.6% to 2.8%, and in the production of wood and wood products from 8% to 4.3%. Pulp and paper industry was characterised by the smallest drop, i.e. from 8.5% to 7.7%. After the 2005-2007 upward trend in the percentage of companies having net profit both in industry overall and in wood industry, in 2008 the share of such firms decreased again. Compared to 2007 the percentage of profitable companies dropped from the level of 81.7% to 73.1% in the whole industry and from 85.5% to 67.3% in wood industry. In comparison to this a favourable situation was observed in pulp and paper industry where, despite a general downward trend, a small increase in percentage of profitable companies, i.e. from 74.5% in 2007 to 77% in 2008, was recorded. In the period 2004-2008 in the Polish industry the level of total costs rose by PLN 245 billion (the increase by 42%), in industrial processing by PLN 212 billion (the increase by 43%), and in wood industry by PLN 4.9 billion (the increase by 40%), including the rise in pulp and paper industry by PLN 3.3 billion (the increase by 29%) and in furniture industry by PLN 4.5 billion (the increase by 26%). [46]

Chosen financial indices suggest that companies of the wood sector in Poland suffered from the consequences of the economic crisis, although their scale was not equal. Their negative effect was the strongest in these industries that are much dependant on foreign demand and construction industry. Therefore the condition of Poland's foreign trade has a significant bearing on the wood sector, especially on furniture and wood-based panel industries. In 2008 Polish furniture was exported to 145 countries around the world, and Germany is the most important partner of the furniture industry (exports to France and Czech has increased dynamically as well). Furniture is imported mainly from Germany, China, Italy, Czech, and France – all in all from 82 countries[47].

Wood-based panels are also important item in foreign trade. In 2008 28% of wood-based panel production was intended for export. Fibreboards had the greatest share (56%) in exports and most often were shipped to German, Ukrainian, Italian, and Russian markets. Particleboards are mostly exported to Belarus, Russia, and Lithuania, while Germany is the main consumer of veneer and plywood.[48] Due to the fact that Germany, France, Italy, and China are among the main trade partners in international exchange, economic situation in these countries is crucially important for the sale level reached by wood industry companies. Since most European countries suffered from the consequences of the

[45] *A. Szostak, E. Ratajczak, G. Bidzińska, J. Pikul-Biniek, M. Lorenc-Michalska. Analiza funkcjonowania polskiego sektora leśno drzewnego w warunkach integracji z Unią Europejską w latach 2004-2008. Wood Technology Institute. Poznan 2009. p. 70.*

[46] *A. Szostak, E. Ratajczak, G. Bidzińska, J. Pikul-Biniek, M. Lorenc-Michalska. Analiza funkcjonowania.... op. cit. p. 71-77.*

[47] *Based on: M. Strzelecki, T. Wiktorski. Relatywnie dobra kondycja polskich mebli. Meble. Biuletyn Informacyjny. Polish Chamber of Commerce of Furniture Manufacturers. June 2009. p. 7.*

[48] *E. Ratajczak, G. Bidzińska, J. Pikul-Biniek, A. Szostak, M. Lorenc-Michalska. Stałe monitorowanie zmian w polskim sektorze leśno-drzewnym według standardów Komitetu Drzewnego EKG ONZ/FAO. Wood Technology Institute. Poznan 2009.*

economic crisis more than Poland (especially this concerns Germany), it is necessary for wood industry companies to look for new strategies of operation not only for the time of crisis, but also for the long-term.

Moreover, it should be added that one of the issues faced by the wood sector is reduction of employment. The Ministry of Economy drew up a list of industries most affected by the economic crisis. In co-operation with district authorities another list containing districts where between 1.04.2008 and 1.04.2009 the unemployment rate increase was the highest (over 3%) was drawn up. The group of industries which suffered the most from employment reduction encompasses the following industries: automotive, wood-based (i.e. wood, furniture, and pulp and paper industries), light (especially textile and clothing industries), and electronic.[49] Reduction of employment [50] in the wood sector was the greatest in the following provinces: dolnośląskie, kujawsko-pomorskie, lubuskie, podkarpackie, pomorskie, warmińsko-mazurskie, and wielkopolskie.

POSSIBILITIES OF THE USE OF WOOD BIOMASS FOR ENERGY PURPOSES IN WOOD INDUSTRY COMPANIES (CASE STUDY)

The market in wood biomass for energy purposes is connected with wood market, energy market (electric and thermal energy), and agricultural market, while entities of the forest-based sector are above all suppliers of wood biomass used by power plants and combined heat and power plants for energy production. This line of wood waste management opens to companies new possibilities of earning by penetration into wood biomass market with their own product. Due to the fact that in economic practice the market in wood biomass for energy purposes is still underdeveloped, which makes effective operation difficult for players in this market, some direct relations between wood sector companies and electric energy producers are observed. It concerns wood industry companies that are suppliers of wood biomass, but co-operating with the local energy producer. An example of such interrelation is given by Sklejka-Eko SA Company and Ostrowski Zakład Ciepłowniczy SA (Ostrów Combined Heat and Power Plant SA). Thanks to modern technology Sklejka-Eko SA, seated in Ostrów, processes wood chips, bark and other waste from plywood production into biomass for energy purposes. Thanks to this operation Sklejka-Eko became a strategic supplier of fuel for Ostrowski Zakład Ciepłowniczy, seated in Ostrów Wielkopolski. On the other hand, the CHP plant in Ostrów is the main electric energy supplier of Sklejka-Eko who satisfies 70% of Sklejka-Eko's annual demand.[51] It is worth adding that Ostrowski Zakład Ciepłowniczy was the first in Poland to apply a solution which uses Organic Rankine Cycle (ORC). A dozen or so such CHPs already operate in Europe. The whole investment (PLN 22 M) is financed from three sources: 40% is a non-repayable grant from Ekofundusz (Eco-fund), 20% is a loan from the National Environmental Protection Fund, and 40% is Ostrowski Zakład Ciepłowniczy's own funds.[52]

The role of a supplier of wood biomass for energy purposes is a new role for wood sector companies, but not the only one possible to play within the framework of this issue. The Regulation of the Minister of Economy of 14 August 2008 states that wood waste from wood industry may be used for energy purposes mainly on sites where it was produced. For wood sector companies it suggests another, new area of operation where they can become active. It means that at the same time a wood industry company is a supplier of wood biomass for energy purposes and an energy producer (combustion is carried out in the same production plant). An example of such activity is production plant "Tartak Olczyk" from Świdno which executes the project "*A biomass-heated associated source of heat and electric energy in the sawmill in Świdno*". The main goal of the project is to increase the effectiveness of production of thermal energy necessary for technological process carried out in the sawmill through associated production of heat and electric energy using biomass that is waste from the production process.[53] Additionally, CO_2 emission in świętokrzyskie province will be considerably reduced by using biomass for generation of heat and electric energy in the sawmill.[54] An important fact is that a company which decides to produce electric energy from its own wood waste may, after it is licensed, sell energy on electric energy market.

POSITIVE EFFECTS OF WOOD BIOMASS USE FOR ENERGY PURPOSES FOR WOOD SECTOR COMPANIES

Every form of activity consisting in waste management brings about environmental and social benefits. The use of wood biomass for energy purposes is supported on European Union level as well as national. Besides global advantages resulting from these activities, such as counteracting climate change, positive effects may also occur for wood sector companies. As it stems from the above-mentioned data, the wood sector suffered from the world financial crisis, but in general to a less degree than other industries in Poland. Another factor hampering operation is strong dependence of some industries on foreign trade. This is so, because in such case economic condition of main foreign trade partners is of importance. A solution to this may be diversification of operation consisting in opening new forms of business activity which bring anticipated profits. This can be done using company's own waste, i.e. wood biomass for energy purposes. No matter whether a company will sell wood biomass, burn it on its own to produce electric and thermal energy for its own consumption or sell the energy generated from wood biomass, each of these form of activity is an additional operation which in the long-term may bring anticipated profits. Moreover, presented examples show that the use of biomass is often connected with innovations in the form of solutions, which are pioneer solutions in Poland, and with the use of modern

[49] *A. Szostak, E. Ratajczak, G. Bidzińska, J. Pikul-Biniek, M. Lorenc-Michalska. Analiza funkcjonowania.... op. cit. p. 87.*
[50] *Among other firms reduction of employment concerned such companies as: Delphia Yachts, Fabryka Mebli Forte, Pagód Meble, KPM Kłodzko [Based on: M. Wnorowska. Tysiące drzewiarzy bez pracy. Gazeta Przemysłu Drzewnego 2009. no 1, p. 6; www.up.poznan.pl/wtd/strony/1/i/15010.php].*
[51] *Based on: http://ebiomasa.pl/Biomasa/sposob-na-zagospodarowanie-odpadow-energia-ze-sklejkowej-biomasy.html.*
[52] *Energia i ciepło z biomasy. http://www.komunalny.pl/index.php?name=article&op=show&id=1895.*
[53] *http://egie.pl/konwersatorium/aeroenergetyka.*
[54] *Report on the activities of the National Environmental Protection and Water Management Fund in 2008. National Environmental Protection and Water Management Fund. Warsaw. April 2009. p.18.*

technologies and equipment. This creates a positive image of a company that is environmentally friendly and innovative. These trumps can be effectively used in promotion and marketing. It also should be added that a company can obtain grant for starting up operation consisting in the use of wood biomass for energy purposes. If we take into consideration the fact that implementation of solutions aiming at waste management is in line with European Union and national policies, companies can look for funds from EU programmes as well as from self-governments and communes.

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TIME-DRIVEN PRODUCT DEVELOPMENT

Abstract: The product realization process, which consists of product planning, design, process planning, and manufacturing. The development time is an important factor. Accelerated development of the product results in a longer sales life, a marketplace advantage by gaining early customers, a pricing advantage for the company, and the ability to use more up-to-date technology in the product. An increase in development time has a much greater effect on profits than, an increase in production costs or development costs. The decision regarding accelerated product development must consider the trade-off among the parameters of interest as are product features, product cost, development speed, and development expense. Often, the development of a product is delayed in the early stages because, no one in the company realizes its importance. Another factor that can cause delays is when a company tries to develop an entirely new product, often using new technology- There is less risk if a product is improved in stages, using only tried and tested technology. The chief factors that facilitate faster development of products are better communication between departments, which also leads to lower cost and higher quality products. The company increases its market share and enjoys higher profits by the early introduction of a product.

Key words: manufacturing, product, time-driven development

TIME-DRIVEN PRODUCT DEVELOPMENT

There is more competitiveness in manufacturing over the last years. The key ingredients are product innovation and quickly developing, actuate product to market. The time period from the moment the company realizes a product to the time it is in the hands of customer, can be reduced by applying specific techniques of time-driven development. This is a methodology used by management to focus on

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From the moment that the company realizes that a product should be developed to the time it is in the customer's hands-can be reduced by applying certain techniques of time-driven development. This is a procedure used by management to focus on reduction the time taken to develop a product. There is possibility of 50 percent time reduction by companies that have applied the method of time-driven product development. The competition on the market requires that producers have to be able to present to customers products, that are low cost, with attributes as short delivery time and high quality. There are several steps in the production process as engineering aspects include planning, design, and manufacturing. The product specifications list and product structure are the important factors of a product's characteristics set during the planning phase. Management point view include a compromise study to determine the economic acceptability of rapid product development; product innovation by stages; and the overlapping of activities in planning, design, and manufacture.

CONVENTIONAL PRODUCT REALIZATION PROCESS

Product realization process consists of two steps, design and manufacturing. in order to understand the process, it´s necessary to look at the whole life of a product, which begins with its planning and ends with its disposal.

Steps in the Product Realization Process

The *need* for a product must exist, and may come from external or internal sources. The external causes are a direct order from a customer, a outdated existing product, the availability of new technologies, or a variation in market demands. Internal to the company, new product ideas may come from developments within the company or the needs identified by the marketing department. After the need is established, the product has to be designed and manufactured. It´s necessary to say, that in this process, which is sequential, each step must be completed before the next step begins, and this fact shows that this procedure leads to delays, mistakes, poor quality, and high costs. The activities in the successive stages are concurrent or overlap.

Product Planning is the selection and development of, ideas for new products. A systematic approach to product planning should iead to a better means of meeting the constraints of cost and time. There are several activities like estabíishing goals, market analyses, detailing the customer's benefits of the product, product´s features deciding, establishing product performance, economic analysis and setting the cost target, setting the expected sales volume, setting deadlines for completion of tasks, such as design, prototype building, and setting up the manufacturing line. The two most important entities invofved in making the decision are the company and the market. The company needs to define its objectives and examine its capabilities. An evaluation of resources and objectives will help focus the company on the type of product it should develop.

Design. The first major step in the design of a product is the preparation of the requirements or specifications list. The specific requirements are classified according to life phases of the product and types of requirements (technical, economic, ergonomic, legal). The most important are the technical requirements for the product use. Conceptual design is the most important phase of design; it has the single largest influence on costs. Embodiment design leads the process through a more concrete stage as the shapes, materials are determined. The final design phase leads to production drawings. The final decisions on dimensions, arrangement, shapes of individual components, and materials are made. The design proceeds from a more abstract level at task clarification and takes on a more concrete form as it approaches this phase.

Process Planning know also as production or manufacturing planning, process planning involves decisions on how the product is to be manufactured, the manufacturing processes, machines required, how the parts are to be mounted. Steps in process planning are productivity analysis, process design, vendor selection, tooling design.

Manufacturing includes materials handling, production of parts, quality control, and related activities. The items as overall design arrangement to the manufacturing process, form design of components, materials for components, and purchased parts relate to production capacity have the largest influence on manufacturing. There are also next steps of the process, as are marketing and product´s disposal.

ACCELERATED PRODUCT DEVELOPMENT

A shorter time to market does not necessarily mean higher costs. A well managed program can realize products at low cost and under allowed time. Its depends also on how the development process is managed.

Cost and Price

From the time the development of a product begins, its cost starts to grow because of the resources used for its realization (personnel, facilities, equipment). The price of a competitor's product decrease with time. There are several reasons for the optimization of the production and manufacturing process, cost-driven development in design, and increased knowledge about the product.

Benefits of rapid product development

Time-driven product development, as opposite to the conventional development process, yield benefits to a company in many ways, as are the product's sales life extending, reality that by early introduction, the product has a marketplace advantage by gaining early customers who lock on to it, develop loyalty, and are less likely to switch. Also that the company gains a pricing advantage ahead of the competitors. A company that applies rapid development methods on a product later than a traditional company will use more up-to-date technology in the product. Status of the technology indicates what advantage does have the technology according to time. The state of the technology is advancing. Companies may reach the market with their products in the same time. But there is a difference between the companies, and the company that applies rapid development methods with younger and higher state of technology is in advantage against company prefer the traditional development process which starts in the same time with technology obtained longer time ago. The market is a moving target. The length of time it takes for product development is very critical. The longer the time to product introduction, the more uncertain will be the market forecast and therefore the greater the risk. The effect on profits due to deviations in development time, production costs, and development costs shows, for example, that an increase of 50 percent in development

costs can decrease profits by 10 percent, but an increase of 10 percent in development time can reduce profits by up to 30 percent. Therefore, it benefits a company to shorten the development time, even at the expense of some increased development costs.

MANAGEMENT FOR RAPID PRODUCT DEVELOPMENT

The primary initiatives in achieving rapid product development must come from the top management of the company. The decisions that must be made and the procedures to be implemented are several. For example economic decisions, decisions regarding product innovations, project management, etc.

Economics of Rapid Product Development

The decision regarding the product development project must be based on facts rather than intuition. It may appear at first that it is difficult to quantify the costs and welfare of the various development goals. Nevertheless, even the use of gross estimations is better and more easily justifiable than an instinctive decision.

The four primary element to be considered in the product development decision are the following:

a) The characteristic of the product ascertain its performance which is an important determinant of its market success. Product public presentation is determined by the customer and the marketplace, not only by satisfying what is in the specifications.

b) Product cost over its life cycle, including the purchase price and the operating, maintenance, and disposal costs.

c) Development speed. Time to market is obviously the most critical factor. This is the total time from the moment when someone thinks about developing the product to the time it is in the customer's hands. The speed of product development determines the time to market, it can be important to the success of the product. It regards all of the company's departments, not just design engineering.

d) Development expense are the one-time costs associated with the development of the product including the one-time costs associated with the product and extra expenses for items such as overtime, facilities, and consultants. Although rarely an overriding concern, this expense must be justified to the upper management. Rapid product development will show extra costs on the balance sheet and must be justified by savings in time that would otherwise be spent.

Each of these factors needs to be weighed against the other three on the basis of costs and benefits before the decision to proceed can be made. It leads to better decisions and is usually preferable to more sophisticated and complex approaches and is certainly an improvement over a decision based on intuition only.

Early Stages of a Project

The lack of management of a product in its earliest phases can account for the greatest loss of time. A project can become inactive without people realizing it, as there is no one responsible to keep track of it; there may be several reasons for this. There might be a sensed need for the product but not enough importance is dedicated to it. The company might be not sure it has the technology for all parts of the product, or is not sure the expenses on the product increase only after its importance is recognized, while the market window of opportunity is closing.

Product innovation by phases

In all new projects, there is a certain level of novelty, which are unknowns and therefore more risk is attached to the product's development. Rather than innovate on the whole product, as far as possible is better to improve only on parts of the product at a time.

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INVESTMENT AND LABOUR PRODUCTIVITY GROWTH IN WOOD PROCESSING INDUSTRY IN SLOVAK REPUBLIC

Abstract: As is known, the investment generates three major effects - capacity, substitution, income. Substitution effect is just currently a dominant factor in the further development of wood processing industry in the Slovak republic (WPI SR). The paper presents the impact of investment on productivity growth, as well as formulation of selected measures for investment and growth in the overall prosperity of the wood processing industry in Slovakia.

Key words: investment, effects of investment, wood processing industry (WPI), labour productivity,

INTRODUCTION

The development of each sector or company requires investment. Without investment can not fully meet the objectives of the business. How investment in the wood processing industry of Slovak republic (WPI SR) influenced its development, achieve goals and also what is the impact of investment on labor productivity across sectors of wood processing industry, is presented in our work. At the same time are formulated measures to increase the effects of investment.

1. INVESTMENT IN THE WOOD PROCESSING INDUSTRY OF SLOVAKIA

Investment in the sector of wood industry (WI) reported stagnation in the years 1999-2002, expressed more in the years 2003 - 2006, at the level of nearly 1.7 to 2.6 billion Slovak crowns (SKK) per year. A significant increasing of investment to the level of 6.07 billion SKK occurred in 2007, but this growth was followed by drop to 2.25 billion SKK.

The sector of furniture production has seen better investment in the years 2000, 2001, 2004-2006 and this fact caused the growth of labour productivity. The investment was in the range of 1.5 to 2.8 billion SKK in mentioned years. Like in the sector of wood industry also in furniture industry (FI) was an equal sharp-year increase in 2006-2008, of 2.8 billion SKK to 4.5 billion SKK in 2007 and then fall to 1.6 billion SKK in 2008.

Investment in the pulp and paper industry (PPI) is reported with rapid changes following the realization of significant business actions during the whole period. Major modernizations in this sector were made in 1999 and 2003-2005, but the overall trends suggest that in the pulp and paper sector is the highest volume of investment from all three sectors of wood processing industry in the range of 1.6 to 6.6 billion SKK per year.

Table 1. Investment in the wood-processing industry and industrial production

Indicator	Sector	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Investment (million SKK)	Wood Industry (WI)	506	881	766	734	1 788	1 710	2 564	2 573	6 068	2 249
	Furniture Industry (FI)	580	1 572	1 645	701	794	1 687	2 024	2 787	4 512	1 644
	Pulp and paper Industry (PPI)	4 785	1 594	2 205	3 083	6 634	5 161	4 744	3 185	2 796	3 300
	Wood Processing Industry (WPI)	5 871	4 048	4 616	4 519	9 216	8 558	9 331	8 545	13 375	7 194
	Industrial production	44 489	42 328	71 077	56 466	59 152	71 897	104 046	105 101	102 993	98 627

Source: data from Ministry of Economy SR and Statistical Office of SR

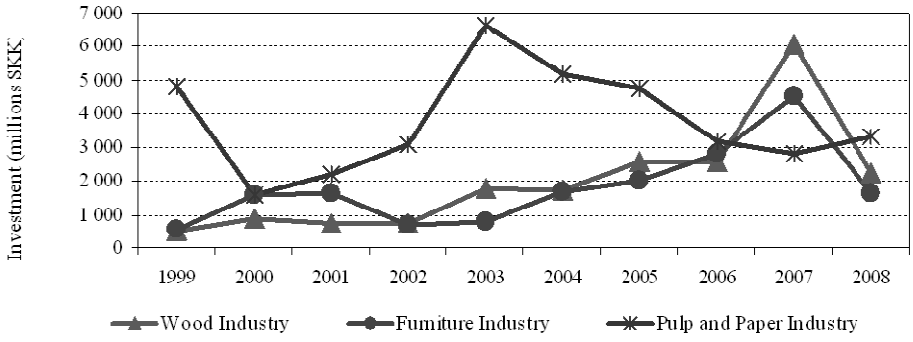

Figure 1. Investment in the sectors of wood-processing industry (millions SKK)
Source: data from Ministry of Economy SR

The global financial and economic crisis since mid-2008 and the subsequent recession also resulted in a decrease of employment in the wood industry, when in 2008 decreased the average number of employees by 8.8%, slightly smaller decrease of 7.3%was in the furniture industry. In contrast pulp and paper industry showed a slight increase in employment of 1.4%. Industrial production of Slovak republic showed employment growth of 3.1%.

Investment per capita is highest in the pulp and paper industry in the long-term (except in 2007, when dominated the sector of wood industry). In the reporting period 1999-2008, however, we can see in all three areas of WPI slight increase of investment per capita, global WPI indicator long-term exceeds the level of investment per capita in industrial production.

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Table 2 Investment per capita in the wood-processing industry and industrial production

Indicator	Sector	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Number of employees (person)	Wood Industry	11 400	10 856	10 460	10 323	9 069	8 604	9 924	9 681	9 451	8 617
	Furniture Industry	10 351	9 079	10 043	10 410	11 015	11 158	11 830	14 240	15 970	14 812
	Pulp and paper I.	10 577	10 141	9 828	8 978	8 509	7 615	7 458	7 285	7 110	7 409
	Wood Processing Industry (WPI)	32 328	30 075	30 331	29 710	28 592	27 377	29 212	31 206	32 531	30 838
	Industrial production	392 703	379 688	381 666	377 770	376 151	363 981	368 664	370 471	383 563	394 965
Investment per capita (million SKK)	Wood Industry	44 342	81 188	73 278	71 109	197 194	198 701	258 374	265 749	642 026	261 019
	Furniture Industry	56 070	173 201	163 755	67 356	72 100	151 225	171 051	195 716	282 518	111 013
	Pulp and paper I.	452 426	157 200	224 319	343 468	779 662	677 754	636 075	437 197	393 213	445 448
	Wood Processing Industry (WPI)	181 610	134 592	152 179	152 094	322 342	312 595	319 437	273 816	411 159	233 274
	Industrial production	113 290	111 481	186 228	149 472	157 256	197 530	282 224	283 696	268 517	249 711

Source: Calculation on the basis from Ministry of Economy SR

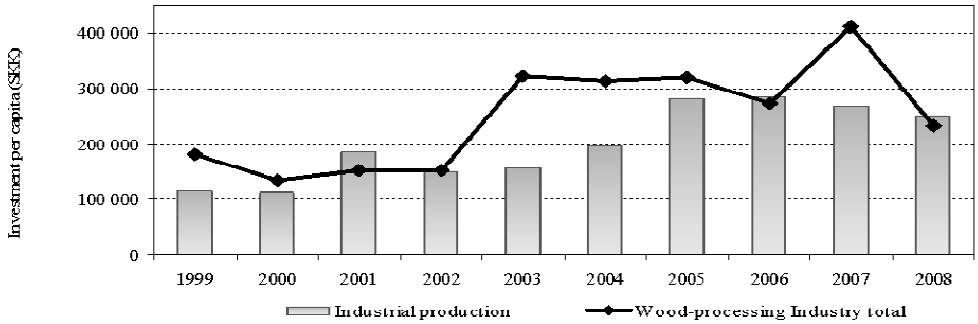

Figure 2. Investment per capita in the wood-processing industry and industrial production (SKK)

2. LABOUR PRUDICTIVITY IN THE WOOD PROCESSING INDUSTRY OF SLOVAKIA

In the wood-processing industry can positively assess the development of labour productivity from turnover, the most significant in the pulp and paper industry, where is recorded long-term growth above average of industrial production. Positive development was also in the furniture industry in the years 1999-2005, where the productivity growth into the level of industrial production caused by just growing volume of investment. Yet it appears positive labor productivity of added value in the CPP, especially in the years 2006-2007, when it was recorded high inflows of FDI into the sector. It appears more positive *labor productivity of added value in the pulp and paper industry*, especially *in the years 2006-2007*, when it was recorded high inflows of foreign direct investment into the mentioned sector.

Table 3. Labour productivity in the wood-processing industry and industrial production

Indicator	Sector	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Labour productivity from turnover (thousand SKK)	Wood Industry	670	810	944	1 095	1 229	1 459	1 563	1 823	2 164	2 048
	Furniture Industry	816	1 115	1 381	1 943	2 427	2 494	2 437	2 058	2 423	1 929
	Pulp and paper I.	2 145	2 855	3 351	3 665	3 656	4 288	4 375	4 976	5 995	5 704
	Wood Processing Industry (WPI)	1 199	1 591	1 869	2 169	2 413	2 668	2 635	2 666	3 128	2 869
	Industrial production	1 395	1 731	1 908	2 098	2 519	2 823	3 052	3 662	4 060	4 075
Labour productivity from added value (thousand SKK)	Wood Industry	179	224	216	265	250	352	361	426	369	386
	Furniture Industry	196	248	249	222	399	411	453	418	381	541
	Pulp and paper I.	668	910	1 127	1 103	902	874	957	1 137	1 252	1 141
	Wood Processing Industry (WPI)	344	463	522	503	501	521	550	589	568	642
	Industrial production	328	402	444	463	498	592	612	672	710	658

Source: Calculation on the basis from Ministry of Economy SR

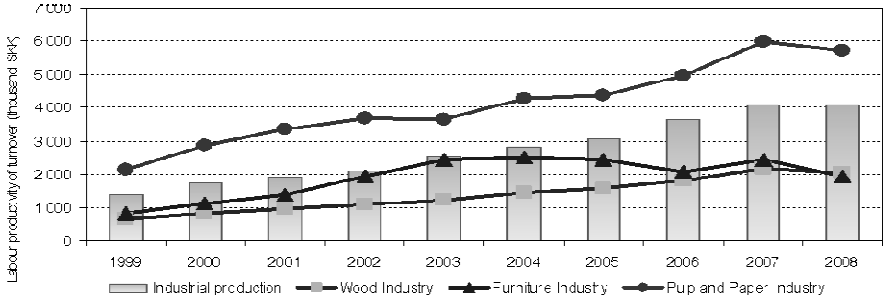

Figure 3. Labour productivity of turnover in the sectors of wood-processing industry (thousand SKK)

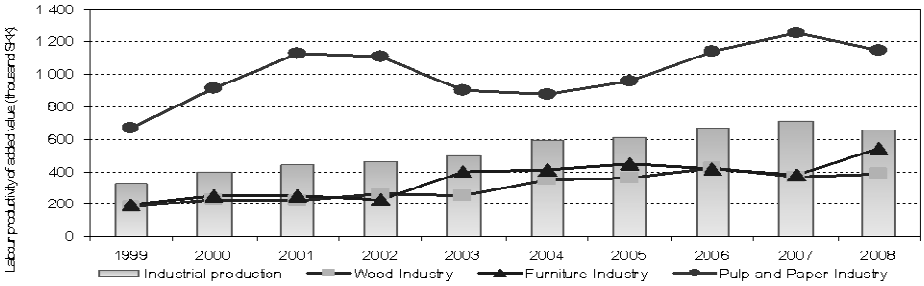

Figure 4. Labour productivity of added value in the sectors of wood-processing industry (thousand SKK)

Correlation and regression analysis demonstrated a positive impact of investment into the growth of sales and labour productivity in the wood processing industry. *Dependence of investment and sales in the WPI* showed a correlation coefficient of r = 0.79. Regression coefficient b = 5.22 means that growth in investment of 1 billion SKK causing sales growth in the value of 5.22 billion SKK. *Dependence of investment and labor productivity in the WPI* has a similar correlation coefficient r = 0.77, the regression coefficient b = 0.162 shows that growth in investment of 1 billion SKK causing labor productivity growth of 0.162 million SKK.

Table 4. Correlation and regression analysis of investment in the wood-processing industry

Variables	Indicator	Unit	Mean	Standard deviation	Correlation (r)	Determination (r^2)	Probability of error (p)	Constant (a)	Slope (b)
X	Investment in WPI	millions SKK	7 527	2 885					
Y	Sales in WPI	millions SKK	70 017	19 024	0,792267	0,627687	0,006287	30687,77	5,224946
X	Investment in WPI	millions SKK	7 527	2 885					
Y	Labour productivity of sales in WPI	thousand SKK	2 321	607	0,770233	0,593259	0,009143	1100,60	0,162090

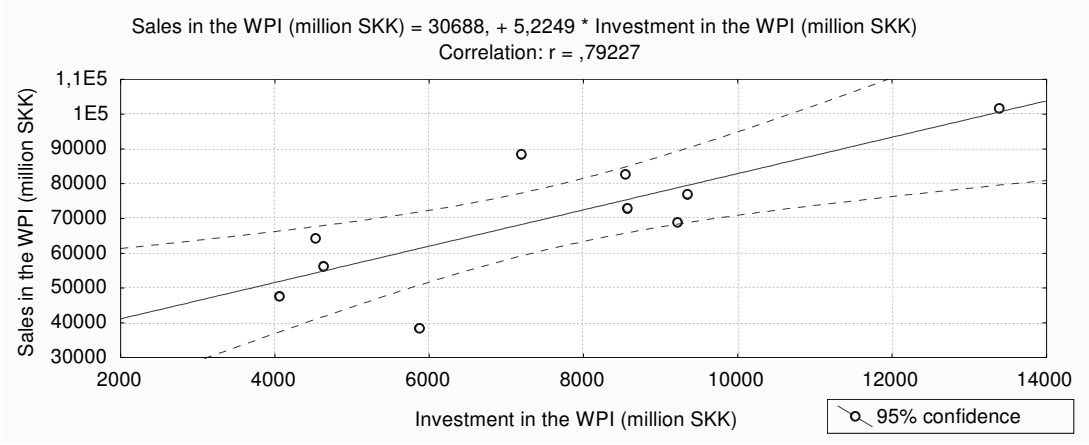

Figure 5. Correlation in the WPI: Investment ~Sales

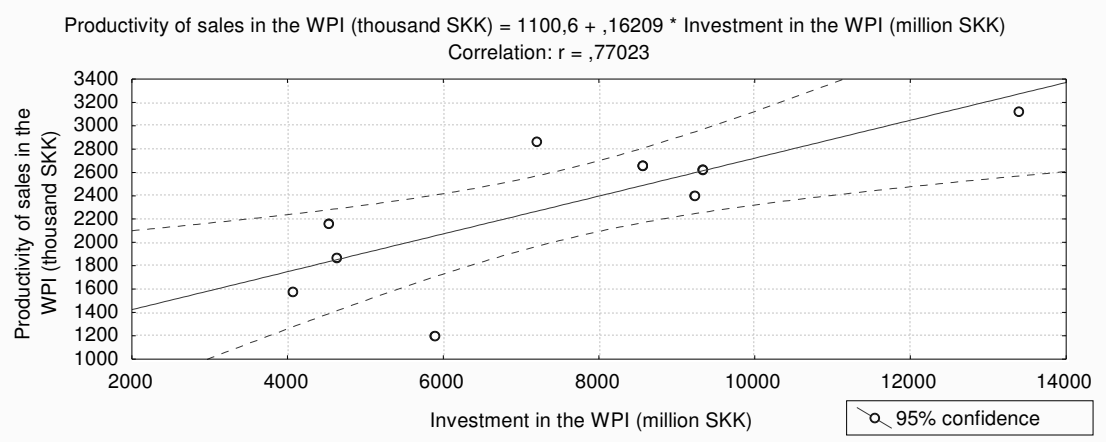

Figure 6. Correlation in the WPI: Investment ~ Labour productivity of sales

3. AVERAGE EARNINGS IN THE WOOD PROCESSING INDUSTRY OF SLOVAKIA

Average monthly earnings in all sectors of the wood processing industry have an increasing trend in the review period. In the sectors of wood industry and furniture industry is salary consistently less than industrial production in Slovakia. However, average earnings in the pulp and paper industry significantly exceed the level of industrial production.

Table 5. Average month earnings in the wood-processing industry and industrial production

Indicator	Sector	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Average earnings per month (SKK)	Wood Industry	8 777	9 785	10 120	10 906	11 610	12 887	13 149	14 684	16 377	17 753
	Furniture Industry	9 196	10 545	11 653	13 149	14 356	16 100	17 197	17 274	18 930	19 428
	Pulp and paper I.	12 693	14 369	15 760	18 308	18 650	20 326	21 936	23 847	25 637	27 097
	Wood Processing Industry (WPI)	10 192	11 560	12 455	13 929	14 763	16 266	17 031	18 005	19 654	20 802
	Industrial production	11 012	12 229	13 557	14 582	15 650	17 430	18 843	20 180	21 656	23 213

Source: data from Ministry of Economy SR and Statistical Office of SR

Correlation and regression analysis shows a *positive impact of labour productivity growth in the average earnings*, where the results show the highest correlation coefficient of all tested relationships in analysis of the wood processing industry.

Table 6. Correlation and regression analysis of labour productivity and average earnings in the wood-processing industry

Variables	Indicator	Unit	Mean	Standard deviation	Correlation (r)	Determination (r^2)	Probability of error (p)	Constant (a)	Slope (b)
X	Labour productivity of sales in WPI	thousand SKK	2 321	607					
Y	Average earnings in WPI	SKK	15 466	3 505	0,952907	0,908031	0,000020	2698,92	5,501
X	Labour productivity of added value in WPI	thousand SKK	520	80					
Y	Average earnings in WPI	SKK	15 466	3 505	0,894327	0,799822	0,000479	-4941,67	39,217

The correlation coefficient in the *relationship between the labor productivity of sales and the average earnings* in the wood processing industry has a value of r = 0.95, regression coefficient b = 5.50 shows that *sales productivity growth of 0.1 million SKK causes the growth of the average monthly wage of 550.13 SKK*. It is important to mention that analysis has also demonstrated an underlying dependence - the growth of labor productivity is due to the growth of fixed assets. This means that increasing volume of fixed assets has a positive impact on labor productivity growth; subsequently labor productivity growth has a positive effect on the growth of average wages in the wood processing industry.

Relationship between labor productivity of added value and the average earnings in the wood processing industry has the correlation coefficient r = 0.89, regression coefficient b = 39.217 indicates that the *value added productivity growth of 0.01 million SKK causes growth of the average monthly wage of 392.17 SKK*.

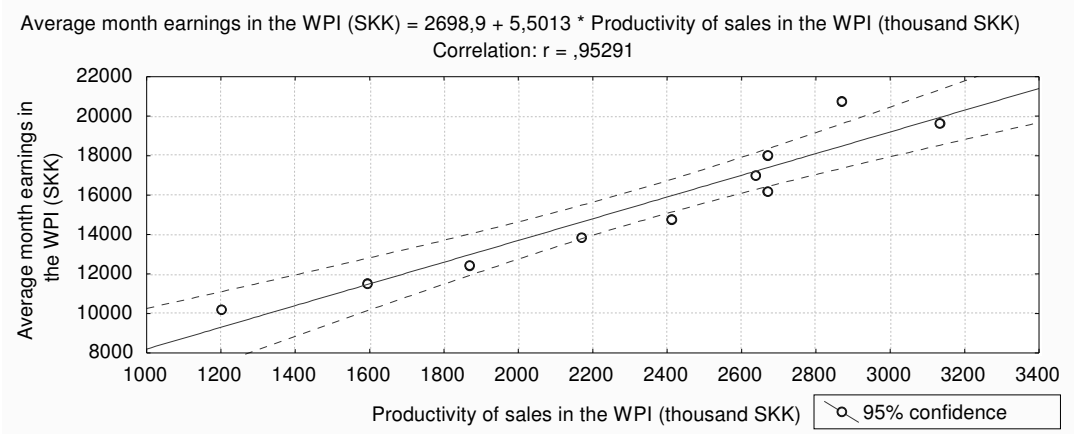

Figure 7. Correlation in the WPI: Labour productivity from sales ~ Average earnings

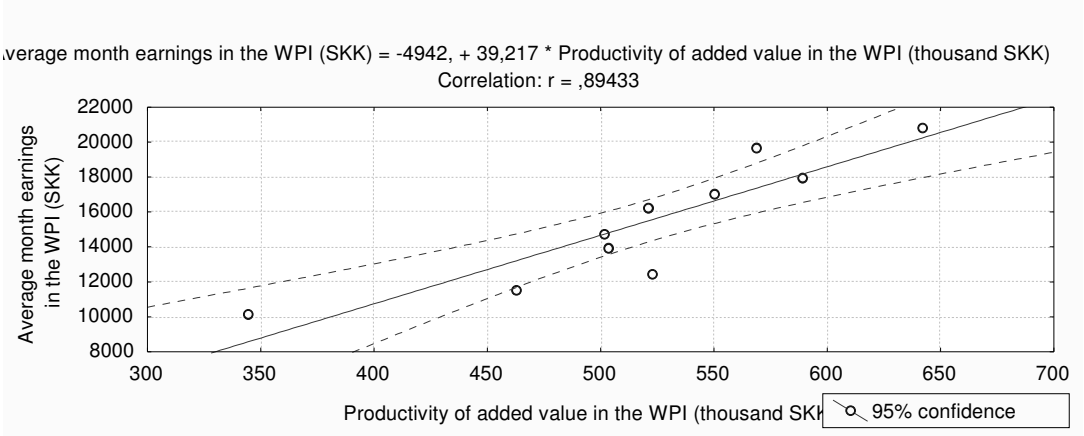

Figure 8. Correlation in the WPI: Labour productivity from added value ~ Average earnings

4. MEASURES FOR INCREASING OF INVESTMENT EFFECTS IN THE WOOD PROCESSING INDUSTRY OF SLOVAKIA

The wood processing industry is significantly affected by effects of the global economic crisis and the status of whole industry is very critical in the present time. The *volume of timber trade in Slovakia fell to 46%* in the first quarter of 2009 compared to the same period of 2008. *Negative developments also have the prices of wood*, they fell on world markets by 15- 20%. In Slovakia, the *average price* for 1m^3 of timber *fell by an average of 24%* in the first quarter of 2009. Production is declining due to *reduced demand* for semi-finished products and timber products abroad. The potential of wood products in Slovakia has not yet been adequately exploited. Production capacities in the sawmill industry are used to 40%, in the furniture production to 60%. Sawmills are at a loss and in spite of reduced production they do not lay off employees.

Stabilization of the wood-processing industry, as well as its development needs to take targeted measures. To increase the attractiveness of the wood processing industry and increase the investment were proposed measures focused in different areas. *In the area of workforce are defined following measures*:

Measures to ensure a skilled workforce in the WPI:

- to reform public education and improve the learning process in general,
- to motivate young people to truly educate themselves and really work on,
- to prepare students for entry into the labor sector during study,
- by educational institutions to reach companies with the possibility of targeted cooperation,
- by business community to participate in education and to guide the educational process according to the needs of individual enterprises,
- to increase awareness of employees focused on negative impacts of crisis periods,
- to increase the interest in the work of the wood-processing industry at the base of its attractiveness.

Measures to ensure quality research and development in the WPI:

- by educational institutions to offer for enterprises the research and development institutes for the possibility of a technological platform,
- by businesses to cooperate with existing research centers - educational institutions, scientific research bases,
- moral, financial support of expertise and students in research activities with a perspective of the job and good position,
- to build their own research centers and institutions with a specific focus,
- to involve the expertise in process of grant application, in projects of applied research and experimental development.

Measures to stabilize and consequently increase an employment in the WPI:

- to avoid cuts in production, next to ensure the production growth through increased consumption of wood products,
- using measures of wage and social policies, using various forms of contributions,
- to apply the reduction of working hours in times of crisis,
- to reduce spending on social and employee benefits in times of crisis.

Measures to encourage self-employed people and small and middle enterprises in the WPI:

- to create favorable conditions and remove barriers for the self-employment, to cut contributions to social and health insurance in times of crisis.

CONCLUSION

As shown in the frame of the presented issues of data analysis and factors of productivity growth, it can be stated the positive impact of investment on the labour productivity and also growth the overall level of business effects. For the development of investment and further growth of global wood processing industry in Slovak republic it is necessary to fulfill completely defined measures. Their real and effective implementation, however, corresponds closely with the development of the economy, its growth, as well as eliminating the impact of the current global economic crisis.

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EVALUATION OF THE EFFICIENCY AND EFFECTIVENESS OF CRM IN THE SELECTED FURNITURE COMPANY

Abstract: In order to achieve customer satisfaction enterprises must manage their own value chains and the whole system of providing the value with focusing on customers. The companies´ aim is not only gaining the customers but mainly keeping them. Customer relationship management deals with this issue. How to measure the level of customer relationship management (CRM)? This is the main idea of this paper.

Key words: Customer, furniture company, customer relationship management, minimal and optimal level of CRM.

INTRODUCTION

The business environment is currently in the unenviable situation. The market has been affected by the crisis and today's customers have the option to choose from a variety of comparable products and services. Because the seller's market has changed into buyer's market and customers are a companies' competitive advantage, for this reason they have to maintain them. Customers decide which company remains on the market.

Therefore the winners on the market may be only those who are able to assess early and properly the trends and risks in their field and adapt their activities to actual customer requirements. Demonstrable key factor is effective care of customers, creating and long-term maintaining of close ties not only with customers but also with suppliers and other partners. To achieve customer satisfaction enterprises must manage their own value chains and the whole system of providing value with orientation to customers. The companies´ aim is not only gaining the customers but mainly keeping them. The companies not only gain customers, but mainly to keep them. The customer relationship management deals with this issue.

Realization of CRM performance and effectiveness evaluation in the furniture company has been solved in relation to the VEGA project number 1/0466/09 "An integrated model of innovation management audit aimed at the valuating and measuring the performance of innovation and marketing processes of Slovak small and medium-sized enterprises" at the Department of Marketing, Trade and World Forestry of Faculty of Wood Sciences and Technology of the Technical University in Zvolen.

1. CRM – CUSTOMER RELATIONSHIP MANAGEMENT/CRM – PHILOSOPHY

Customer Relationship Management (CRM) is an interactivy process which aims to achieve optimal balance between company's resources and satisfaction of customer needs. The balance optimum is characterized by a maximal profit of both parties. Prerequisite to achieve this optimum is to create long term partnerships with customers. Long-term perspective cooperation brings to both parties significant quantifiable value enumerable by money. (Chlebovský, 2005. s. 23)

According to several authors dealing with the CRM issue understanding of this concept has been stabilized in terms of business strategy for selection and management of the most valuable customer relationships. "CRM is a business philosophy and corporate culture oriented to the customer, which supports effective marketing, sales and service processes. CRM is the way the company behaves to its customers, what relations it maintains with them and how to use these relations to the mutual benefit" (Storbacka, Lehtinen, 2002, s. 16).

2. EVALUATION OF THE EFFICIENCY AND EFFECTIVENESS OF CRM IN THE SELECTED FURNITURE COMPANY

2.1 The chosen procedure of measuring the CRM performance and level

By the analysis of individual methods we found out it is important to determine what values within customer relationship management the company wants to study and according to this it must decide which method will be used when measuring CRM performance. Regarding the realized analysis and comparison of the methods, we have decided to use the CRACK method which was applied for selected furniture company and its key customers.

Performance evaluation, respectively CRM using has been divided into the following basic parts, namely:

- determination of observed variables, respectively criteria,

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- calculation of the of individual variables scales by the Saaty matrix,
- valuation from the point of view of the company,
- calculation of complex variable of CRM level,
- valuation from point of view of the customers,
- confrontation, respectively comparison of obtained findings from the of company and customers' evaluation.

"It's always true that the evaluation system, respectively measurement system is not possible to create in an absolutely general form that would be immediately usable in any society. It must be modified to a concrete enterprise, namely its structure, environment where it operates, and needs of the management." (Chlebovský a kol., 2005, s. 134).

According to mentioned it was necessary to consider carefully the selection of specific criteria which will be the subject of monitoring. We also had to take into account the following factors:

- we do not need to identify only previous and current state, but in the main areas it is needful to determine what is the future outlook,
- not to concentrate only on the behavior and attitudes of customers, but also to monitor internal processes and business activities that are closely linked with the subsequent behavior and customer attitudes.

As a starting point for the selection of appropriate criteria the **CRACK Model** (**Customer Relation Complex Analysis Kit**) has been set. Criteria selection was always realized on the basis of discussions with representatives of relevant departments namely the departments of marketing, sales, logistics, manufacturing, and also director of the company. All the criteria listed in CRACK model were discussed, but only those were selected which from the perspective of a particular enterprise can be monitored and properly evaluated. Selected and evaluated were:

1. field Marketing – brand:

f_1: the brand quality – at what quality level is brand perceived by customers,

f_2: loyalty to brand – customers' attitude toward the brand.

2. field Marketing – offer:

f_3: satisfaction with offer – how are the customers satisfied with the offer,

f_4: offer value– how is the gained value perceived by the customers.

3. field Customers:

f_5: success possibility – success in negotiations

f_6: loyalty to customers– company's relation with key customers,

f_7: business relation risk – endangering the relation with key customers,

f_8: customer attraction – perceiving the attraction of key customers.

1. field Service:

f_9: complaints handling – customers satisfaction with their complaints handling,

f_{10}: eligibility of complaints – percentage of the total number of eligible complaints.

2. field Logistics:

f_{11}: not executed orders in the given term – percentage of orders that were not executed by the company in the given term,

f_{12}: executed orders in the given term – percentage of orders that were executed in the term requested by the customer.

3. field Complex indicators

f_{13}: customers going off to competition - the probability that a customer goes off to a competitor,

f_{14}: the overall satisfaction – overall satisfaction rate of business partners in business relations.

The next step following the selection of appropriate indicators for measuring and evaluating the level and efficiency of CRM was to assign scales to given criteria. It is necessary because not each criterion is as significant as other ones. Before the scales were determined for each of the criteria there have been identified preferences among individual fields. **To set preferences and then scale calculation the method of quantitative criteria comparison was used.** In this step, there were set all the scales of the criteria of all selected areas. After determining the scales for individual fields and criteria it was also necessary to "objectify" those scales because it is needful to calculate the value of scales so their sum would be equal to 1. Only then these scales can be used in further evaluation of CRM performance. Conversion of scales was realized the way that each of the scales of the criteria was multiplied by the scale value of the given field.

The next essential step to evaluate the performance of CRM is to obtain values for each criterion. Typically, the values are derived only from the employees responsible for ensuring the CRM but in our case there is not concrete responsible employee. So we decided to get the evaluation from several representatives of the company. Each evaluator was given a questionnaire containing 14 questions linked to individual evaluation criteria in order to obtain value for each of them. The principle was the determination of importance (0-10) or percentage (0 - 100%) of the criteria.

2.2 Valuation from the point of view of the company

Each representative of the company evaluated all the criteria, regardless the given area falls directly within his competence or not. However, to achieve objectivity of final value of variables, we decided to determine scales for each department when answering specific questions. So we ensured that criteria in the marketing field are in the main responsibility of a representative of this department but also the sales department and director of the company are partially responsible for this field.

From these values we created a weighted average and obtained CRM level percentage, while 100% is a theoretical ideal status. To calculate the weighted average was used relation:

$$x_p = \frac{h_1 per * v_1 + h_2 per * v_2 + ... + h_n per * v_n}{v_1 + v_2 + ... + v_n} = \frac{\sum_{n=1}^{k} h_n per * v_n}{\sum_{n=1}^{k} v_n}, \quad n = 1, 2, ..., k$$

where: x_p – weighted average,
$h_n per$ – criteria value percentage,
v_n – criteria scale,
k – criteria number.

The calculated weighted average value is 78.08 %. It means that the CRM level in the company is 78.08 % so 21.92 percentage points lack to the theoretical ideal. Regarding this value of CRM level we can conclude that the company meets the value of CRM to 78.08 % which reflects relatively good level but the distance from the "ideal" is a prerequisite for further improvement by detailed analysis of the searched fields and criteria. Taken into account the above-mentioned and partially utilized CRACK model and also consultations with representatives of the company we can state that it is rather not real to approach to the ideal 100% value. So we decided to establish the optimal values, which should reflect the level of individual fields and criteria which is kind of a real maximum for the company. Reaching these values should make the company satisfied because the required planned level was achieved. On the other hand we consider necessary to establish so-called minimum values that would present some kind of critical level for the field as well as for the criteria. If the minimum values were achieved, respectively if they were lower, the company would realize quick measures to change the bad situation that could seriously endanger especially relations with key customers. Mentioned optimal and minimal values were determined by individual departments and even though each department has different responsibilities. For a limited impact of this factor, the values were multiplied by scales of individual department for each criterion. These values will help us for fast and easy comparison where is the actual level of CRM, which we have already calculated. Based on these results it is clear that the current level of CRM is located in the interval between the optimal (84.42 %) and minimal (67.58 %) level. The actual level is far from optimal one about 6.34 percentage point and from a minimal one about 10.5 percentage point. Determining the distance tells us that the current level of CRM is closer to the optimal one, but missing percentage reflects the place for real improvement.

2.3 Valuation from point of view of the customers

Although the company established its current CRM level it is evaluated only from the inside. Because the aim of CRM is the right customer relationship management, we found it important to find out how company's CRM perceived by its customers. CRM is primarily focused on the most important customers so we decided to survey the perceptions of CRM by key customers. To calculate and determine the value of CRM from the point of view of customers, we used the same procedure as in the case of the company. To compare the valuations there were used the same criteria. Individual values were obtained by the customers by questionnaire. To preserve "customer view", all five customers (trading partners) were asked to express their preferences compared to individual criteria as well as fields containing these criteria. To calculate the level of CRM perceived by customers, we used the weighted average as in the calculation for the company. Using these calculations we have come to value of CRM level the perceived by the customers that is 79.86%, which is compared to CRM level value from the point of view of the company (78.08%) slightly higher (about 1.78%). Regarding mentioned customers perceiving is at the similar level, respectively slightly better than the company perceives itself. Because we got similar results in both approaches, we can note that the CRM level in the company is at the good level because it only misses about 20 % to the theoretical maximum. Although it is not too much, the difference creates space for improvement, not only in its own perceiving, but also from the perspective of customers. To define exactly the fields (concrete criteria) which need improvement it is required to make a more detailed analysis. For this purpose customers have to determine minimal and optimal values that will represent minimum which customers are willing to accept and optimum which means maximum expected in this field and criterion. Reaching lower values than customers´ minimum can significantly harm mutual relations and lead to the termination of cooperation. Optimal values determine the border that achievement will result in maximal customer satisfaction and thus its crossing is not necessary. If the actual values are lower than optimal ones, but they are still in the interval created by minimal and optimal values, within its criterion there will be a space for improvement, which usage will mean reaching the optimal value.

3. OVERALL EVALUATION

In this phase we aimed at comparison the results of evaluation of CRM level from the point of view of the company with evaluation from the point of view of key customers.

We have decided for this comparison because we consider necessary to seek and find common points of valuation but mainly differences which could be wrong aimed and finally work the wrong way (to harm or threaten relations with key customers) when applying CRM.

We decided to realize comparison in a simple way - so the minimal, actual and optimal values (obtained when determining the appropriate levels of CRM from the point of view of the company and its key customers) will be compared.

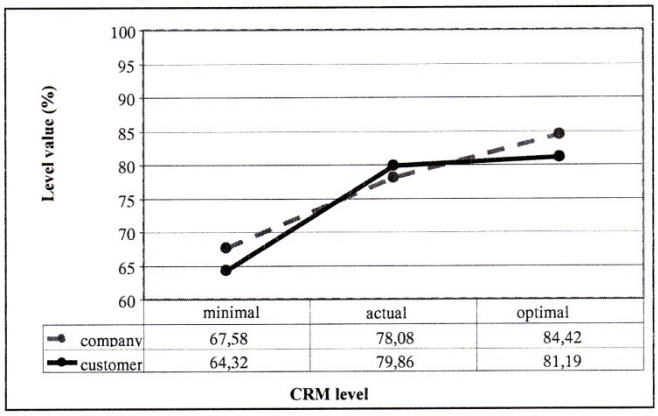

Figure 1. Comparison of minimal, actual and optimal CRM level

It is obvious that customer values are lower besides the current value. Actually it can be concluded that this situation is good for business. Indeed, customer minimum is lower than the minimum determined by the company so it is sufficient for company to reach its minimal level and it is still in the area which is accepted by key customers. However, lower value of customer optimum compared to company's one means that the company could simply reach by customers expected value even if it achieves own optimum the company will exceeds their expectations. We can say that customer satisfaction exceeds the level which they consider to be real maximum. Another advantage is that the actual CRM level value perceived by customers is higher than perceived by the company itself. It is also important that from the actual CRM level perceived by customers it is needful to increase the level of CRM only about 1.33% to achieve the expected maximum. Knowing the significance of individual criteria for customers and their expectations when fulfilling each of them is an excellent prerequisite to achieve this optimal level of CRM, not only from the point of view of customers but also the company itself.

CONCLUSION

The best way to find out how the CRM is important for business is to measure its level of performance. If we want to create a methodology of measuring the CRM level, we must follow the idea of CRM oriented at corporate strategy. It is almost impossible to reach an absolute generalization and give specific advice applicable for any ideal situation. On the other hand, it is possible to make the basic structure of the measurement procedures and methodologies that can be effectively adapted to the requirements of the company.

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Elżbieta Mikołajczak[58]

RENEWABLE ENERGY SECTOR IN POLAND IN COMPARISON WITH OTHER EU COUNTRIES

Abstract: Crucial factor stimulating renewable energy development, quite apart from fast exploitation of natural resources of coal, gas, oil or uranium is the threat represented by conventional energy waste products such as sulphur, nitrogen and carbon monoxides as well as ashes. Renewable energy resources are not only sustainable but as naturally bound up with environmental processes are highly pro-ecological. Generating energy from renewable resources is in comparison with traditional ones much more environment-friendly mainly via limitation of harmful substances especially greenhouse gases. The article presents current level of harvesting energy from renewable resources in selected EU countries taking into account various forms of those renewable. Compared to European data the situation of renewable energy sector in Poland was presented.

Key words: energy from renewable resources, generating, electric and heat energy.

INTRODUCTION

The ever growing demand for energy and constant depleting of its conventional sources, mainly fossil fuels, as well as growing environmental pollution they cause are the main factors which lie at the bottom of growing interest in renewable

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energy. Scientific and technological resolution additionally strengthened by 3,2-fold growth of population between 1950 and 1970 led to 12–fold increase in total and 40-fold increase in industrial energy consumption. Even though the trend in the last 40 years has been elevated it still remained crucial. In 1970 world-wide energy consumption amounted to 218 EJ (EJ: J x 10^{18}), in 1980 – 301 EJ, in 1990 – 347EJ, and in 2001 426EJ. The forecast for the upcoming decades envisage further energy consumption: up to 599 EJ in 2020 and 657 EJ in 2025 [Lewandowski W.M. 2010].

GENERATING RENEWABLE ENERGY IN EUROPE.

Current level of generating energy from renewable sources in selected EU countries between 2004 and 2007 is show in table 1. Data analysis indicates gradual increase of share of energy possessed from renewable sources in the overall primary energy of EU member states from 12,6% in 2004 up to 16,4% in 2007. Such result was possible mainly due to Germany, Lithuania, Sweden and Slovakia achieving respectively 9,2%, 8,1%, 7,2%, and 5,2%. In Poland despite a decrease in possession of primary energy by almost 8%, the growth of renewables share in it in the analyzed period was rather small only 1,6%.

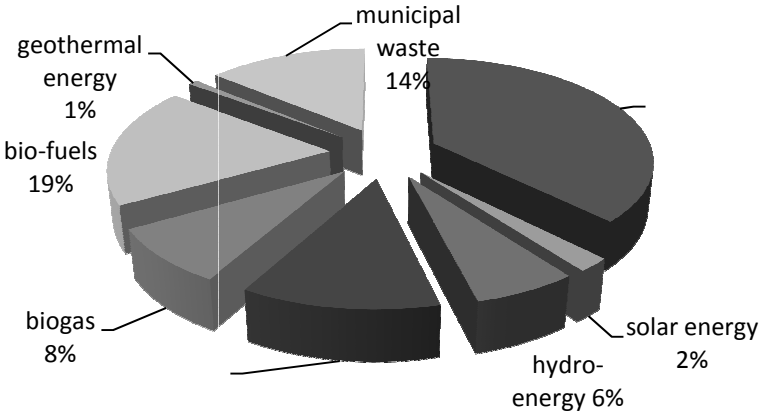
Table 1. Generating energy from renewable sources in selected EU countries between 2004 and 2007.

Country	Possessing primary energy								Share of energy generated from renewable sources in the total primary energy [%]			
	total [MTOE]				from renewable sources [MTOE]							
	2004	2005	2006	2007	2004	2005	2006	2007	2004	2005	2006	2007
UE-25	883,8	852,2	832,0	812,1	111,0	114,3	122,1	133,1	12,6	13,4	14,7	16,4
Austria	9,9	9,7	10,0	10,4	7,1	7,3	7,5	7,8	71,8	75,3	74,4	75,2
Czech Republic	32,8	32,4	33,2	33,3	1,9	2,0	2,2	2,4	5,9	6,2	6,6	7,2
Estonia	3,8	4,0	3,9	4,4	0,7	0,7	0,6	0,7	17,7	17,3	16,6	16,8
Finland	15,4	16,2	17,8	15,7	8,7	8,1	8,7	8,6	56,3	49,8	48,7	54,6
Lithuania	5,0	3,7	3,2	3,5	0,7	0,8	0,8	0,8	15,0	21,1	25,1	23,1
Latvia	1,8	1,9	1,8	1,8	1,8	1,9	1,8	1,8	99,8	99,9	99,8	99,8
Germany	135,5	133,9	134,8	135,3	15,8	17,6	20,8	28,1	11,6	13,1	15,5	20,8
Poland	78,7	78,4	77,7	72,6	4,3	4,5	5,0	5,1	5,5	5,8	6,5	7,1
Slovakia	6,2	6,3	6,3	5,6	0,8	0,9	0,9	1,0	12,3	14,1	14,1	17,5
Sweden	33,8	34,2	32,3	33,1	13,5	15,3	14,8	15,6	40,1	44,7	45,9	47,3

Source: [Energy from renewable resources in 2008 in accordance to data from Central Statistical Office, Warsaw 2009.]

STRUCTURE OF RENEWABLE ENERGY RESOURCES

Different climate, geological and natural conditions linked to generating energy from renewable resources make the structure of its usage in separate EU counties very individual. The majority of energy in all EU member states, on average 50% of it is possessed from biomass, which is presented in table 2. It dominates in Estonia where almost 100% of energy from renewable resources comes from biomass, and in Lithuania and Poland where it constitutes approximately 90%. In Slovakia, Austria and Sweden the main renewable energy resource are biomass and hydro energy. Their share in total energy possession is comparable however in the years small biomass dominance may be observed. The largest quantities of biogas and bio-fuels are used by Germany 8,5% and 18,6% respectively in 2007. Also the level of generating energy from solid municipal waste and wind is there the highest which may be the proof of the most balanced development of renewable energy sector among all EU member states (picture 1).



Picture 1. Share of individual resources in generating renewable energy in Germany in 2007.
Source: own research on the basis of [Energy from renewable resources in 2008 Central Statistical Office, Warsaw 2009.]

Table 2. Structure of renewable energy generation according to the resources in selected EU countries between 2005 and 2007 [%]

Countries		Solid biomass	Solar energy	Hydro-energy	Wind energy	Biogas	Bio-fuels	Geothermal energy	Municipal waste
UE-25	2005	51,9	0,7	21,2	5,3	3,9	3,4	4,6	9,0
	2006	50,8	0,8	20,2	5,8	3,9	5,1	4,5	9,0
	2007	48,2	0,9	18,8	6,7	4,3	6,6	4,3	10,1
Austria	2005	50,8	1,3	42,4	1,6	0,4	0,7	0,5	2,4
	2006	50,7	1,4	40,2	2,0	0,4	1,2	0,5	3,5
	2007	50,1	1,4	39,5	2,2	0,5	2,7	0,4	3,2
Czech Republic	2005	76,4	0,1	10,2	0,1	2,8	5,6	-	4,8
	2006	78,0	0,1	10,0	0,2	2,9	4,5	-	4,3
	2007	81,0	0,2	7,5	0,5	3,2	3,7	-	4,0
Estonia	2005	98,4	-	0,3	0,7	0,6	-	-	-
	2006	98,1	-	0,2	1,1	0,6	-	-	-
	2007	98,1	-	0,3	1,1	0,5	-	-	-
Finland	2005	82,7	0,0	14,7	0,2	0,5	-	-	1,9
	2006	86,4	0,0	11,4	0,2	0,4	-	-	1,5
	2007	83,2	0,0	14,2	0,2	0,5	-	-	1,9
Lithuania	2005	92,9	-	5,0	0,0	0,3	1,4	0,4	-
	2006	93,4	-	4,2	0,1	0,2	1,8	0,2	-
	2007	90,0	-	4,4	1,1	0,2	3,9	0,2	-
Latvia	2005	83,8	-	15,4	0,2	0,4	0,1	-	-
	2006	86,2	-	12,6	0,2	0,4	0,5	-	-
	2007	85,3	-	13,1	0,3	0,4	0,9	-	-
Germany	2005	44,5	2,0	9,6	13,3	7,6	12,7	0,8	9,5
	2006	40,7	2,3	8,2	12,7	8,0	18,5	0,8	8,8
	2007	37,6	2,1	6,4	12,1	8,5	18,6	0,8	13,9
Poland	2005	91,6	0,0	4,2	0,3	1,2	2,6	0,2	0,0
	2006	91,2	0,0	3,5	0,4	1,2	3,3	0,3	0,0
	2007	91,6	0,0	3,9	0,9	1,3	2,1	0,2	0,0
Slovakia	2005	45,1	0,0	45,2	0,1	0,6	4,1	0,9	4,0
	2006	46,2	0,0	42,7	0,1	0,9	4,7	0,7	4,7
	2007	49,3	0,0	39,0	0,1	0,7	6,0	1,0	3,9
Sweden	2005	51,9	0,0	41,0	0,5	0,2	1,5	-	4,8
	2006	56,2	0,0	35,8	0,6	0,2	2,0	-	5,2
	2007	54,0	0,1	36,4	0,8	0,3	2,6	-	5,9

Source: [Energy from renewable resources in 2008 in accordance to data from Central Statistical Office, Warsaw 2009.]

ELECTRIC ENERGY FROM RENEWABLE RESOURCES.

In table 3 the share of electric energy from renewable resources in the overall electric energy consumption in selected EU countries between 2004 and 2007 was resented . Data analysis allows to say that also in generating this type of energy Austria, Sweden and Latvia are the leaders. Comparing the share of energy from renewable resources in the overall primary energy (table 1) including electric energy from renewable sources in the total Gross energy usage (table 3) indicates that in countries such as Latvia, Estonia, Lithuania and even Finland renewable resources are mainly used for generating heat.

The structure of generating energy from renewable resources differs from the structure of sole electric power production based on using renewable energy sources (table 4). While generating this energy in all counties under analysis the biggest share is represented by hydro-energy, on average 57,8% (2007). In 2007 the largest quantity of this energy produced from water power was generated by: Latvia, Slovakia, Austria and Sweden. Wind power comes second. Its share in electric energy production from renewable resources grew since 2004 by 7,1%, reaching in 2007 20,7%. This type of energy dominates in Estonia (61,1%) and Germany (43,7%). The next in terms of generating renewable energy is biomass which biggest share in electric energy production from renewables in 2007 was noted in Poland and amounted to 43,5 %. The lowest level of usage is characteristic for solar energy. Out of all countries under analysis only Czechs and Germans convert this type of renewable source of energy into electricity, yet at a very small level in 2007 respectively in 0,1% and 3,4%.

Table 3. Share of electric energy from renewable resources
in gross energy consumption in selected EU member states between 2004 and 2007.

Country	2004	2005	2006	2007
UE-25	13,7	13,6	14,3	15,5
Austria	58,7	57,4	56,6	59,8
Czech Republic	4,0	4,5	4,9	4,7
Estonia	0,7	1,1	1,4	1,5
Finland	28,3	26,9	24,0	26,0
Lithuania	3,5	3,9	3,6	4,6
Latvia	47,1	48,4	37,7	36,4
Germany	9,5	10,5	12,0	15,1
Poland	**2,1**	**2,6**	**2,8**	**3,5**
Slovakia	14,4	16,7	16,6	16,6
Sweden	46,1	54,3	48,2	52,1

Source: [Energy from renewable sources in 2008 Central Statistical Office Warsaw 2009.]

Table 4. The structure of electricity production from renewable resources in selected EU countries between 2005 and 2007.

Country		Solid biomass	Solar energy	Hydro-energy	Wind	Biogas	Municipal waste
UE-25	2005	9,5	0,3	64,6	16,1	3,1	5,2
	2006	9,9	0,5	62,0	17,7	2,3	5,3
	2007	10,4	0,7	57,8	20,7	3,7	5,4
Austria	2005	4,9	0,0	90,7	3,4	0,2	0,8
	2006	6,1	0,0	88,3	4,2	0,2	1,2
	2007	7,9	0,0	86,1	4,8	0,2	0,9
Czech Republic	2005	17,8	0,0	75,8	0,7	5,1	0,6
	2006	20,7	0,0	72,3	1,4	5,0	0,5
	2007	28,3	0,1	61,1	3,7	6,3	0,6
Estonia	2005	18,9	0,0	19,8	48,6	12,6	0,0
	2006	19,5	0,0	10,9	59,4	10,2	0,0
	2007	16,1	0,0	14,8	61,1	8,1	0,0
Finland	2005	39,2	0,0	58,5	0,7	0,1	1,5
	2006	46,8	0,0	51,1	0,7	0,1	1,3
	2007	39,5	0,0	58,0	0,8	0,1	1,5
Latvia	2005	0,7	0,0	98,0	0,4	0,9	0,0
	2006	4,4	0,0	91,2	3,2	1,2	0,0
	2007	8,3	0,0	72,5	18,3	0,9	0,0
Lithuania	2005	0,2	0,0	97,4	1,4	1,1	0,0
	2006	0,3	0,0	96,8	1,7	1,3	0,0
	2007	0,2	0,0	96,6	1,9	1,3	0,0
Germany	2005	7,3	2,0	30,8	42,9	7,4	9,6
	2006	9,0	3,0	27,4	42,2	8,5	10,0
	2007	11,4	3,4	23,0	43,7	9,4	9,1
Poland	2005	36,4	0,0	57,2	3,5	2,9	0,0
	2006	42,7	0,0	47,6	6,0	3,7	0,0
	2007	43,5	0,0	43,3	9,6	3,6	0,0
Slovakia	2005	0,1	0,0	98,7	0,1	0,1	1,0
	2006	7,6	0,0	91,1	0,1	0,2	1,0
	2007	8,9	0,0	89,8	0,2	0,2	0,9
Sweden	2005	8,4	0,0	88,8	1,1	0,1	1,6
	2006	10,5	0,0	86,1	1,4	0,1	2,0
	2007	10,9	0,0	84,8	1,8	0,1	2,4

Source: [Renewable energy in 2008 Central Statistical Office Warsaw 2009.]

CURRENT STATE OF POLISH RENEWABLE ENERGY SECTOR

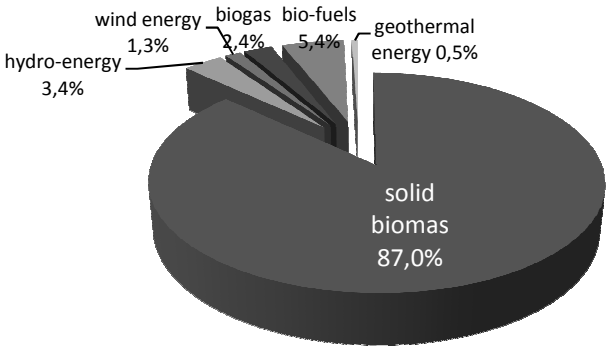
As it has been shown in table 1, Poland has the lowest among all analyzed countries rate of usage of renewable resources in the total primary energy. Lack of adequate financial instruments, supporting both installation producers as well as their users makes dynamic growth of renewable energy sector in Poland impossible. Data analysis presented in table 5 indicates the fall in total quantity of primary energy possessed between 2001 and 2007 both in Poland (by 9,5%), as well as the whole EU (9,1%). Whereas generating renewable energy grew in the same period in Poland by 24,4%, and in the remaining EU states by 34,2%. Combination of both trends resulted in the increase of renewable energy share in total primary energy in Poland only by 2%, and in the EU by 5,5%. It has to be noted however that the highest growth in that factor in Poland by 0,6% in 2006 and 2007, was mainly the consequence of decrease in generating total primary energy which took place then from 77,7 MTOE to 72,6 MTOE, and not the increase in possessing this energy from renewable sources from 5,0 MTOE to 5,1 MTOE.

Table 5. Possessing renewable energy in relation to primary energy in the EU and in Poland between 2001 and 2007.

Division		2001	2002	2003	2004	2005	2006	2007
Generating overall primary energy [MTOE]	European Union	894,3	893,5	888,0	883,8	852,2	832,0	812,1
	Poland	80,2	80,0	79,9	78,7	78,4	77,7	72,6
Generating renewable energy [MTOE]	European Union	97,7	95,8	103,6	11,0	114,3	122,1	133,1
	Poland	4,1	4,1	4,2	4,3	4,5	5,0	5,1
Share of renewable energy in total primary energy [%]	European Union	10,9	10,7	11,7	12,6	13,4	14,7	16,4
	Poland	5,1	5,2	5,2	5,5	5,8	6,5	7,1

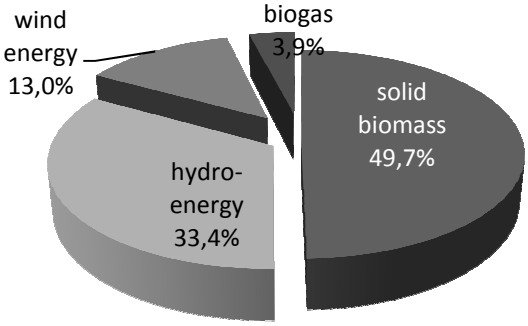
Source: [Energy from renewable sources in 2008 Central Statistical Office Warsaw 2009.]

In the structure of generating primary energy from renewable resources in Poland (picture 2) in 2008 biomass dominates and its share amounts to 86,9% . In 3,4% this energy was possessed from water potential. Small share of other sources has been noted as well among them bio-fuels – 5,4%, biogas – 2,4%, wind – 1,3%, geothermal sources – 0,5%, while in the recent years a significant increase of interest in wind energy sector has been observed. Solar energy and municipal waste energy were omitted as they amounted to 0,024% and 0,0042% respectively.



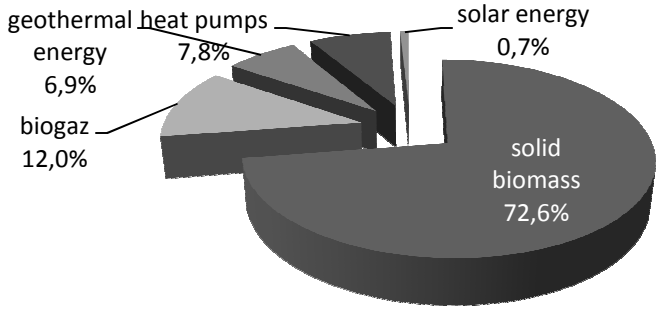
Picture 2. Share of separate resources in Generating renewable energy in Poland in 2008
Source: own research based on [Renewable energy in 2008 r. Central Statistical Office Warsaw 2009.]

Poland belongs to a group of countries which utilize biomass mainly to generate heat, which is proved by the analysis of the structure of electricity production (picture 3) and heat (picture 4) from renewable resources. Yet also in the production of electric energy biomass share in 2008 was domineering and accounted for 49,7%. (2 % of solid biomass was used in cofiring. Significant for the production of electricity was also water which share accounted for 33,4%. Also year to year growing interest in wind energy should be noticed. Its share in generating electricity grew from 3,5% in 2005 to 13% in 2008. In total in 2008 from renewables 6 440,6 GW h of electric power was generated which means 40,3% increase in comparison with 2005.



Picture 3. Structure of electricity production from renewable sources of energy in Poland in 2008.
Source: own research based on [Renewable energy in 2008 r. Central Statistical Office Warsaw 2009.]

Heat production from renewables in 2008 amounted to 7 718 TJ, out of which 6 528 TJ, that is 84,6% was generated in Professional and industrial energy sector. In comparison with 2005 (4 186 TJ) 45,8% increase was noted. Apart from substantial share of solid biomass in generating heat other sources played their role as well among them biogas - 12%, heat pumps (surrounding heat) – 7,8%, geothermal energy 6,9%.



Picture 4. Structure of heat energy production from renewables in Poland in 2008.
Source: own research based on [Renewable energy in 2008 r. Central Statistical Office Warsaw 2009.]

CONCLUSIONS

1. The highest share of energy in EU countries is generated from biomass – on average about 50%. In almost 100% it dominates in Estonia, in approximately 90% it is used in Lithuania and in Poland.
2. Austria, Sweden and Latvia are the leaders in generating electricity from renewables.
3. In Latvia, Estonia and Finland renewables are mainly used for heat production.
4. In all analyzed countries hydro-energy has the biggest share in electricity production, on average 57,8%. In 2007 the largest quantity of electricity from this sources was produced by Latvia, Slovakia, Austria and Sweden.
5. Wind energy dominates in Estonia (61,1%) and Germany (43,7%), Chile the highest level of biomass share in the production of electric power from renewables in 2007 was noted in Poland and accounted for 43,5 %.

6. Poland's distinctive feature is the lowest, among all analyzed countries, rate of renewables usage in overall primary energy, which is caused by then lack of appropriate financial instruments supporting both installation producers as well as the users.
7. In Poland biomass is mainly used as the source of heat energy - 72,6% in 2008. Also in the production of electricity biomass share in 2008 was domineering and accounted for 49,7%. 92% of solid biomass was used in cofiring.

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Elżbieta Mikołajczak, Katarzyna Mydlarz, Włodzimierz Popyk[59]

LEGAL REGULATIONS CONCERNING USAGE OF RENEWABLE ENERGY SOURCES

Abstract: The result of European legal regulations concerning national promotion of energy produced from renewable source in all EU Member States was the introduction in Poland adequate acts to fulfill Community obligations. The article presents European legal documents which indicate objectives and rules of energy policy accounting for renewable energy sources as well as Polish legal regulations concerning renewables including appropriate directives ensuring efficient law implementation.

Key words*:* renewable sources of energy, community directives, Polish legal regulations

INTRODUCTION

Wood residue is the most accessible element of biomass which is considered to be one of the renewable sources of energy. Its popularity grows steadily due to pro-ecological dimension as well as the urge to become independent from conventional forms of energy. The development of renewable energy sector in the EU Member States is supported by adequate legal solutions.

EU LEGAL SYSTEM

The beginnings of interest in renewables caused by the lack of self-sufficiency of individual Member States, fuel crises and the ever growing societies' ecological awareness may be found in the Community document concerning energy policy published in 1986, namely Council Resolution of 16th September 1986 concerning New Community Energy Policy Objectives and Convergence of the Policies of the Member States, OJ C 241. Yet only in 1994, Madrid Declaration determined that in 2010 targeted share of renewable energy in the EU energy balance should account for 15% [The Declaration of Madrid. An Action Plan For Renewable Energy Sources in Europe. European Commission DG XVII-D-1, Brussels, 1994]. The first document embracing the rules of energy policy in relation to renewables was 'Energy for the future: renewable sources of energy. Green Paper for a Community Strategy. published in Brussels and accepted by European Commission in November 1996. Its objectives were created on the basis of the finding that despite their high potential renewables are not sufficiently used and their contribution to the overall energy balance of separate Member States varies significantly. Whereas in key document - European Commission White Paper Energy for the future, renewable energy source. European Commission, Brussels, Published 1997 long-term goals of renewable energy as well as strategies of their implementation were determined. It's main target between 1998 and 2010 was to double from 6% to 12 % the renewables share in the total primary energy of individual Community states. This document treated biomass as the source with significant importance as its share in the production of liquid fuels was to grow 40 up to 60 times, in electricity production ten times and double in heat production. Achievement of these goals was to be guaranteed by action plan outlined in White Paper ensuring the creation of adequate conditions for the development of renewable energy sources without bearing excessive costs, among them supporting research, stimulating co-operation in the field of development and popularization of new competitive technologies, determining the rules of using by Member States fiscal stimuli or other incentives promoting renewables penetration.

The documents indicated that the need for active development of renewable energy sources is the result of:

- The increase of Community states energy safety via diminishing their dependence on imports,
- Reduction of CO_2 emission from energy sector,
- Creation of new work places,
- Regional development aiming at achieving social and economic cohesion between various EU regions,
- Increase of Community competitiveness on external markets [Gradziuk P. 2005].

For ensuring the implementation of the goals described in White Paper European Parliament and Council passed a few directives concerning the following:

- support of internal production of renewable energy (2001/77/WE),
- common rules of internal electric energy market (2003/54/WE),

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- promotion of bio-fuels or other renewables fuels in transport (2003/30/WE)
- restructuring community framework regulations concerning imposing tax on energy products and electricity (2003/96/WE).

Quantity targets related to the share of electricity possessed from renewable sources of energy in the gross electricity consumption were determined by Directive 2001/77/WE [Directive 2001]. In line with this document common European goal for 2010 should be achieved at 22%. The list of targets to be achieved by separate Member States in 2010 were described in the attachment to the Directive, as they embrace only electricity hence differed from the goals indicated in White Paper (12%), which concerns renewables share in the overall energy balance of each EU country. Planned in Directive 2001/77/WE for 2010 share of electric energy obtained from renewables in gross electricity consumption of Community States in relation to the quantities achieved in 1997 is presented in Table 1. Table 2 shows the analogical data negotiated in Accession Treaty from 2003 for new EU members.

Table 1. Planned in Directive 2001/77/WE for 2010 share of electric energy from renewables in gross electric energy consumption of Community States in relation to the quantities achieved in 1997.

Member State	Total renewable sources of energy [%]	
	1997	2010
Belgium	1,1	6,0
Denmark	8,7	29,0
Germany	4,5	12,5
Greece	8,6	20,1
Spain	19,9	29,4
France	15,0	21,0
Ireland	3,6	13,2
Italy	16,0	25,0
Luxemburg	2,1	5,7
Holland	3,5	9,0
Austria	70,0	78,1
Portugal	38,5	39,0
Finland	24,7	31,5
Sweden	49,1	60,0
Great Britain	1,7	10,0
UE-15	13,9	22,0

Source: [Krawczyński M., Wodzyński L. 2006]

Table 2. Share of electric energy from renewables in gross electric energy consumption of new Community states in 2010 in relation to the quantities achieved in 1997 negotiated in Accession Treaty in 2003

Member State	Total renewable sources of energy [%]	
	1997	2010
Estonia	0,2	5,1
Cyprus	0,05	6,0
Lithuania	3,3	7,0
Latvia	42,4	49,3
Malta	0,0	5,0
Poland	1,6	7,5
Czech Republic	3,8	8,0
Slovakia	17,9	31,0
Slovenia	29,9	33,6
Hungary	0,7	3,6

Source: [Krawczyński M., Wodzyński L. 2006]

EU enlargement resulted in the expansion of the list of state targets. Due to possible problems in achieving them by New Member States originally passed goal of 22% in 2010 (UE-15), taking into account the new EU boarders was decreased to 21% (UE-25)

POLISH LEGAL REGULATIONS.

In Poland one of the most important documents for the development of renewables energy is 'Strategy for renewable energy development'.

The result of European legal regulations concerning supporting internal renewable energy production is introducing to Polish law also to the constantly amended Act on Energy Law [Act 2006] adequate regulations, ensuring the fulfillment of Community obligations. The first significant strategic document, concerning the whole renewable energy sector is „*Strategy for renewable energy development"*[Strategy 2000], passed by Polish Parliament on the 23rd of August 2001. Determining the conditions of renewable energy development up to 2020, the *Strategy* describes the basic goal that is achieving 7,5% share of renewables in the overall national primary energy balance by 2010 and 14% by 2020. Comparing those targets with the results from 1999 (2,5%) means a triple increase in the usage of renewable energy sources by 2010.

Act on energy law from 10th April 1997 – [Act 2006], from the beginning of its legal binding embraced regulations promoting heat and power production using renewables. Its essence is imposing legal obligation for purchasing (or previous generation) of energy from renewable sources. Those who do not meet this criteria have to pay financial fines imposed by the President of Energy Regulatory Office. Subsequent amendments of the Act led to further specification and clarification of initially laconic regulations. *Act from the 2nd of April 2004 concerning the change of the Act – Energy Law and Acts – Environment Protection Law* [Act 2004] gave new character to the regulations concerning the obligation to purchase electric energy from renewables. The group of enterprises which had to obey by this rule as well as the means of fulfilling the obligation had been redefined. New regulation has been added which specified the procedures proving the fact

of generating renewable energy via so called 'certificates of origin'(point. 9e). The legislator indicated requirements concerning the content of such certificate (point 2), clarified the content of the application for the certificate of origin (issued by energy producer), means of its validation by the operator of energy system and the procedure of issuing and remitting the certificates by the President of Energy Regulatory Office. (points 3-7).

The following amendment of the Act – *Energy Law*, namely *Act from the 4th of March 2005 concerning the change in the Act – Energy Law and Acts – Environment Protection* [Act 2005], aimed at organizing dynamically developing renewable energy sector. It has been prepared on the basis of acquired experience related to the functioning national system of certificates of origin as well as the experiences of other EU Member States. All changes aimed at efficient promotion of renewables assuming that the basis of this support is the obligation to buy. Significant changes have been introduced in the current method of calculating the obligation to purchase electricity created from renewable sources. As an alternative for presenting 'certificates of origin' the possibility of substitute fee was introduced. This regulation launched a totally new system of fulfilling and calculating the obligation for clean energy purchase as well as changed the system of issuing certificates of origin additionally clarifying the content of the application for the certificate in question. It also initiated the regulations concerning property rights stemming from certificates of origin which may be sold and are stock market commodity. So as to facilitate turnover of those special 'securities', the obligation of selling and purchasing them via Energy Stock Exchange was imposed. The most significant consequence of adopted solutions was splitting renewable energy sales income into two flows:

- sales income from physical electric energy (monthly or other depending on the type of contract) which provide direct, guaranteed income of renewable energy producers;
- sales income from property rights stemming from certificates of origin, which are created at the moment of purchase – sales of certificates registered on Energy Stock Exchange official list.

DIRECTIVES

Following the Acts appropriate minister passed corresponding directives.

The first one published on the basis of article 9 point 4 of *The Act*, *Directive of The Minister of Economic Affairs from the 2nd of February 1999 concerning the obligat*ion *to purchase power and heat created from unconventional sources and the scope of this obligation* [Directive 1999], obliged energy enterprises carrying out commercial activity related to power or heat turnover to buy from domestic producers adequate quantity of renewable energy or heat from unconventional sources including traditional renewable sources of horse power rating up to 5 MW. The directive also determined the maximum purchase price of energy unit, which could not be higher than the highest (in effect in the purchasing company) price determined in the current tariff for the unit of electric energy consumed by the recipients at low voltage. Imprecise regulations resulted in substantial differences in prices of electric energy possessed from renewables which led to unfair treatment of individuals producers.

Subsequent *Directive of The Minister of Economic Affairs from the 15th of December 2000 concerning the obligat*ion *to purchase power and heat created from unconventional sources and produced combined with heat generation as well as heat from renewables and the scope of this obligation* [Directive 2000], concerned the duty of energy enterprises dealing with power and heat turnover to purchase power or heat from unconventional and renewable sources linked to one network, regardless of its source power rating. The directive determined the minimum share of electric energy created from unconventional and renewable sources in the total annual sales of electric energy by an individual company, conditioning fulfilling that purchase obligation.

2,65% in 2001
2,85% in 2001
2,65% in 2003
2,85% in 2004
3,10% in 2005
3,60% in 2006
4,20% in 2007
5,00% in 2008
6,00% in 2009
7,50% in 2010 and in the subsequent years

For the first time the possibility of qualifying part of energy created in cofiring as renewable energy for domestic energy producers was created when *the Directive of the Minister of Economic Affairs, Labour and Social Policy from the 30th of May 2003 concerning detailed obligation for the purchase of renewable electric energy and heat purchase as well as electric energy created with heat generation* [Directive 2003], published on the basis of the authorization given in the article 9a point 4 of the *Act from 24th of July 2002 concerning change of Act – Energy Law* [Act 2002] came into effect. Paragraph 6 of this Directive states that the obligation mentioned in article 9a point 1 *of the Act*, is considered to be fulfilled when quantitative share of renewable energy purchased or created using its own renewable sources and sold to those who buy electric energy for their own use in the total annual sales of electric energy by individual energy enterprise accounts for less than:

2,65% in 2003
2,85% in 2004
3,10% in 2005
3,60% in 2006
4,20% in 2007
5,00% in 2008

6,00% in 2009
7,50% in 2010

In the next amendment – Directive of the Minister of Economic Affairs and Labour from the 9th of December 2004 concerning detailed scope of obligation to purchase renewables electric energy and heat [Directive 2004] all requirements related to measuring, registration and the method of calculating the quantity of energy created in cofiring have been precisely described. Strict procedures guaranteeing detailed documentation concerning 'green' energy have been introduced.

The required share of renewable energy has been increased starting from 2006 up till reaching 9% target in 2010 that is up to indicative quantitative objective of 7.5% stipulated for Poland in Accession Treaty 2003. After 2010 that stable level was adopted due to the estimated growth of energy consumption in Poland. [Polish Energy Policy until 2025] as well as the possibility of creating united system of renewable energy promotion within the whole EU. The increase of those figures was the result of the need to eliminate incompatibility caused by differences in defining electric energy usage in Poland and the EU. In Poland the obligation to buy electricity produced from renewables concerns the sales of electricity to final users, excluding producers own consumption, technical, commercial and distribution loss. While in Directive 2001/77/EC [Directive 2001] 'electricity consumption also embraces domestic energy production including own production increased by delivery and decreased by dispatch (Domestic gross electricity consumption)'. Therefore the Directive [Directive 2004] demanded, that: 'the quantitative share of purchased renewable electricity or own renewable energy sold to the recipients buying this energy for their own use, in the overall annual electricity sales of an individual energy enterprise, looked as follows:

3,1% – 2005
3,6% – 2006
4,3% – 2007
5,4% – 2008
7,0% – 2009
9,0% – 2010
9,0% – 2011
9,0% – 2012
9,0% – 2013
9,0% – 2014

In Minister of Economic Affairs Directive from 19th December 2005 concerning detailed obligations connected with obtaining and remitting the certificates of origin, payment of substitute fee and the purchase of electricity and heat produced from renewable sources [Directive 2005], in line with the changes [Act 2005], the obligation to obtain and remit certificates of origin by President of Energy Regulatory Office or the need for substitute fee payment have been introduced. The Directive also embraced the issue of promotion of biomass from energy crops as well as residues biomass which was the result of limited competition for wood between energy sector and other sectors of economy. For cofiring technology the obligation to use biomass from energy crops was introduced. It has also been decided to speed up the process of reaching 9% share of renewables electricity in relation to electricity sold to final users:

3,1% – 2005
3,6% – 2006
4,8% – 2007 (previously 4,3%),
6,0% – 2008 (previously 5,4%),
7,5% – 2009 (previously 7,0%),
9,0% – 2010
9,0% – 2011
9,0% – 2012
9,0% – 2013
9,0% – 2014

The scenario did not account for the suggestion of the President of Energy Regulatory Office, who on the basis of renewables results in 2004 recommended even faster percentage growth between 2006 and 2010.

The increase in value of quontative electricity balance resulting from certificates of origin was introduced by the *Directive of the Minister of Economic Affairs from the 3rd of November 2006 changing the directive concerning detailed obligation of obtaining and remitting certificates of origin or payment of substitute fee and the purchase of electricity and heat from renewables.* It embraced the period between 2007 and 2014 [Directive 2006] The figures presented below were supposed to guarantee achieving indicative objective stipulated in Directive 2001/77/WE [Directive 2001]:

5,1 % in 2007
7,0 % in 2008
8,7 % in 2009
10,4 % in2010
10,4 % in2011
10,4 % in 2012
10,4 % in 2013
10,4 % in 2014

In the justification to the changes in the Directive and adopting new objectives the results of statistical data analysis have been quoted. They indicated the presence of stable relation between the amount of electricity delivered to the final

users and the domestic electricity use as well as prevailing relation between electricity export and import, which directly affects the level of obligation and as the consequence the amount of electricity possessed from renewable resources. The need to increase the share of electricity from renewables in the total gross energy consumption, stems from the necessity of adjusting the size of obligation to the current and projected renewable electricity production. Due to the fact that in 2005, 145 752 GW h of electricity was used domestically, delivering l 108 625 W h to the final users, thus adopted for 2010 (7,5%) volume of electricity produced from renewables, keeping the current increase in electricity consumption, amounts to the production of about 11 000 GW h. At present, stable increase in electricity sales to the final users that constitutes 10.5% share of renewable electricity in relation to the overall electricity delivered to those users. [Krawczyński M., Wodzyński L. 2006]

In the last *Directive of the Minister of Economic Affairs from the 14th of August 2008 concerning detailed obligation of obtaining and remitting certificates of origin, payment of substitute fee, purchase of electricity and heat from renewables as well as the obligation concerning the confirmation of data describing the size of electricity produced from the renewable sources of energy* [Directive 2008] yet once again the percentage share of electricity from renewables in relation to the electricity sold to the final users has been increased to the following figures:

7,0 % in 2008
8,7 % in 2009
10,4 % in 2010
10,4 % in 2011
10,4 % in 2012
10,9% in 2013
11,4 % in 2014
11,9% in2015
12,4% in 2016
12,9% in 2017

This document kept the rule introduced by the Directive of the Minister of Economic Affairs from the 19th of December 2005 regarding the detailed regulation concerning the obligation for measuring, registration and the means for calculating the production of energy using cofiring technology, which entails using transparent procedures ensuring reliable records of the quantity of 'green' energy.

The comprehensive list of the values of required share of renewable electricity in comparison with the amount of electricity sold to final users introduced by consecutive Directives has been shown in table 3.

Table 3. The share of renewable electricity in comparison with the amount of electricity sold to final users introduced by consecutive Directives

Year	Projected share in accordance with individual Directive					
	15.12.2000	13.05.2003	9.12.2004	19.12.2005	3.11.2006	14.08.2008
2001	2,65%					
2002	2,85%					
2003	2,65%	2,65%				
2004	2,85%	2,85%				
2005	3,10%	3,10%	3,1%	3,1%		
2006	3,60%	3,60%	3,6%	3,6%		
2007	4,20%	4,20%	4,3%	4,8%	5,1 %	
2008	5,00%	5,00%	5,4%	6,0%	7,0 %	7,0 %
2009	6,00%	6,00%	7,0%	7,5%	8,7 %	8,7 %
2010	7,50%	7,50%	9,0%	9,0%	10,4 %	10,4 %
2011			9,0%	9,0%	10,4 %	10,4 %
2012			9,0%	9,0%	10,4 %	10,4 %
2013			9,0%	9,0%	10,4 %	10,9 %
2014			9,0%	9,0%	10,4 %	11,4 %
2015						11,9%
2016						12,4%
2017						12,9%

Source: own research on the basis of [Directives: 2000, 2003, 2004, 2005, 2006, 2008].

CONCLUSIONS

Adjusting Polish legal regulations to the EU legal system constitutes the duty stemming from the fact of being Community Member State. Therefore each member is obliged not only to introduce adequate legal acts but also to implement programmes that would guarantee meeting the requirements as well as subsequent monitoring and enforcing once adopted regulations.

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PERSONNEL CONTROLLING APPLICATION IN FIELD OF EMPLOYEES´ REMUNERATION

Abstract: The article deals with employees´ remuneration and efficient distribution of the salary budget. The objective is to analyse and evaluate a remuneration system in a chosen enterprise. Based on these results by use the personnel controlling principles and statistical methods a multi-criterion system of the salary budget distribution will be proposed. After the proposed system's application its contribution for the enterprise and advantages in comparison with the original system will be evaluated.

Key words: personnel controlling, employees´ assessment, remuneration, salary budget.

INTRODUCTION

The world economic crisis has markedly influenced almost all the fields of enterprise activities. Customers´ behavior has changed, they prefer making savings and spend their resources for elementary goods and services. Customers are much more conservative and deliberate especially by purchasing luxury products. This behavior change combined with the crisis has negative impact to the automotive industry, that has significant position within the Slovak economy.

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During the crisis the HR represent a strategical potencial for the enterprise and many companies start to use personnel controlling as a sub-group of the controlling system. It concerns the system that facilitates to analyze economic and social impact of decisions that influence performance and motivation of the employees and thereby of the whole enterprise. The need of the personnel controlling use is connected with high share of the personnel costs on the whole-plant costs and it represents a conception that contributes to optimize structure and volume of this group of costs. The orientation towards the personnel costs is not necessary, it is sufficient to act in a process of the salary budget efficient use and distribution.

Particularly in time of the economic crisis it is very important to keep those employees who perform their work above standard and their working position is crutial in regard of the enterprise´s activities. Despite decrease the employee turnover and supply on the labour market there is still demand of the higly-qualified specialists. Because of the demand decrease in automotive industry i tis not possible to raise the salary budget volume, but in order to keep the crutial employees it is necessary to distribute disponible resources efficiently.

PERSONNEL CONTROLLING

With regard to high share of the personnel costs on the whole-plant costs there is a need to use controlling tools even in field of personnel management. Controlling is understood as a method whose purpose is to raise efficiency of the management system by continuous and systematic comparison of reality and desirable (in advance determined, planned) status of the business process, evaluation of detected variations, finding their reason, proposing activities for improvement or for update the determined objectives.

Personnel controlling is a system of planning, control and information flows management whose aim is a continual adaption to exchanging conditions. It thus concerns continuous following and identification the variations from determined objectives and creating proposals of actions to eliminate them. Personnel controlling enables to analyze economic and social impact of decisions that influence performance and motivation of the employees and thereby of the whole enterprise.

Personnel controlling can be considered to be a management method to optimize structure and volume of the costs, based on which it is possible to analyze, plan, manage and control obtained personnel data. It supports economic and strategical thinking and changes position of personnel work. Its task is nota n effort to reduce the personnel cost, but their optimization.

The main point of the analysis is not only field of costs, but also knowledge about employees´ behavior in working process. Employees with their needs and abilities are in focus. Personnel controlling represents way to search and control efficiency and economy of the HR activities. It shall measure qualitative and quantitative contribution by values creating in field of the HR management. There are three levels of the personnel controlling:

- controlling of efficiency,
- controlling of effectiveness,
- controlling of costs. (Babeľová, Holková, Vaňová, 2007)

Importance of the personnel controlling can be seen in assuring the goals achievement and successful realisation of strategical plans in field of HR management.

PERSONNEL CONTROLLING AND REMUNERATION

Remuneration policy deals with work assessment, employees´ stimulation, their social securing and is directly connected to remuneration. For the enterprise it is necessary to have a remuneration system, that is at once appropriate and just. Appropriate means to adapt remuneration to the enterprise´s economic abilities. Creation of the resources for monetary and non-monetary remuneration has interlock to the economic results. On the other hand, justice is an ethical value that cannot be determined by any science. Enterprise has to try to reach relative justice of its remuneration system in terms of differentiation individual labour activities according to objective criteria. Justice in remuneration relates with encouraging employees´ behavior and performance and with the fact, that enterprise´s salaries should be comparable with salaries for comparable jobs in other enterprises. Besides this the valid legislation that determines elementary principles of remuneration has to be respected. (Maníková, 2002)

In general there are two main functions of the remuneration:

- to encourage employees to labour performance and development, motivate them to reach treir goals, improve their performance or in regard with particular objectives and priorities to extend and deepen their abilities (orientation towards future),
- to evaluate, remunerate employees for tasks which are done, thus provide them recognition for their efficiency in form of reaching or exceeding their performance objectives or in form of reaching certain level of abilities (orientation towards past). (Koubek, 2004)

A proposal of good remuneration system requires so that employer clearly defined what the management wants to reach by application the program. Development of strategy, objectives and processes has to be especially considered. As the next step the process of remuneration administration has to be determined in order to define responsibility by decision-making and performing within the remuneration program. (Wagnerová, 2008)

APPLICATION OF THE NEW REMUNERATION SYSTEM

Results of the remuneration system analysis and allocation of salaries were taken into consideration and enterprise´s management decided to change the existing system. The new remuneration system should fulfil following requests:

- to consider employee´s performance in remuneration process,
- to compare employee´s salary with the labour market conditions,
- to improve internal justice so that employees occuping comparable position did not have expressively different salary,
- to consider statistical position of the salary within the tariff class,

- to conserve differences among particular tariff classes.

Based on the being tariff system we determined allocation of the percent occurance by tariff classes and statistical zones. For each tariff class we calculated the middle point – median and determined grades of variation from this value, global data are in table 1.

Tab. 1. Statistical allocation of salaries in 2007

Tariff class	7	8	9	10	11	12
<80%	0,00%	0,00%	0,00%	0,72%	0,31%	0,00%
80%	0,00%	0,00%	0,00%	0,72%	0,00%	0,98%
85%	4,65%	0,00%	3,23%	14,39%	17,03%	29,41%
90%	2,33%	50,00%	25,81%	15,83%	18,58%	7,84%
95%	39,53%	0,00%	19,35%	17,99%	13,93%	9,80%
medián	20,93%	0,00%	29,03%	15,83%	13,00%	12,75%
105%	18,60%	50,00%	3,23%	16,55%	11,46%	11,76%
110%	6,98%	0,00%	6,45%	7,19%	8,36%	3,92%
115%	2,33%	0,00%	3,23%	4,32%	6,81%	6,86%
120%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
>120%	4,65%	0,00%	9,68%	6,47%	10,53%	16,67%

Based on mentionnes requests we proposed a matress to calculate an individual amount of salary rise (table 2).

Tab. 2. Matress of the salary rise calculation

stat. zone/valuation	1	2	3	4	5
<min - Q1)	P x 1,6	P x 1,4	P x 1,2	0	0
<Q1 - median)	P x 1,4	P x 1,2	P	0	0
<median - Q3)	P x 1,2	P	P x 0,8	0	0
<Q3 - D9)	P	P x 0,8	P x 0,6	0	0
<D9 - max>	P x 0,8	P x 0,6	P x 0,4	0	0

All the employees were ranged according to the tariff class and then by level of salary into five statistical zones:

- <min – Q1) – interval from the minimum of the tariff class up to 25% employees (lower quartil),
- <Q1 – median) – interval that represents 25% of population from lower quartil to median,
- <median – Q3) – population that appears in the interval of median and 75% employees (upper quartil),
- <Q3 – D9) – range including 15% employees of the tariff class from upper quartil up to upper decil (90% of values),
- <D9 – max> - 10% best earning employees in interval of upper decil – maximum of the tariff class.

P is an average value of individual salary rise. Proposed model considers with the statistical salary postion within the tariff class and performance grade determined by superior at the annual interview. The lower salary and better assessment employee has, the higher value of P he gets in form of individual salary rise. As it results from the table, the highest salary rise will get employees on the minimum of tariff class with grade 1. If the employee has good assessment but his salary is situated in range of upper decil to maximum, his salary rise will reach only 50% of the maximal amount. This system assures so that employees with comparable working position (the same tariff class) did not have expressively different salary and so the differences went smaller.

As presented at the table 2, individual salary rise touches only the employees with assessment grade 1-3. Grades 4 and 5 represent insufficient and unacceptable performance, employees with these grades will not get any salary rise.

The next step was to regard differences among particular tariff classes. We decided to conserve existing span of 5% between two following tariff classes. So if the employees are situated in tariff classes 7-12, coefficient of the tariff class 7 is equal to 1, for class 8 it is 1,05, for class 9 it is $1,05^2$ etc. An individual index P was calculated for every employee with assessment grade 1-3 in regard with statistical zone of his salary, employee´s assessment and tariff class. The way of calculation is presented at the table 3.

Tab. 3. Way of calculation the individual index

Entity	Superior	ID	Name	Salary on 31.12.07	Tariff class	Stat. zone	Assessment grade	Index * grade	Tariff class index	Total P
RSH	Superior 1	12345678	Employee 1	710	7	1	1	1,60	1,000	1,60
RSH	Superior 2	12345679	Employee 2	725	7	2	2	1,20	1,000	1,20
RSH	Superior 2	12345680	Employee 3	760	8	3	3	0,80	1,050	0,84
RSH	Superior 2	12345681	Employee 4	760	8	3	1	1,20	1,050	1,26
RSH	Superior 2	12345682	Employee 5	800	9	3	3	0,80	1,103	0,88
RSH	Superior 2	12345683	Employee 6	810	9	3	2	1,00	1,103	1,10
RSH	Superior 3	12345684	Employee 7	830	10	2	2	1,20	1,158	1,39
RSH	Superior 3	12345685	Employee 8	830	10	2	3	1,00	1,158	1,16
RSH	Superior 3	12345686	Employee 9	870	10	5	2	0,60	1,158	0,69
RSH	Superior 3	12345687	Employee 10	880	11	3	3	0,80	1,216	0,97
RSH	Superior 3	12345688	Employee 11	900	11	4	2	0,80	1,216	0,97
RSH	Superior 3	12345689	Employee 12	900	11	4	1	1,00	1,216	1,22

Calculation principle is following:

- the highest individual index has the employee with grade 1 at the first statistical zone, so that one who earns the least – employee 1,
- employees on comparable working position (employees 3 and 4) with the same salary and garde heve the same final index,
- employees with higher salary on comparable working position (employee 5 compared to employees 3 and 4) and same grade have lower final index,
- employee with the same salary on comparable position (employees 11 and 12) has higher final index, if he got better assessment grade,
- employees at the same statistical zones and gardes (employees 2 and 7) do not have equal final index, because the higher tariff class (and therefore more demanding job) is regarder by the employee 7.

After this step we took a total sum of all P indices and divided the budget amount determined for the salary rise by this sum. As a result got the average amount of the P index. In the next step we multiplied the particular employee´s index by this average amount and got a final amount of the salary rise.

In order to avoid a one-way decision making from the HR, it was necessary to provide some space to superior to decide about the final amount of salary rise. We decided to calculate a span (minimum and maximum) within that the final amount had to be situated. Maximum was already calculated. The minimal amount was calculated the same way, but the statistical zone index was decreased by one level down (table 4).

Tab. 4. Matress of the minimal amount calculation

stat. zone/valuation	1	2	3	4	5
<min - Q1)	P x 1,4	P x 1,2	P	0	0
<Q1 - medián)	P x 1,2	P	P x 0,8	0	0
<medián - Q3)	P	P x 0,8	P x 0,6	0	0
<Q3 - D9)	P x 0,8	P x 0,6	P x 0,4	0	0
<D9 - max>	P x 0,6	P x 0,4	P x 0,2	0	0

It means that employee at the first statistical zone with assessment grade 1 will get salary rise in span of 1,6 – 1,4 P. His minimum is thus the same as maximum of the employee who has the same grade and higher salary zone or the employee at the same zone with one grade worse assessment. This system will assure that no employee can get higher salary rise than his colleague with better assessment or lower salary.

After two years of the new system application we evaluated the current status (table 5).

Tab. 5. Statistical allocation of salaries in 2009

Tariff class	7	8	9	10	11	12
<80%	0,00%	0,00%	0,00%	2,41%	0,77%	0,00%
80%	0,00%	0,00%	0,00%	1,20%	0,38%	9,32%
85%	0,00%	0,00%	0,00%	8,43%	15,38%	11,86%
90%	17,39%	0,00%	11,11%	16,87%	13,46%	10,17%
95%	17,39%	0,00%	38,89%	20,48%	20,00%	18,64%
medián	56,52%	100,00%	22,22%	26,51%	16,92%	20,34%
105%	4,35%	0,00%	22,22%	13,25%	14,62%	7,63%
110%	4,35%	0,00%	5,56%	3,61%	5,00%	8,47%
115%	0,00%	0,00%	0,00%	2,41%	6,92%	4,24%
120%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
>120%	0,00%	0,00%	0,00%	4,82%	6,54%	9,32%

After the new system application during two years we succeeded to eliminate most of unfavorable extreme values and move the peak of curve towards median. This is the best proof of internal fairness improvement, therefore one tariff class includes employees with similar work tasks.

Together with the new system application we succeeded to avoid of the mechanistic approach in that remuneration depends only on the job performance assessment and does not considers employee's overall profile. For each employee we calculated a minimum and maximum of pay rise and his superior determined the final amount from this interval. This way could the superior, that knows his collaborators the best, influence the remuneration process and consider an individual employee's profile.

CONCLUSION

Enterprise's ability to reduce costs and efficiently treat with the available resources becomes more and more a significant competitive advantage. In time of vehicles´ demand decrease it is necessary so that producers kept quality of their products and produced with the lowest cost in order to make a profit. One way how to fulfill these goals is an implementation of the controlling system in the enterprise. Controlling represents a management system that is able to evaluate a current situation, promptly react to possible menace and provide to enterprise's management relevant information for decision-making. It does not concern only the enterprise's costs, controlling principles are more and more applied in all enterprise's activities.

HR management is not any exception and here we can see a personnel controlling application. In no case it concerns only the statistics of headcount, employees´ turnover and absences rate, structure and volume of the salary resources and education and age structure. As well as the whole-plant controlling system, personnel controlling is not just a mean of reporting, but it provides support to the HR managers in the process of decision-making.

The objective of the article was to propose a new system of the salary budget distribution based on the enterprise's management requests with use of the controlling approach. The original system was not able to assure an internal fairness and gradual compensation salaries of the employees at the same work position. It considered employee's assessment from the previous period but the influence on the final amount of salary increase was not sufficient.

The proposed system can be marked as a multi-criterion, because it is based not only on the employee's assessment, but it also considers a statistical position of his salary and conserves current differences among the tariff classes. After its application we can see improvement of the original situation in all the six tariff classes.

If the enterprise continues the applied remuneration trend in similar volume as in 2008, we can expect a definitely improvement of salaries´ positionement and even a better level of internal fairness.

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***Renata Nováková, Ondrej Kusý*[61]**

ANALYSIS OF THE USE OF COST MODELS IN PRACTICE

Abstract: Economics of quality is a trendy area of quality management. Nobody doubts the need to monitor and evaluate the costs related to quality. However, there were significant divisions by experts in the field, which is also reflected in practice. In our contribution, therefore, deal with it rather than theoretical knowledge is converted into company practices.

Key words: economy on quality, management of quality, cost models in quality

INTRODUCE

Quality management is an essential part of any organization that wants to survive in a competitive environment. I in the wood processing industry is the ownership certificate of quality, whether the system, product, or staff, of course. Not always, however, ownership certificates declaring that the organization is viable and that it can in a difficult competitive advantage. It will survive only those profitable. This is also the main goal and each business entity - to generate profits. In particular, emphasis is placed on the fact that in times of economic crisis.

In light of these facts are well developed area of quality management and so far prevailed until the customer-oriented quality management, is now interested in organizations with an established quality management system, focused on value orientation preference in the field.

It is a further development stage, which is promoted in developed countries.

The quality is considered a great product made at a price acceptable to the user and at reasonable cost to the producer.

Such understanding rather accentuates the expression efficiency indicators. This means that not only quality products to meet customer requirements, but must simultaneously be profitable. With this understanding of product quality, the focus shifts to the cost of production processes and controlling. [1]

Although the practice almost requires that the concept of quality management adapted to current trends, professional public approach to this issue very fragmented and the divisions and subsequently results in disorientation, which is clear from the experience.

But must also say that in each sector gives rise to certain specifications that must be taken into account. Nevertheless, there might be shared and procedures to enable the comparability between organizations.

ECONOMICS OF QUALITY VERSUS COST-ORIENTATION

If we wanted to highlight the quality of the economy across the board, we should focus on three main areas:

a) cost-oriented quality management - is monitoring and evaluating quality costs
b) monitoring and evaluating the effectiveness of quality management
c) pricing in relation to quality.

The object of this paper is the first approach, which focuses on cost-orientation.

Cost orientation in quality management has not, however, is a concept unknown. In the literature we can find the detailed description of its models, such as. COPQ model, a model life-cycle cost, process cost model and a model of PAF, which is recommended by ISO 9000:2000.

How, these models and their use of translated into practice? The brief analysis that presented in this contribution, we want to bring the relevant facts on the ground.

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Our research is focused more on medium-sized organizations, to small enterprises was the following meaningful review. Large organizations monitoring and evaluation costs related to the quality of place, most commonly used model of PAF, which is recommended by ISO. This, however, also been the subject of our interest, as that in our national economy, large organizations are usually organizations with foreign capital participation, for the improvement in the area do not have much interest.

Downloading rules of their foreign mothers.

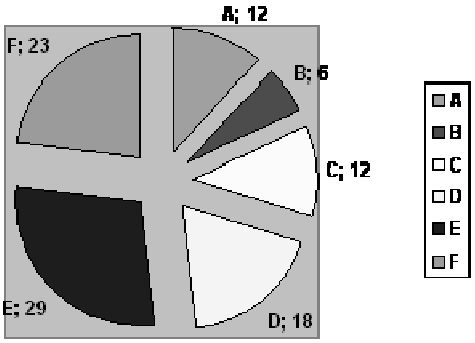
In the survey, we tried to preserve the basic criteria of comparability in the surveyed organizations with established quality management system. The entire survey was also possible in the full width of a limited contribution to embed, so we chose some of the most important areas of research. The survey was conducted through a questionnaire which was sent to quality managers and workers in economic organization. Consider the fact that they would be able to give meaningful answers to our questions.

RESULTS OF QUESTIONNAIRE SURVEY AND ASSESSMENT

What base models use your company a cost analysis?

Companies put the following models, which were then sorted and evaluated graphically.

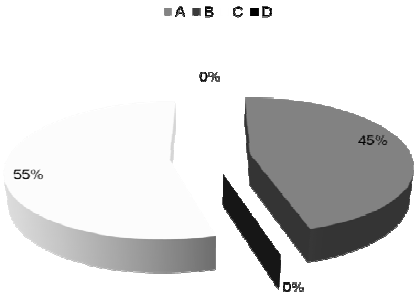
A. Paf method
B. Copq model
C. Model cost during the life cycle
D. Model business performance
E. Complex cost model for quality
F. Additional tools for monitoring and evaluation of quality costs



Based on the answers are clearly visible, as operating divisions of experts in this field. Companies are disoriented and therefore do not know either of these models nothing or very little. This means that you can not choose a method that would give a clear answer as to monitor expenditures related to quality. On the other hand, this area can affect the fact that every organization in the role assigned to monitor the quality of expenditure to another department. This can be seen from the following questions:

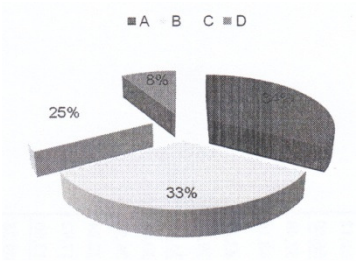
Who pursued Cost of quality?

A. Accouting department
B. Authorized personnel
C. Quality control staff
D. Other



As illustrated by the following chart, up about 45% of the enterprises transferred to the monitoring cost accounting department, or rather the economic department. This loses the direct contact of observation. The staff of the economics department then do not systematically analyze the data in a homogeneous layer, but often assigned to another group and the cost comes to skewing.

If we look at this issue from another party, you will get to the question by which we find the amount of expenditure incurred on various types of errors.



By the costs of quality is undertaken most funds?

A. Cost of internal error (not matched)
B. Cost of external defects (complaints and claims)
C. Cost of control
D. Costs of prevention

The graphical presentation is apparent that companies spend up to 67% of the costs associated with the quality of internal and external costs. When the enterprise is most dangerous for the external costs.

As can be seen from the graph, the company reported its best. If we look at the cost of prevention, in most of these organizations make up the smallest part of the cost associated with quality. It should be noted that these expenses to the greatest extent they can influence the amount of expenditure on internal and external errors of law and to try to save them.

CONCLUSION

The questionnaire survey of selected issues and recovery, we just confirmed that the divisions of experts in the field are reflected in practice. However, in practice, those responsible have no doubt that the cost, or rather the expenses related to the quality should be monitored and evaluated. Therefore, trying to the best of its knowledge and experience to generate, either on their intuition, or on computer programs, which partially addresses this issue, the individual cost items, or choose one of the models recommended in the scientific literature. The problem remains whether the model or monitored and assessed for costs actually reflect what the organization needs to find out. The second aspect is that in the absence of a uniform field, can not exercise any of the methods or results of such comparisons. benchmarking and so on.

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***Renata Nováková, Andrea Tománková*[62]**

ON THE QUESTION OF THE USE OF THE WOOD INDUSTRY EURO FUNDS IN SLOVAK REPUBLIC

Abstract: The European integration represents the process of a continuous expansion of cooperation and help. We can definitely add drawing of the financial support from EU funds among the ways of help. The paper discusses this issue and also focuses on evaluating the contribution of funds and their use in the wood processing industry as the way of economic growth support. It describes the theoretical knowledge and the options of the structural funds drawing directed into this area and at the same time it analyzes the significance of marketing communication as an inseparable part of the projects submission process and their consecutive implementation.

Key words: wood industry, integrated marketing communication, communication tools, structural funds, drawing of euro funds

EURO FUNDS AND THE IMPORTANCE OF THEIR SUPPORT IN THE LUMBER INDUSTRY

With the accession of the Slovak Republic to the European Union, it was necessary to improve and in many cases I build new structures in the various areas of the national economy. Many businesses have not been sufficiently prepared for these changes and, in particular because they are not without realizing the power of advanced competitive market of the European Union.

The production range of wood, its supply and processing are in Slovakia related segments of the forestry and wood-processing industry. The importance of wood industry production in the economy of Slovakia is given its specific mission

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and task throughout national economic complex. Wood industries within the economy of Slovakia has a specific position, which results from its comparative advantages. There is relatively little dependent on imported raw material inputs and is permanently unable to form the balance of foreign trade. With respect to the distribution of raw resources is important from the perspective of regional development of small and medium-sized enterprises, as it has good possibilities of using the technology of production changes and results of innovation processes, it can support the development of employment and a relatively low capital input and quickly adapting to the requirements of the market.

Wood production needs to be understood as well as the production is based largely on the processing of wood and wood processing not only as timber and the production of forest products, but also the production of paper and cellulose and the production of furniture.

Forest-based industry in the Slovak economy still has a small share in recent years there has been significant inflows of foreign investment in this area. A frequent question producers is the possibility of granting State guarantees for the supply of wood but these requests are usually rejected and remains part of the wood destined for export.

Just wood industry was the first industry in the Slovak Republic, the impact of the economic crisis and felt especially for falling demand in the construction business. The result was the closure of several smaller factories. Overall, sales in this sector fell last year by 16% to 570 million. Eur. after four years in the black so that sector found itself once again in loss.

Slovak wood and furniture industry is in a very precarious situation. Comparative advantages of its sources of timber from the forest cannot sufficiently make use of. The whole sector is accompanied by a high number of competitions, a range of shops and factories, productions of high debt to banks and suppliers. Permanent shortage of funds for the operation, the modernisation of the art and technology, requires a massive capital, without which it is not possible any shift.

Europe is one of the economically most prosperous parts of the world, but not all regions or industry have the same conditions that determine their status and development in the ongoing process of globalisation of the world economy. Ignore these facts would eventually mean the brake on the development of the European Union as a whole. With the entry of Slovakia into the EU and for our country, has opened new opportunities for further development. One of them constitute the structural funds. The issue of the structural funds is currently very current and possibilities to obtain finance for projects are enticing.

Each project is actually a response to the problem that we want to solve, or responds to the need to be met. In addition, each project must have a mission and vision, which must be in accordance with the vision and mission of the institution that implements the project. Forestry research, ensures, in particular in the framework of the Department of the Ministry of Agriculture of the Slovak Republic, the Forestry faculty, Technical University in city Zvolen and at the Institute of forest ecology of the Slovak Academy of Sciences in city Zvolen. Implementation of scientific-research activity is carried out in particular by means of research tasks financed by the Ministry of Agriculture of the Slovak Republic, of the projects of the Agency for the promotion of research and development and Scientific projects and grant agency of the Ministry of education of the Slovak Republic and the Slovak Academy of Sciences.

From the structural funds goes to the forest-based industry operational programme ' competitiveness and economic growth, the global objective is to ensure sustainable economic growth and employment. Priority axes of the operational programme is supplemented with some areas supported under the programmes of the regional operational programme, research and development, employment and social inclusion and education. The operational programme is one of the main implementing instruments for achieving the priorities of the national programme of reforms in the field of innovation and directly contributes to the realisation of its priorities in the field of business environment.

Just the use of funds from EU funds in the period 2007 to 2013 shall be opened only for non-State, but also for national forestry and forest-based operators new drawing on specific projects. But we are ready to take advantage of this opportunity? The question of whether we are prepared, is truly justified, as in the previous programming period the forest sector in Slovakia had problems with the creation of projects, with applying to the projects, respectively, in fulfilling the conditions laid down. Those that were and still are very complicated, the question of co-financing and attestation of the solvency margin. Is not at all easy for the current entity to ensure the financial resources of co-financing of reimbursable projects. Another serious administrative problem was demonstrating compliance with the undertakings in every step of the assessment and funding of the project. In any case, we think that this is a very important moment that may significantly English wood industry forward. In particular, should be at least partially reduce the deficit financing, which in recent years in this sector were not available.

INFORMATION AND COMMUNICATION FOR POTENTIAL APPLICANTS

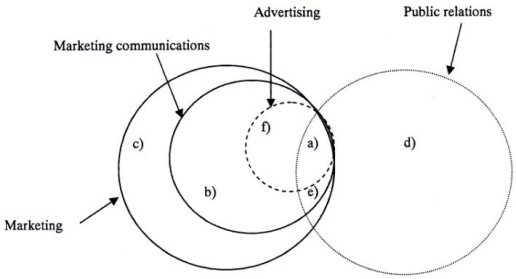
For the purpose of providing information about how to benefit from the structural funds and implement demand oriented projects were set up by the managing authorities, intermediate bodies and information centres. Their aim is to create an efficient way of promotion, advice and mutual communication with potential applicants. In principle, the respect of such information in order to find your way through the final beneficiary in the operational programme (the basic conditions for obtaining funds, finding an appropriate measures within the meaning of the business plan, the suitability of the applicant for the programme or measure, familiarisation with eligibility criteria, (I) unauthorized investments eligible), or the alignment of the candidate on a more operational programme (unless its intention not to support), and providing candidates with all information and promotional materials.

The obligations of information centres shall not apply to assistance in the preparation of projects, candidates may make use of the consultancy firms.

EFFECTIVE USE OF MARKETING COMMUNICATIONS FOR MAKING PROJECTS

Implementation of the structural funds, which has become the European importance especially in the new global economic and financial crisis is largely subject to the quality and selection of communication tools and marketing activities applied applicants for financial grants from European sources.

Marketing communications is in today's rapidly evolving competitive environment, the most important tool in the marketing mix. It focuses not only on the achievement of the desired response and increase demand for products, but also provides the necessary information, the company operates to differentiate the product from the competition, it is recalled product current consumers, compete, offset fluctuations in demand and what is very important, behaviour and public opinion. Its importance is essential even in the use of project management in all stages of the process.



a) a corporate advertising
b) sales force and channels of communication, direct marketing, sale support
c) distribution, logistics, pricing, and the development of new products
d) relations with investors, relations in the company communication with employees, public affairs, relations with the Government, crisis communications, a corporate identity
e) publicity, media relations, sponsorship, crisis communication a corporate identity
f) traditional mass media advertising

Figure 1: a marketing mix and integrated marketing communications

Integrated marketing communication basically is uniform and coordinated the involvement of all instruments in the implementation of marketing communications marketing goals and objectives of the enterprise in a difficult market environment. Integrated marketing communications shall not be made automatically. All the components of the communications mix must be carefully planned so as to create a consistent and coherent integrated communication plan. Subsequently, integrated marketing communications can be successful only if it comes to strategic integration of the various departments responsible for communication. Advertising, public relations, sales promotion and personal sales are in the majority of companies managed by individual divisions (departments), which rarely communicate with each other, mutual priorities or integrating their efforts. Successful integrated marketing communications lies in the existence of the Communications Manager, who has the power to monitor, manage and integrate all specialised communication functions of the organization. This often times means (causes) radical change in the structure of the organisation and may be the reason why integrated marketing communications has been introduced in most companies.

Table 1: Classic and integrated communication-comparison

Classic communication	Integrated communication
- targeted to retrieve information	- targeted for withholding information, relational management
- mass communication	- selective communication
- monologue	- dialogue
- the information is sent	- the information is requested
- information is provided	- separate collection of information
- broadcaster takes initiative	- the recipient takes initiative
- retention of information	- the provision of information
- effect through repetition	- effect through the relevance
- assault/offensive	- defence/defensive
- strong brand	- trust in the brand
- transaction-oriented	- relational oriented
- change of position	- addressing
- modern: linear, massive	- circular, fragmented

Source: van Raaij, L.F. (available on the website: http://books. google.com/books?id=vDTiukzRteEC...)

Communication process in your organization/company is both for individual communication levels that correspond to individual management degree both internally communication system that copies the organisational structure of the enterprise. Within an organization/company can and often is a communication process takes place between staff of different hierarchical levels and management degrees, which includes between group relationships, which are often hazy. The so called. diagonal/cross-communication that uses mainly group and mass communication based on the oral form. meeting, trainings, conferences, business presentations, discussions and under controlled. Diagonal communication is used currently in particular processes of project management and project tasks, called solutions. project management.

CONCLUSION

The consequences of the global crisis, which is neither isn't avoid forestry, wood processing and cellulose industry, we have to think to mitigate its impacts. In this area we have compared with developed countries a huge handicap and the

active support of the State do not remove the without and the EU. We think such support to this sector of the economy has received in the form of competitiveness within the EU countries. To this end may drawback considerably facilitate forms of financial support from the EU structural funds.

Despite the risks involved, it is necessary to see all the options industry as a stable production based on the processing of domestic raw materials. Enough wood indicates that Slovakia is projected to become furniture power.

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CONDITIONS FOR CONTRACTOR SERVICES IN FORESTRY OPERATIONS

Abstract: This paper deals with the description of general conditions for contractor services in forestry operations. It describes forest policy framework, legal and institutional framework which influence design and administration of contracts in forestry. Additionally, it explains the theoretical background of property and use rights relating to the forest outputs and forest use and the main aspects of these rights that influence contract conditions. Last chapter is dedicated to the description of the present conditions in forestry contracting at the European market.

Keywords: contracting, forestry operations, property rights

INTRODUCTION

Forestry sector has been traditionally linked to rural areas thus proving employment for local people and development of rural regions. In order to provide all demanded functions, timber as well as non-timber functions, management activities in the forests should be comprehensive and aimed at a whole range of activities covering silvicultural and harvesting operations as well as providing of different forest uses, goods and services. With regard to the size and ownership structure of forests these activities can be provided by own capacities or by contacting.

Conditions for contractor services may vary significantly in different regions or countries as the result of geographical, legal, economic, cultural and other conditions. They usually reflect conceptions of national forestry policies, legal requirements and institutional framework for contract design and administration.

FORESTRY POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK FOR CONTRACTS

Forestry policy framework consists of national goals, resource management principles, strategic objectives and priorities for action (FAO, 2001). National goals are defined broadly and should be aimed at securing national interests and sustainability of forest resources in order to guarantee present and future material and social needs, development and long-term health of forests. Presently, forest resource management principles in developed countries often follow resolutions and principles of intergovernmental global and regional processes. They mainly cover environmental, social and economic aspects while taking into account scarcity of forest resources and demand of society for forest products and should provide for balanced decision-making. Policy framework should establish the rights and responsibilities of actors and fair mechanism for dealing with conflicts, create confidence and security for actors, investors, communities etc. and enable fairness and stability of the conditions required for business operations. As the policy in other sectors of economy can affect forestry policy and cause significant forest destruction, the cross-sectoral linkages should be considered.

Activities of countries are to a certain extent constrained by international law in the area of international trade, regional agreements etc. International organisations such as World Trade organisation regulate international trade relations between countries and influence domestic policies. The examples of international agreements are the Convention on Biological Diversity defined in 1992 in Rio, The International Tropical Timber Agreement (ITTA) or the Convention on

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International Trade in Endangered Species of Wild Fauna and Flora (CITES). At the national level, legislation instruments cover country's constitutions, statutory laws (criminal, contract, forest, environmental and other), governmental and ministerial decrees or particular forest regulations. Contract law of a country usually defines contracts themselves and arrangement of contractual relations. Forest law should incorporate elements such as forest ownership, rights and obligations of forest users, responsibilities and authority of state agencies and administration, requirements for sustainable forest management, public participation in decisions related to management and utilization of public forest lands and mechanisms for monitoring of forest management practices. Forest regulations provide legislated rules for administration and management procedures. They are usually the administrative means for implementing legislation.

Institutional framework refers to the role and structure of institutional capacities required in design of contractual arrangements for the utilisation and management of forests and effective administration of forestry contracts. Institutional structure of government agencies must have ability and capacity in the areas such as strategic planning and policy analysis, implementation of forest legislation, design of administrative procedures, financial analysis for assessing values and benefits involved in forest contracts, experience in the design and writing of forest contracts to avoid misunderstandings and conflicts, design and implementation of competitive bidding procedures, capacity to carry out the competitive bidding process, contract negotiation abilities, monitoring and control capacity, enforcement capabilities etc.

MEANING OF PROPERTY AND USE RIGHTS FOR CONTRACTS

Contracts in forestry are very flexible and they can be designed to convey a range of property and use rights and obligations. Property refers to the rights the owner of these rights has in relation to the rights of others and it is often established in laws or customs that define the conditions under which the owner has these rights (FAO, 2001). Forest contracts convey property rights to forest outputs or forest use. The nature and extent of property rights establishes the power over a resource that the owner of the rights may exercise, but also limits or constrains these rights. There are couple of dimensions relating property rights: exclusiveness, duration, comprehensiveness, rights to economic benefits and obligations, transferability and quality and security. Exclusiveness refers to the extent to which the owner may claim and secure use rights. It also defines the power to exclude others and to control access and charge for use of the resources. Duration of property rights determines the extent to which the holder will take account of the future impacts of his actions and therefore may influence investments into silviculture or forest management activities in order to yield benefits in the future. Comprehensiveness covers the range of benefits from the forest. In certain cases overlapping rights to the same interest may result in conflicts. Comprehensiveness has an impact on the way the forests are utilized and managed. When contract holders have full and comprehensive rights to the forest they will manage it to generate the most financial values to themselves. The rights to economic benefits are often constrained by forest regulations and may include restrictions on the harvesting rate, protection of environmental values, requirements of domestic wood processing industry etc. Transferability refers to the ability to transfer the rights, i.e. sell or assign these rights to someone else. However, transfers of forests contract are often restricted. If there is no transferability there is no market value of the rights. Transferability allows relocating resources to those who can make best use of them. Quality and security of property rights reflects how well these rights are protected from encroachment by others.

OVERVIEW OF AND CONDITIONS IN THE EUROPEAN FORESTRY SECTOR

Forestry operations are carried out mainly by SME's. A summary estimation shows that some 50,000 mainly small enterprises employ a workforce of about 250,000 which today is the majority of professional forest workers in European forests. Being small enterprises in rural and often remote areas these contractors play an important role for rural economies, and of course for the economic and ecologic functions of forests (ENFE, 2008). There is a range of contracted services in forestry, however the main offered services involve harvesting, silviculture operations, harvesting and biomass harvesting, forest amelioration, road transport, etc. Contracting companies have different level of mechanisation degree, which varies among different countries in Europe. In North Europe about 97.5% harvesting is mechanised, in West Europe it is about 72% and the lowest level of mechanization is in Eastern Europe (about 3%). However, except of the level of mechanisation there is another significant indicator of mechanisation - the age and quality of machines. The age of machines used for forestry services is very different and depends on the region. Generally, the age varies from 4 to 15 years. In some Eastern European countries it is possible to find lorries older than 40 years (COMFOR, 2008).

Present conditions for forestry contractors at the European market are very heterogeneous. In spite of the EU and countries' support to development of rural areas and sustainable forest management through different social, political and economic tools the situation in forest operation enterprises in uncertain. Similar situation is with profit vs. increasing requirements to undertake environmentally friendly works. There is a weak and vulnerable link in the global and internationalised forest based value chain. Other paradox is that forestry contractors are under constant pressure from the bargaining power of the supplier of raw wood material (forest owners regulating the access to the resources) and the customer (timber based industries regulating the access to the global market) (Broget et al., 2010).

One of the specific features at the European market is that innovations are linked mainly to investments into machinery and technique. These innovations as well as, diversification of operations to some extent (bio-fuel harvesting, packing timber for conservation, etc.) are often radical changes for the companies. Another very important specific feature is that competitive advantages are searched in the integration of the wood value chain by providing other services than timber harvesting related, such as transportation or saw milling. Competitive advantages can be seen in offering quality services, e.g. via modern technologies, where the new machineries are choice criteria to access the timber procurement market, as well as, by specialisation in niche markets such as salvage or storm cuttings, or by providing more efficient work, (e.g. bring large machines with high productivity on local markets, or use the machineries for other purposes in the low harvesting season). Except the above mention features there are many others, which help to create character of this

sector. For example services are usually operated at local or regional market, occasionally abroad. Access to the market is mainly based on negotiations or tenders. However, there is trend to replace the long-term relations by tendered contracts for services. This situation could be pretty danger for local businesses. Many forestry companies have started to use subcontracting as operational cooperation strategy. This strategy uses to face extra work or needs for special equipment. Generally we can say that companies have weak capacities in negotiating for prices and influencing timber procurement policies. Additionally, this market is characterised by spot transactions, short term delivery contracts and relatively small values (Broget et al., 2010).

The sector is also influenced by supporting and prohibiting policy issues. Supporting policy offers rural development programs for supporting investments in new technologies and machinery. From the other point of view, there are many barriers as requirements for quality of the services, age of machinery, regulatory provisions about transportation limits and last but not least rules regarding the use of cheaper fuel and changes in technological requirements (cut to length felling method). Policy issues can directly influence portfolio of activities. The large portfolio offer more flexibility and better change to face uncertainties at timber markets. However, regulatory framework of forest operations induces high transaction costs and they try to be pushed to contractors either from the forest owners or industry.

CONCLUSION

Contracts in forestry relate to specific forest outputs or forest uses. Forest utilisation contracts can provide a range of rights to timber, non-timber forest products, harvesting or other use rights such as e.g. hunting, water rights, tourisms etc. There are also many factors influencing the conditions for contractor services in forestry. On one hand there are general factors of the political, legal and institutional environment creating the basic framework for this sector, on the other hand, there are specific conditions of designing and arranging contractual arrangement. Present conditions for forestry contractors at European market can be defined as uncertain and small and medium size contractors work in a strongly competitive environment, often under the pressure from the forestry sector on one side and wood processing industry on the other side.

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RECENT STATE IN GLOBAL MARKETS FOR PULP AND PAPER

Abstract: The paper deals with the state of pulp and paper markets in the global point of view. The research detailed analyses pulp and paper industry (PPI) and identifies a most important producers and exporters of different pulp and papers commodities. The analysis of markets for pulp and paper has been done according to data 2008. Thanks to statistic analyses (correlation analyses) we describe relationship among production, consumption and foreign trade of the most important commodities (chemical wood pulp, mechanical wood pulp, paper and paperboard).

Keywords: pulp and paper industry, correlation coefficient,

INTRODUCTION

Forest distribution, change in forest cover, tree species as well as wood quality are very variable in the World. Consequently, utilisation of wood is very versatile and different, depends on regions, technological development etc. Wood as a natural material has unique properties and servers for different purposes. It is considered to be ecological, aesthetic and renewable material with exceptional physical and mechanical properties. It is mainly used in construction, paper production, furniture making and a number of different related sectors and activities.[5] At the present time, wood is important material for industry processing, as well as for energy sector in many developed countries. On the other hand, wood is essential for rural people in developing countries. The history confirms that wood is important material for society development. New technologies offer to use low quality wood and recycled materials (e.g. recycled paper) for industry. The key issue is that wood resources as many other materials started to be insufficient. Scientific and technological development of PPI improves technological ways of utilisation of lower quality wood resources and help to increase competition of this sector. However, there is a conflict between IT and utilisation of classic ways of communications, as

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paper. IT technologies represent important substitutes for paper, but still according to official prognosis, the global market demand for paper and paperboard will increase by 25% till 2020. [6]

PRESENT SITUATION IN GLOBAL MARKETS FOR PULP AND PAPER

The global markets for pulp, paper and paperboard pass a series of unexpected twists. Even in begging of 2008 the economic development of the PPI was optimistic. In the second half of 2008 and the first half of 2009 global demand fell sharply. PPI has been strong affected by the financial crisis. Special influence had decreasing of consumer's expenses, of international trade flows and industrial production in general point of view. The largest drop occurred in graphic paper and packaging paper and cardboard, while the area of hygienic paper was affected only slightly. The worldwide economic recession led to a decline in production of wood pulp even in China. (recession about17% compare to previous year). The price of pulp in the beginning of 2009 fell heavily, which is particularly true in the case of market situation in North America, but the situation throughout the year had constantly changed. According to UNECE data production of paper and paperboard declined from early 2008 to early 2009 in Europe, as well as in the U.S. by 17%. In 2008, demand for paper and paperboard reduced in all three UNECE regions (Europe, CIS, North America), the largest decline in paper consumption recorded in North America (-7.4%), Europe (-3.7%) and CIS (-0.5%). However, this situation is not so critic compare with other sectors of industry it is reflection of close interface among markets in different regions. Major paper and paperboard trade flows within the UNECE region in recent years reflect ongoing developments in competitiveness and growth, influenced also by shifts in currency exchange rates. At the present time situation is step by step changed and production and foreign trade achieve amounts from the period before crises.

METHODOLOGY

For analyse current situation in global markets of pulp and paper could be done in different ways. Static statistic methods are able to describe model in concrete situation. The statistical research in various disciplines tends to pursue more information by multivariate statistical methods such as correlation and regression procedures for analysis. A correlation analysis is composed of several methods, which are simple linear and nonlinear correlation. Thanks this method we describe causality among production (P), consumption (C) and foreign trade (export E, import I) of pul and paper comodities (chemical wood pulp CHWP, mechanical wood pulp MWP, paper and paperboard PaP). The data from the FAO statistical database (Faostat in 2008) has been analysed. A main different between chemical and mechanical wood pulp is in processing technology of pulp. According to this technology, different quality of paper is produced. The current situation of PPI has been analysed in thirty developed and developing countries, which are the most important pulp and paper producers in the World, as well as they have the biggest wood resources and technological development in this field. Through the correlation analyse we determined relationship between two quantitative data as production and consumption and foreign trade of chemical, mechanical wood pulp, paper and paperboard. The results have been statistical tested and statistical significant results are market. In the table 1, statistical significant results are marketed (bold) with signification $p< 0.05$ and N (number of analysed countries) 27.

RESULTS

The correlation analyse shows different result for relationship among consumption, production and foreign trade. There are about 60 % of results statistically significant. Compare with others, the strongest statistically significant relationship is between production and consumption of PaP where correlation "R" is about 0,99 in 2008. In general, we can affirm that foreign trade of PaP is in balance and have not significant influence on connection between consumption and production. On the other side, it is very misrepresenting result seeing that PaP is consisting of many different types of papers. (e.g. printing paper, graphic paper, newsprint paper, hygienic paper, packing materials, wrapping paper, others paper and paperboard). Consequently, results wouldn't be desorbed, if we are able to separate analyses for different types of paper. The lowest correlation (R -0.38) is between consumption PaP and import of MWP. The explanation is very simple. For PaP production usually uses CHWP that is why analyse describe low causality between MWP and paper. The second non significant correlation is between consumption and export of PaP. Export of PaP is depending on production and there is low connection with consumption. Others indicators describe strong and middle strong correlation (standard deviation +/- 5 % and wit confidence interval 95 %).

Tab. 1. Correlation coefficients between among different pulp and paper products ($p < 0,05$) year2008

	P-CHWP	E-CHWP	I-CHWP	C-CHWP	P-MWP	E-MWP	I-MWP	C-MWP	P-PaP	E-PaP	I-PaP	C-PaP
P-CHWP	1,00											
E-CHWP	0,68	1,00										
I-CHWP	0,36	0,02	1,00									
C-CHWP	0,94	0,45	0,61	1,00								
P-MWP	0,47	0,67	0,09	0,33	1,00							
E-MWP	0,35	0,25	0,10	0,32	0,45	1,00						
I-MWP	0,17	-0,08	0,44	0,31	-0,04	-0,01	1,00					
C-MWP	0,47	0,67	0,11	0,34	0,96	0,43	-0,01	1,00				
P-PaP	0,65	0,25	0,90	0,82	0,31	0,20	0,39	0,32	1,00			
E-PaP	0,52	0,51	0,43	0,51	0,73	0,45	0,23	0,73	0,49	1,00		
I-PaP	0,61	0,24	0,77	0,75	0,23	0,27	0,33	0,24	0,72	0,60	1,00	
C-PaP	0,63	0,18	0,91	0,82	0,19	0,15	0,38	0,20	0,99	0,38	0,70	1,00

As we mention above, between production and consumption of paper is close relationship. Similar situation is between production and consumption of mechanical pulp. In case of paper and paperboard correlation coefficient "R" is 0, 9878 and coefficient of determination R2 is 0, 9758. We can expect, if consumption increases, production growth of paper will be equally. This hypothesis has been tested at 95% confidence interval and 5% standard deviation (with a tolerance 5 %). In analysed countries demand for PaP is high, following that foreign trade of these countries is important from global point of view. Besides domestic demand foreign trade is important. Volume of foreign trade as well as volume of domestic demand depends on prices of final products.

CONCLUSION

Pulp and paper industry offer the possible ways to utilise wood as a renewable resource, however this sector is affected by many issues. At the present time, wood resources availability, innovations, wood trade and information technologies as well as other competitive products are keys factors, which influence markets for pulp and paper. Production and foreign trade as well as pulp and paper products consumption are increasing. We assume paper consumption has been increasing from 3,3 mil. t. in 1890 till 370 mil. t. in 2005. Consequently with consumption waste paper production is increasing. Pulp and paper consumption is strong connected with global consumption which is rapidly increasing.

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APPLICATION OF SOCIAL RESPONSIBILITY IN THE WOOD PROCESSING BUSINESSES

Abstract: The paper describes the basic principles of the Corporate Social Responsibility (CSR) and the significance of its application in the wood processing businesses.

INTRODUCTION

Due to the world globalisation, when the boundaries in the industrial world tend to fade away more and more often, a gradual confrontation, too, must necessarily occur not just in the area of professions and languages but also in the cultural, religious and ethnic area with the goal of the economical and social development of the particular country. The role of corporations in the society has significantly changed in the recent years. In order for a corporation to be successful in the long term or even permanently also in today's global world it must meet new expectations of its surroundings. One of these expectations is, without any doubt, its responsible behaviour towards the society in which it operates

The corporate social responsibility involves all activities that go far beyond the maximum legitimate requirements, as well as activities adopted by the corporations when seeking for understanding and meeting expectations of all interested parties in the society.

CSR begins to find application in all types of corporations. Considering the large emphasis being placed in the application on quality of the surroundings and of the society, CSR implementation in the wood processing businesses is the right direction when enhancing a company's competitiveness and its acceptance by its surroundings.

Wood processing businesses perform their activities with regard to the safety and health of their employees and with emphasis on the environmental effect on the society.

The attributes indicated are a significant and dominant element of the CSR application.

For this reason, it is opportune to ask also the following question: To what extent and with what benefit is it possible to apply the CSR requirements in the wood processing industry? I will try to answer these questions in my paper.

1. FUNDAMENTALS OF THE CORPORATE SOCIAL RESPONSIBILITY

The Corporate Social Responsibility ("CSR") is meant as an initiative based on freewill and having no precise boundaries. The European Union Green Paper (2001) defines corporate social responsibility as a voluntary integration of social and environmental concerns into everyday operations of businesses and as interactions with the corporate stakeholders.

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Businesses affect with their activities and operations not only interests of subjects with economic activities (owners, shareholders, employees, suppliers, customers, etc.) but they directly or indirectly affect also the quality and living standards of all inhabitants of areas where they operate.

Although the most significant scope and principle of CSR is to meet all interested parties' needs it is not possible to ignore the important fact of being always important to start with oneself, inside one's own business, with own employees, suppliers, customers and, last but not least, with one's own clients.

Therefore, CSR is not only a way towards a moral development but also towards an economic development of the business as well as towards a profit increase, production expansion, modernisation of machinery and technical equipment, improvement of the production technologies, research and development of new products, cost reduction and, above all, towards achieving a higher satisfaction of all interested parties through loyal, qualified and motivated staff, but also it is a way towards increase in credibility of all interested parties.

CSR doesn't include just individual activities or occasional gestures and neither is it a marketing-driven initiative or an initiative presented as a part of public relations. It involves an entire complex of policies, practices and programmes that are integrated at all decision levels of the corporation and all their commercial activities.

CSR can be regarded from the following perspectives:

Customer - confidence in the quality of the product

Employee – confidence about a good care given by the corporation (emphasis is placed on occupational health and safety)

Public - confidence that the corporation is concerned about its good future (protection of human rights, environmental care, development of regions)

CSR consists of three basic pillars (areas) often referred to as 3P:

- Profit (economical pillar)
- People (social pillar)
- Planet (environmental pillar)

Tab.1. Three basic CSR pillars and their principles [1]

CSR economical pillar	CSR social pillar	Environmental pillar
Principles of corporate volunteer management, ethical codex	Corporate philanthropy and corporate volunteering	Ecological production, products and services
Rejection of corruption	Employee policy, health and safety of employees, education, retraining	Preservation of natural resources
Intellectual property protection	Equality between men and women	Investments into environmentally friendly technologies
Supplier and customer relations	Rejection of child labour	Environmentally friendly corporate culture (recycling, energy saving, etc.)
Customer relationship	Human rights	
Quality and safety of products and services	Employment of minority and endangered groups of population	

2. APPLICATION OF CSR IN THE WOOD PROCESSING INDUSTRY

Opportunities and benefits of CSR application in the wood processing industry can be regarded on the basis of the three pillars (areas) described in tab. 1.

Economical pillar – includes mostly activities comprised in the quality management requirements and also in the ISO 9001:2000 standard requirements. Supplier and customer relationships, customer relationships and quality assurance of products and services are concerned. A new approach from the point of view of CSR is rejection of corruption, ethical codex, intellectual property protection and principles of corporate volunteer management. Such activities are concerned that involve changes in attitudes and approach of leaders and subsequently, following the example of the leaders, those of other employees and interested parties. This results in a new corporate culture with respect for the whole society including its surroundings, the region and the state. Thus it is necessary, in application of this pillar in the wood processing businesses, to focus on the leaders themselves and on their attitudes towards all activities.

Environmental pillar – the wood processing industry is oriented towards activities so as their outputs have the minimum possible environmental effects on the society. Environmentally friendly production is fully respected and preservation of natural resources is a priority in the wood processing; investments are made into environmentally friendly technologies, and recycling is being adopted when creating the products' life cycle as well as after their use. Among other, legislative requirements as well as environment and ecology law, which define strict criteria and …, are fully observed during the production.

Social pillar – this pillar focuses on employees and on the relationship towards the external environment (the corporation's behaviour towards its surroundings).

3 BENEFITS FROM APPLICATION OF THE SOCIAL RESPONSIBILITY PRINCIPLES

By supporting the basic CSR principles a new level of relations between the business sphere, state authorities versus organisations and non-governmental organisations as the citizens' representatives.

It is typical for CSR that corporations are voluntarily trying to behave better towards people and towards their surroundings. The corporations don't maximise their profit at all costs but rather choose the way of optimisation.

Inclusion of CSR as a strategic investment into the basic business strategy and into the management principles can have a positive effect on the corporation, environment and also on the community where the corporation operates and, at

the same time, improve its image and economic results. This method doesn't focus only on profit generation for today and on the present position of a particular corporation but also on building up the corporation's position in the future.

Benefits from application of CSR principles to wood processing businesses:

- Strengthened credibility.
- Long-term sustainability of the corporation's development.
- Increased loyalty and productivity of employees.
- Build-up of reputation leading to a strong position in the market.
- Differentiation from the competition (competitive advantage).
- Opportunity for innovations.
- Reduction of risk management costs.
- Dialogue and building up a relationship of trust with the surroundings and the resulting mutual understanding.
- Direct financial economies related to ecological practice.

In this context, corporations should be particularly aware of significance of their own transparency towards their surroundings. They develop as well a cooperation with schools, which is motivated by the above mentioned effort to acquire quality staff; in some cases it involves carrying out joint research tasks. To a certain extent, involvement in favour of environmental protection is regarded as important.

Today's consumer is so far interested mostly in availability of the goods, their parameters and price. He or she is so far very little concerned about who is the producer of the goods, what conditions they are produced in, how the producer behaves towards the social and natural environment. This indicates, in contrast to developed countries, an insufficient development of the social culture and of the social involvement of customers.

CONCLUSION

Application of CSR principles is an important point of departure for a successful progress of the corporate competitiveness, for an improvement of the corporate culture, satisfaction of employees (including establishment of a safe working environment), creation of social programmes aimed at achieving a good quality of life, development of environmental attitudes for permanently sustainable development and satisfaction of regions and of the entire society.

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METHODS OF PROCESSING AND RECYCLING OF WEEE IN THE SLOVAK REPUBLIC

Abstract: Currently, the main priority of the company is to preserve, protect and improve the quality of the environment, protect human health and rational use of natural resources. Therefore the aim of society is based on the principle of precaution, prevention, to prevent environmental pollution. As an example in this paper highlight the process of recovery of WEEE, the development of sales of electronics and electronic volume effect for each period in the Slovak Republic.

Key words: disassembly, product, process, recycling.

INTRODUCTION

Electrical appliances are part of everyday life for decades. They facilitate our daily responsibilities at work and help us provide entertainment. Speed of their development increases and their prices are more accessible. This implies a serious problem about what with them at the end of their life. The more electrical and electronic equipment gets in the recycling process, the less natural resources shall be used to produce new and also causes the elimination of the amount of hazardous and health harmful substances, which are included in these appliances.

1 CURRENT SITUATION IN SLOVAKIA

Current recycling technology allows retrieving and using from 50 to 80% of materials containing WEEE depending on the type of WEEE. The Slovak Republic has to meet the conditions applicable in other European Union countries in 2008 – collect and assess 4 kg of WEEE per citizen per year. This means that each entity (importer and producer in Slovakia) will have to collect annually about 20,000 tons, a quantity which, according to statistics, the Recycling Fund in 2002, collected in Slovakia. Raise such an amount of WEEE in Slovakia is hardly feasible. This relates mainly to the prolonged use of electrical devices in Slovak households (for example, the average life of washing machines in Slovakia is three times higher than in developed countries of the European Union, which is about 13 years; audiovisual equipment is used on average twice as long as in the European Union, where consumers change old television to a new one after six years. On

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Slovak dumps also ends only a very small percentage of mobile phones and personal computers in comparison with the Netherlands or Germany). In developed countries, the European Union recorded sales of around 25-30 kg of new products per capita, in Slovakia's per capita of only 8.5 to 9 kg [10].

The following figure (Fig. 1) shows the collection of WEEE in each year and the resulting assumption for 2010.

As shown in the picture, there was a sharp increase in the collection of WEEE and it is expected that in 2010 this trend will grow. This shows how the new legislation is implemented in the field of environmental disposal of WEEE. Fig. 2 shows the forecast of WEEE in Slovakia by 2010.

Electronics and WEEE takes a relatively high growth rate. Regarding the sale of electronics, increase by 0.56 kg per capita can be expected in 2010, and thus indirectly resulting into the collection of WEEE, which we assume also to increase to 1.29 kg per capita. This trend can be generally assessed positively during the economic crisis.

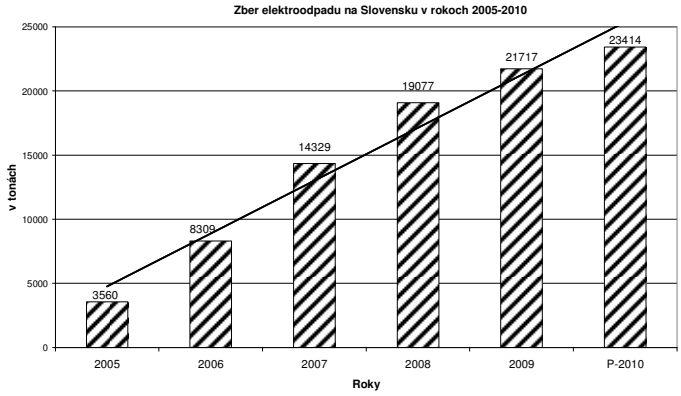

Fig. 1. Collection of WEEE in Slovakia in 2005-2010
Source: data of the Statistical Office of Slovak Republic

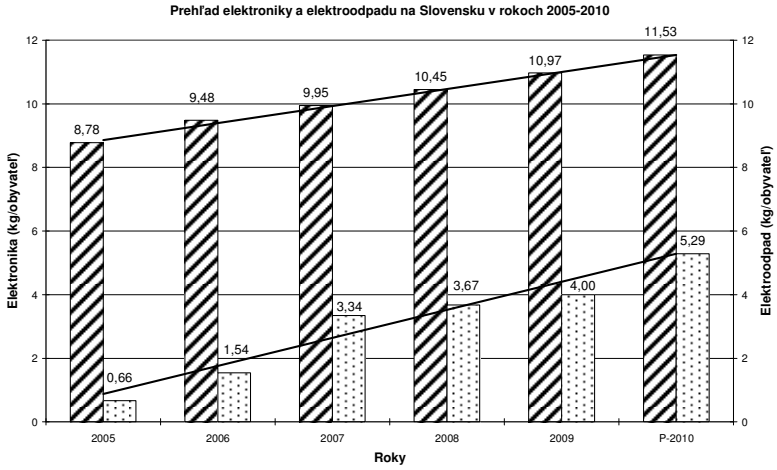

Fig. 2. The Future of WEEE for Slovakia
Source: data of the Statistical Office of Slovak Republic

2 PROCESSORS OF WEEE IN SLOVAKIA

The most important realized project is building of a processing capacity of a comprehensive system of recycling of WEEE ELEKTRO RECYCLING, s. r. o., Banská Bystrica with a target annual capacity of 5050 tons, which allows evaluating most of the electronic devices within the specified 10 categories of waste, except for refrigeration equipment. Since late 2006, the company also uses operation of refrigeration and air conditioning allowing subsequent recycling of materials and components of these products.

Other processors of WEEE are: BOMAT, s. r. o., Veľké Orvište (180 t/year), V.O.D.S., s. r. o., Košice (1800 t/year), ARGUSS, s. r. o., Bratislava (500 t/year), TAVAL, s. r. o., Ľubotice (500 t/year). Other processing companies are operating in this field: ENZO-VERONIKA-VES, a.s. Dežerice, EKORAY Námestovo and more. Currently in Slovakia following companies handle waste from light sources containing mercury (WHO): Detox, a. s., Banská Bystrica, ARGUSS, s. r. o., Bratislava, FECUPRAL, s. r. o., Prešov and company ENZO-VERONIKA-VES, a. s., Dežerice.

3 COMPOSITION OF WEEE

Environmentally friendly disposal of electrical and electronic waste (used cell phones, computers, home appliances and other equipment containing electrical parts) are now quite a serious problem.

Waste of precious metals are bought in (to the greatest extent of dismantling centers), and both for the purposes of trade and for purposes of processing, these wastes are divided into several groups. The most important divide factor is the contents of plastic (organic) and homogeneity of the precious metal content in the supplied material.

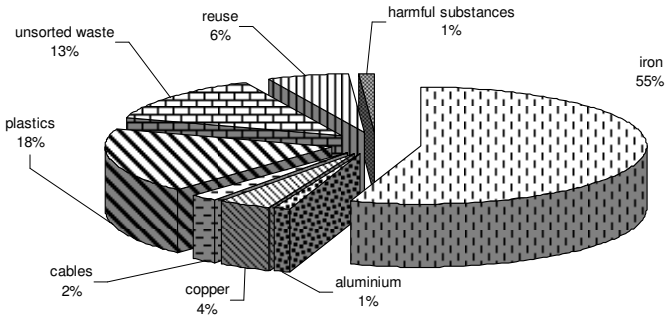

Fig. 3. The average material composition of small household appliances
Source: data of the Statistical Office of Slovak Republic

4 TECHNOLOGY PROCEDURES OF PROCESSING AND RECYCLING OF WEEE

Treatment and recycling of WEEE is normally made by manual dismantling followed by multi degree crushing, granulating and separation. The whole process is made up of several stages:

1. Manual removal - separation of hazardous components (battery, PCB capacitors, components containing Hg, engine parts, large aluminum, respectively. ferrous parts).
2. Rough treatment - treated scrap is fed into the grinding apparatus and crushed, and then any dangerous substances and metal components are sorted from the waist by hand.
3. Finishing - in this level is usually more crushing and granulation of material, for example, in the impact or crushers. Granules are sorted with the sieves in various sizes, coarser iron pieces are removed magnetically. Subsequently, in the separator (e.g., air, electromagnetic, etc.) for non-ferrous metals plastics from a mixture of non-ferrous metals are separated, which can still be sorted into heavy and light metals.

Outcomes tend to a different quality depending on the technology used. It depends on market opportunities to which final output should the technological process be directed. Whether the mixture of copper and aluminum is enough and there is a sale for it in the market, or whether because of the market the mixture has to be separated for further qualitative cleaner concentrate of copper and aluminum. The systemic view of the removal consists of the following actions [4]:

- ranking the dismantling operations (dismantling procedure),
- identification of actions to ensure removal (power operation, unsealing, grinding, etc.),
- clear definition of the orientation node (component) relative to other components before disassembly,
- transport product to preparatory, technology head, finger, respectively hand man.

Dismantling process consists of dismantling operations, by which final products are discussed in units (assembly nodes, groups) and those on components and materials. It is carried in the specific technically and economically purposeful sequence. Removing (in the organizational sense) includes preparatory, auxiliary and service activities that support the dismantling process and streamline. Dismantling processes is carried out in specific technical, technological, organizational and economic conditions. Dismantling operations may have the structure whose composition is given in Fig. 4.

Frequently it is the following logical sequence of activities: the administration of operational components of mounted tanks, their orientation, separation, sorting, clamping, self-assembling, removal of nodes and assembled units, inspection, palletizing to transport pallets etc. The logical structure of each activity may vary and depends on the specific application conditions of assembly product.

CONCLUSION

According to the literature [6] in 2010, the developed markets in the U.S., Europe and Asia will produce about 150 million new PCs, emerging markets around 566 million new computers. During this time, there will be 178 million new users in China and 80 million in India. In Mexico, 46% of the population will hold the computer. In Europe, disposal sites of electrical and electronic waste are widening even more. The European Union it represents about 6 million tons per year, about 16 kg per capita.

In the UK, such waste is estimated to be this year more than one million tons, a 13.5 kilograms per capita. According to Gartner in the past year 140.1 million PCs become obsolete and withdrawn in the world, this year 153.9 million is estimated and next 162.7 million units are expected. These alarming numbers should be an impetus for addressing this issue at the global level, including the position of "small" Slovakia.

The predominant trend is to design and produce electrical and electronic equipment by taking facilitates dismantling and recovery into account, in particular the reuse and recycling of waste electrical and electronic equipment (WEEE), their components and materials.

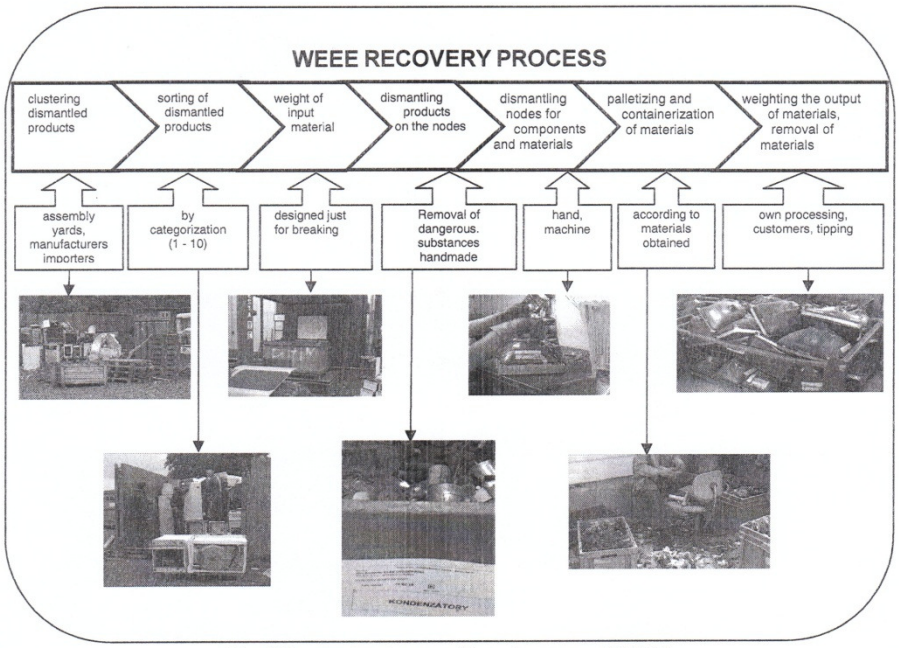

Fig. 4 The structural composition of recovery of WEEE
Source: custom processing

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***Włodzimierz Popyk*[68]**

INVESTMENT ACTIVITY OF WOOD PROCESSING AND FURNITURE ENTERPRISES IN THE YEARS 2000 - 2009

Abstract: The paper presents the assessment of the innovative activity of wood-processing and furniture enterprises in the years 2000-2009. Until 2008 an increase in expenditure on investment activity was observed. In the recent two years investment activity has slowed down due to economic crisis. Investment in wood processing industry was mainly aimed at technical and technological modernisation of production plants. Furniture industry is characterised with balanced approach to technical and technological investment and investment in buildings and infrastructure.

Key words: investment activity, wood working industry, furniture industry

INTRODUCTION

Effective functioning of wood processing enterprises in the present economic conditions: competition and ongoing globalisation processes is not possible without a proper investment policy of an enterprise. Technical and technological level and innovativeness of production are important factors determinating the development of industry in the light of European tendencies. Only through systematic investment activity aiming at modernisation of production plants and through proper investment in innovation Polish wood-processing enterprises will be able to match west-European companies.

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The level of moderning of the enterprises of individual branches in the wood sector is largely varied. The most modern machine park and relatively high level of technology used is observable in the furniture industry. Due to long-standing tradition and attractiveness, Polish furniture industry in the last decade has enjoyed considerable interest on the side of foreign investors. Flow of foreign capital to this sector made it highly competitive on the European market. A number of successful achievements improving the effectiveness of functioning of production plants and quality of production has been done.

High technological level is also present in the Polish wood based panels production, also due to, in large extent, foreign investment, accompanying the process of privatisation and restructurisation of the branch. New modern technologies, perceived as such from the European and world perspective, have been introduced in the production plants. Considerably low level of modernity is shown by the sawmill industry, where production machinery is worn out, high participation of handiwork and low level of processed product.

In the last decade in the European countries the number of production plants is getting smaller, and production capacity is being concentrated. Vertical integration is being observed, that is manifested by the creation of large industrial wood processing complexes, aiming at more comprehensive wood processing. Systematic concentration of production potential makes it possible to generate financial resources necessary to finance investment projects [3].

Against the developed EU countries, the Polish wood sector is much dispersed (with the exception of wood based panel and cellulose and paper industries). Fragmentation of the production potential of sawmills in Poland limits the possibility of gathering suitable financial resources for modernisation, possible supplies and seriously perturbs logistic processes in wood industry.

In the present economic conditions speeding up economic growth is impossible without accepting proper development strategy of industrial enterprises. The fact that revitalising economic activity mainly through supporting innovative activity and creating proper climate for investment becomes one of the priorities of the economic policy of the EU and Polish government is a positive phenomenon.

CHARACTERISTIC OF INVESTMENT ACTIVITY

Investment activity of wood-processing industry is directly dependent on the financial situation of an enterprise and the possibility of financing this sphere from external sources. In the Polish conditions so far the basic sources of financing investments are own resources. At present the importance of external loans of investments is rising. Accessibility and attractiveness of the offers of financial institutions both Polish and foreign ones is an important factor in the development of companies of the wood sector because of limited possibilities of financing investments from financial surplus.

The size of investment in wood processing and furniture industry in the years 2000-2009 is presented on figure 1.

Fig.1. Investment outlays in wood and furniture industry in the years 2000-2009

Source: author's evaluation on the basis of CSO's data [4,5]

In the years 2000-2007 increasing economic growth, good economic trends on the sale market for wood production, especially on the foreign markets had influence on the positive dynamics of the investment activity of wood processing and furniture companies. Investment spending in wood industry rose from 846.1 million PLN in 2000 to 1830 million PLN in 2007. In the same period furniture industry noted double increase of investment spendings. The value of investment rose from the level of 945.5 million PLN in 2000 to 1839 million PLN in 2007. High dynamics of investing in this period was influenced by systematic growth of demand for products on the home and foreign markets, finishing possibilities of meeting demand with maximum use of available production capacity and better and better financial situation of economic entities [1]. In the case of furniture industry, which financial condition depends, above all, on the results of sale on the foreign markets. Profitability of exportation is reflected by the capacity of generating capital, including investment funds. The increase of profitability of exportation due to good economic situation and demand for wood and furniture products on the external markets and advantageous rate of exchange allowed the entrepreneurs to generate proper financial surplus. It is directly reflected by the increase in investment activity of economic entities in the period of 2000-2007.

Reduction of investment activity was observed, however, in the years 2008-2009. Slowing down of the investment dynamics took place in the second half of 2008. In that year the level of investment in wood industry was on the level lower than in the previous year and amounted to 1600 million PLN, and in the furniture industry it was similar to the level obtained the previous year: 1811 million PLN.

Considerable fall in investment in both branches compared to the previous year was noted in 2009. To the largest extent expenditures of wood products was visible – lower by 54.7%. In the furniture industry the value of investment in 2009 was about 1180 million PLN, which means it fell by 37% compared to the level of investment in the previous year.

The main factor influencing the worsening of investment conditions was the economic crisis that hit the Polish economy in the second half of 2008 and which results are still felt. The Polish economy, so far developing at a fast rate began to slow down, which was reflected by falling dynamics of economic growth. Slowing dynamics was visible in demand on the internal market and in the foreign trade and also in the investment activity.

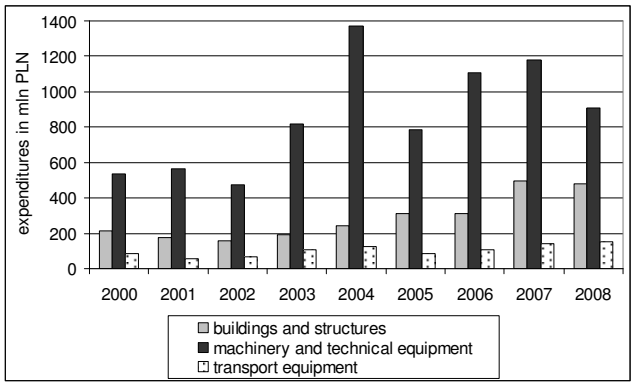

Fig.2. Structure of investment in wood industry in the years 2000-2008

Source: author's evaluation on the basis of CSO's data [4, 5]

The economic situation in Poland was not as negative as in other EU countries. Quite mild form of recession in the Polish economy, including numerous branches of the wood sector allowed maintaining some investment capability by economic entities.

Specifics of the development of branches of wood industry and their level of modernity are reflected in the type of investment expenditures. The structure of expenditure on investment in wood and furniture industry in the years 2000-2008 is shown on fig. 2 and 3.

In the structure of investment in wood industry there is a large disproportion between the dominating undertakings aimed at technical and technological modernisation - development of production potential and investment into buildings, facilities and transport infrastructure. Despite systematic growth of investment in wood industry in consecutive years there has been a tendency to lower the expenditure on technological equipment and favor investment aimed at development of production sites and sale points as well as transportation infrastructure.

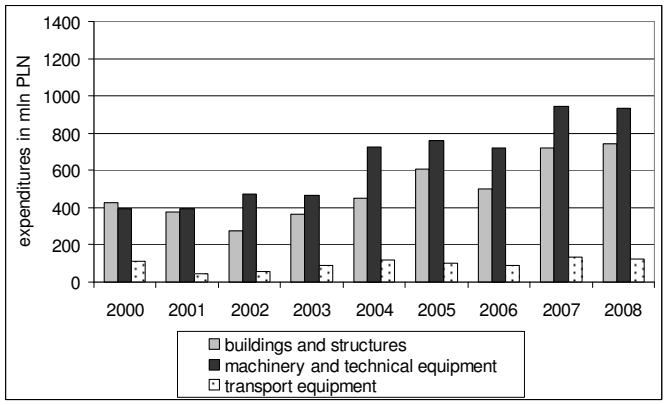

Fig.3. Structure of investment in furniture industry in the years 2000-2008

Source: author's evaluation on the basis of CSO's data [4,5]

An important difference concerning investment in wood industry may be seen in the structure of investment in the furniture industry. The furniture industry is characterised by quite balanced level of investment in machinery and equipment as well as buildings. Investment expenditure in the studied period rose from the level of 429 million PLN in 2000 to 742 million PLN in 2008 in the case of investment in technological equipment and from the level of 393 million PLN in 2000 to the level of 932 million PLN in 2008 in the case of investment in building infrastructure.

From the third quarter of 2008 a reduction in investment spending in all spheres of activity has been observed [2]. Still continuing world economic crisis with financial markets breakdown and poor market trends on goods markets may result in limited activity of investment economic entities in the coming years.

CONCLUSIONS

Among all the macroeconomic categories, investments are the most responsive to trend changes. In the recent decade, but before the crisis overwhelmed the world economy, the Polish wood sector noted systematic growth of investment in technical and technological equipment of production plants. It was especially visible in the primary processing of wood. In furniture industry, the structure of investment was more balanced. Not only technological equipment was purchased, but also infrastructural investment was developed.

The world economic crisis in the recent years influenced negatively the trends in the investment activity of wood processing enterprises of the Polish economy. The breakdown of the sale markets of the Polish wood and furniture

production considerably limited the possibilities of generating capital for investment. It also, according to numerous entrepreneurs, was a decisive factor when earlier planned investments were abandoned.

Still present recession of the world economy undoubtedly will limit the dynamics of growth of investment activities in the coming years. A possibility to use the EU funds aiming at revitalising investment activity and subsidizing specific investment activities will to some extent level off the fall in investments.

Limitation of investment activity in wood industry is connected not only with difficult conditions on the markets, reflected in the financial condition of a company, but also with lack of effective systems of finance management. Also, the level of utilization of the EU funds is quite low. Formal and organisational requirements to obtain these funds are often an obstacle impossible to overcome by entrepreneurs.

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Włodzimierz Popyk, Marek Tabert[69]

SOME ASPECTS OF INNOVATIVE DEVELOPMENT OF THE ENTERPRISES OF WOOD SECTOR

Abstract: The paper presents an analysis of the trends of innovative activities of enterprises in the wood-processing sector. Innovative activities in the wood sector to large extent are limited to modernisation of production lines. Lack of own resources is an important obstacle to innovation, as well as belief of entrepreneurs that those improvements are not efficacy. In the future innovative activities will depend to a large extend on the level of the utilisation of the EU funds within the targeted framework programs.

Key words: innovative activity, wood working industry, furniture industry

INTRODUCTION

Innovative processes in the present economic conditions directly influence the competitiveness of economic entities, and therefore the condition of national economy. The innovativeness of companies is reflected by real processes facilitating adaptation of the results of scientific and technological advances in practice. Numerous factors determine the willingness of entrepreneurs to innovate and introduce innovations. In this context innovativeness of an enterprise may be perceived as multi-faceted activity encompassing:

- creation of own R&D departments,
- cooperation with scientific and research institutions,
- modernisation of technical equipment,
- creation of new technologies and products,
- automatisation and robotisation of production processes,
- informatisation of production processes.

Innovativeness of companies is manifested not only by introduction of new technological solutions – innovations of products and processes, but also by innovative activities concerning company organisation, distribution process or marketing.

TRENDS IN INNOVATIVE ACTIVITIES

At present innovations are becoming one of the basic tools of initiating company development, and investment in innovative activities is an important factor, object of interest of European countries within their economic policy. Despite these efforts, innovative activity of wood-processing companies is still low. Awareness of the fact that an innovative process requires financing and involves risk connected with profitability makes entrepreneurs implement solutions that to some degree guarantee positive results. Low level of financing influences in a negative way the scope and quality of innovative processes. Allocation of financial resources influence technological character of innovations (fig. 1)

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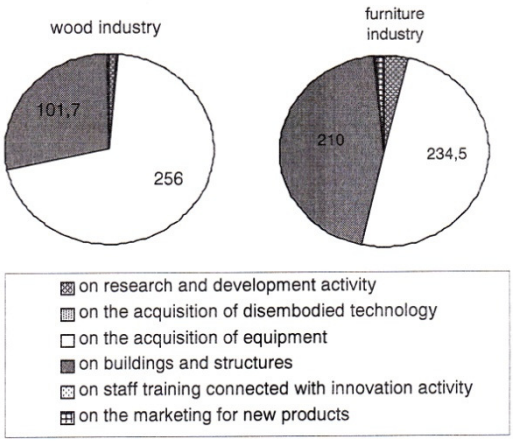

Fig.1. Expenditures on innovation activity in wood and furniture industry in 2008
Source: author's evaluation on the basis of CSO's data [1, 2]

In wood industry enterprises most of investment funds is used for purchase of machinery and technical equipment. Contrary to wood industry, expenditure on innovation in furniture industry is equally divided between investment in technical and technological equipment of production plants and investment in buildings as well as modernisation and development of production sites, distribution and sale points. Innovative activities in wood industry are, to a large extent, modernisation of production factors and not innovative activities as such, introducing new solutions concerning production or new products. Furniture industry, as far as innovative activities are concerned, show sustainable level of investment in process and product innovations. Investment in companies of this branch is still concentrated on the purchase of new or second-hand machinery and equipment or investment in production sites. Investment in new technologies of production is still rare. To a very limited extent own R&D activity or cooperation with scientific and research institutions are financed, while this direction of investment activities may become the source of supply with cheaper innovative solutions as compared with transfer of technologies from abroad.

In the present economic situation, aiming at limiting production costs becomes one of the basic aims of any wood industry enterprise. It demands of entrepreneurs to automatize production. In the recent decade in Poland systematic growth of production has been noted. In this period good economic situation on wood markets both in Poland and abroad was the driving force, adequate for development of production potential of industrial enterprises as well as modernisation of quite outdated and worn out machinery and production lines. In larger part investment in technological resources of wood processing and furniture companies takes part through the importation of new and second-hand machinery and equipment as well as production lines. The scale of the importation of machinery for wood processing in the years 2002 –2009 is presented on fig. 2. The most significant suppliers of technical and technological solutions for Polish wood processing companies are German, Italian and Austrian enterprises. The percentage of technological equipment in Polish wood processing companies purchased from Polish producers of wood processing equipment is small.

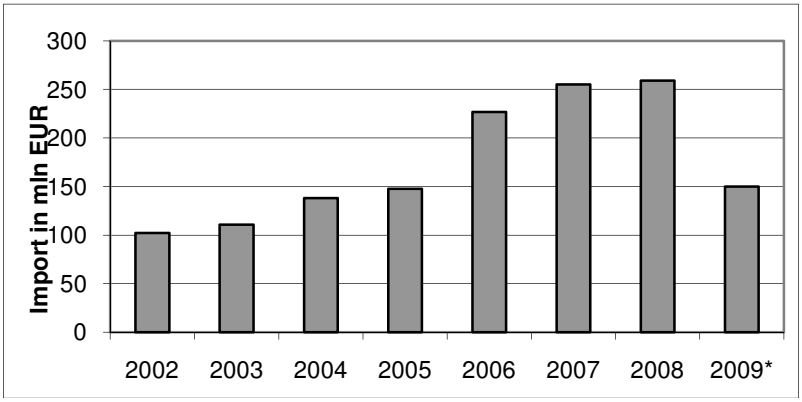

Fig. 2. The value of importation of machinery and equipment for wood processing in the years 2002-2009
Source: Wronowska 2010

In the period of 2002-2008 the value of machinery and equipment purchased from foreign producers was increasing systematically from the level of 102.3 million euro in 2002 to 259 million euro in 2008 [3]. Modernisation of industrial plants slowed down in the recent two years. The world crisis in this period negatively influenced the positive trends in investment activity of industry. The crisis on the sale market of the Polish wood and furniture production considerably limited the possibilities of generating capital for investment and also was the reason why numerous entrepreneurs decided to abandon formerly planned investments. Already in 2009, according to the estimations of specialists, a considerable fall in purchasing of imported technological equipment for wood and furniture companies was observed. In that year the value of imported machinery and equipment amounted to about 150 million euro, which constituted only 57% of the value of imported wood-processing machinery in 2008. Still continuing world recession undoubtedly will limit the dynamics of investment activities in the years to come.

A factor leveling off to some extent the falling tendency in the sphere of investment activity is undoubtedly a possibility to use the EU funds, aimed at revitalising innovative activities, and subsidies to specific investment activities. Wood companies need today modern technologies, ready to replace human work. Implementation of the above mentioned aims will require in the future not investment in single machines, but automated wood processing lines. This is demonstrated by trends visible on the technological equipment marked for wood and furniture industry.

EXTERNAL FINANCING

Permanent revitalising of innovative activities in the conditions of limited capacity of financing innovative activities by own capital in Polish wood processing enterprises to a large extent depends on the attractiveness of forms of external support. At present the most important instrument of supporting innovative activities are EU funds.

Operational Programme "Innovative economy" accepted for implementation by the European Commission in 2007 is an important document regulating innovative activities. Is financed from the structural funds of the European Investment Bank and the European Investment Fund. It is a programme aimed for first of all, entrepreneurs who would like to implement innovative projects concerning modern technologies of production, implementation of new products and ICT. The framework programme is especially aimed at strengthening the innovative possibilities of small and medium enterprises (SMEs). Funds allocated within this programme constitute a significant source of external financing also for SMEs of the wood sector. Enterprises may use the resources within a wide range of investments aimed at [6]:

- Innovative investmens
- Research and implementation projects
- Investment in ITC
- Technological loan
- E-services development
- Industrial design

To increase innovative activities of the Polish economy, the government adopted the "Innovative economy" Operational Programme [IEOP] that was developed within the *National* Strategic Reference Framework for the period of 2007-2013. The aim of this program is, first of all, direct financial support of innovative activities of economic entities, public administration and scientific and research institutions. Within this programme, financing of innovation has a systemic character. It concerns not only supporting specific activities in already operating enterprises, but also is aimed at creation of new innovative companies. It encompasses innovative activities not only process ones, that dominate in the Polish economy, but also product ones, as well as organisational and marketing. The implementation of the programme in the Polish conditions is supervised by the Ministry of Regional Development, and during implementation of individual priorities there participate other ministries, namely: the Ministry of Economy, the Ministry of Science and Higher Education, the Ministry of Interior and Administration. The direct support of innovativeness of enterprises is defined within the IV priority axis implemented by the Ministry of Economy [5]:

- Capital for innovation
- Investment in innovative projects
- Diffusion of innovations
- Polish economy on the international market

Successful implementation of this programme is a real chance for shortening the distance between modern, high-technology economic entities of west-European countries and Polish industrial companies, that in majority have outdated technical and technological machinery, low percentage of new products introduced on the market and management systems of low effectiveness.

The level of financial resources allocated for the development of innovativeness also reflects serious approach to solving the innovativeness problem. Poland allocated more than 9.71 billion euro for this purpose. Community assistance through the European Regional Development Fund (ERDF) amounts to €8.25 billion, and the remaining 1.46 billion comes from the national budget.

BARRIERS TO THE DEVELOPMENT OF INNOVATIVENESS IN THE WOOD SECTOR

Despite multi-directional activities within the EU and Polish policy aiming at the development of innovativeness of enterprises, the activity in this sphere in the wood industry is quite low. There is still observed low level of interest on the side of entrepreneurs to implement the full cycle of innovative activity: starting from research and development stage and finishing with introduction on the market new products or methods of production. The main obstacle to introducing innovations is still the limited possibility of financing them. At present the expenditure on innovative activity in the Polish wood processing enterprises is far from the level of financing in industrialised EU countries. Limitation of innovative activity of wood processing enterprises results not only from lack of financial resources for this purpose, but also from the negative perception by entrepreneurs of their own possibilities and the results of introduction of innovations. The most important factors in this respect encompass:

- insufficient own innovative potential manifested through lack or underdeveloped R&D base,
- lack of readiness to introduce up-to-date technological advances,
- lack of qualified staff to fulfill these tasks,
- low level of cooperation in R&D with external institutions,
- lack of sufficient information about the latest technologies and potential sale markets of innovative production.

Launching innovative solutions in enterprises is not possible without effective national policy treating innovativeness as the basic factor for competitiveness of Polish industrial enterprises. Profitable and rational solutions of the tax system are

of considerable importance in stimulating innovative activities of companies. This should be realised by tax exemptions for companies conducting R&D activity and introducing innovative technologies. Taking into consideration the fact that for Polish enterprises depreciation of fixed assets is an important source of financing their activities, suitable solutions in this sphere could positively influence the dynamics and implementation of innovative processes. For example, application of accelerated cost recovery in the case of high-technology machines would make it possible for companies that innovate to shorten the period of recovering the capital and accumulate own resources for further company development [4]. Accelerated cost recovery in a defined scope could influence considerably the dynamics of modernistation of production plants in wood industry, that in the case of wood industry are still to a large extent having outdated and used up technical and technological equipment.

SUMMARY

Limited financial possibilities of wood-processing enterprises and low level of utilisation of EU funds as well as careful approach to innovative investment from the side of entrepreneurs influence low level of innovativeness of enterprises of wood and furniture enterprises. Modernisation of wood-processing enterprises in the largest part takes place not through introduction of innovative solution but through modernisation of technological equipment through importation of new and second-hand machinery for wood processing and production lines.

The strategies of the development of innovativeness of the Polish economy should be based not only on assigning suitable financial resources, but also on creating proper climate for dynamic competition of innovative ideas as well as creating supporting mechanisms that would encourage the enterprises to introduce innovations in their processes of production. The success of these processes in larger part depends on the state policy, its ability to set priorities and quick reaction in the sphere of legal regulations, including the tax system.

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BRAND MANAGEMENT

Abstract: From historical perspective, brand appeared in the 19th century. Its emergence is associated with the development of packaged products. Industrialization shifted the production of large quantities of household products from smaller local companies to centralized factories. The factories producing products of mass production were trying to expand the sales of their products to people who had previously purchased only the products from smaller local companies. The manufacturers of packaged goods from large factories had to convince the market about the quality of their products. We do live in a branded world. There is no doubt about it. We all make produce decisions every day. We probably all have certain types of products of which we like only one or two brands, while we buy other things based on what is on sale on a given day. This inclination to buy branded products is rooted in two basic things: recollection and satisfaction. We remember which one we like by brand name.

The concept of branding is so powerful that we now extend it to human beings as well. Have you heard people talk yet about the idea of the Brand Called You? That's right: People are now thinking that you had better become the brand manager of you, and soon. Say what? This brand thing is getting very close to home.

Key words: brand, name, segmentation, identity, process, quality

1. A SHORT HISTORY OF BRANDS

The word brand comes from the Old Norse *brandr*, meaning to burn, and from these origins made its way into Anglo-Saxon. It was of course by burning that early man stamped ownership on his livestock, and with the development of trade buyers would use brands as a means of distinguishing between the cattle of one farmer and another. A farmer with a particularly good reputation for the quality of his animals would find his brand much sought after, while the brands of farmers with a lesser reputation were to be avoided or treated with caution. Thus the utility of brands as a guide to choice was established, a role that has remained unchanged to the present day.

Some of the earliest manufactured goods in "mass" production were clay pots, the remains of which can be found in great abundance around the Mediterranean region, particularly in the ancient civilisations of Etruria, Greece and Rome. There is considerable evidence among these remains of the use of brands, which in their earliest form were the potter's

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mark. A potter would identify his pots by putting his thumbprint into the wet clay on the bottom of the pot or by making his mark: a fish, a star or cross, for example. From this we can safely say that symbols (rather than initials or names) were the earliest visual form of brands.

In Ancient Rome, principles of commercial law developed that acknowledged the origin and title of potters' marks, but this did not deter makers of inferior pots from imitating the marks of well-known makers in order to dupe the public. In the British Museum there are even examples of imitation Roman pottery bearing imitation Roman marks, which were made in Belgium and exported to Britain in the first century ad. Thus as trade followed the flag – or Roman Eagle – so the practice of unlawful imitation lurked close behind, a practice that remains commonplace despite the strictures of our modern, highly developed legal systems.

With the fall of the Roman Empire, the elaborate and highly sophisticated system of trade that had bound together in mutual interdependence the Mediterranean and west European peoples gradually crumbled. Brands continued to be used but mainly on a local scale. The exceptions were the distinguishing marks used by kings, emperors and governments. The fleur-de-lis in France, the Hapsburg eagle in Austria-Hungary and the Imperial chrysanthemum in Japan indicated ownership or control. (Interestingly, the chrysanthemum signifies death in Korea, intermittently over the centuries a Japanese colony.) In a similar fashion the cockleshell, derived from the legend attached to the shrine of St James at Santiago de Compostella in north-west Spain, a favourite medieval centre of pilgrimage when the holy places of Palestine were closed to pilgrims by the Muslims, was widely used in pre-Renaissance Europe as a symbol of piety and faith.

In the 17th and 18th centuries, when the volume manufacture of fine porcelain, furniture and tapestries began in France and Belgium, largely because of royal patronage, factories increasingly used brands to indicate quality and origin. At the same time, laws relating to the hallmarking of gold and silver objects were enforced more rigidly to give the purchaser confidence in the product.

However, the widescale use of brands is essentially a phenomenon of the late 19th and early 20th centuries. The industrial revolution, with its improvements in manufacturing and communications, opened up the western world and allowed the mass-marketing of consumer products.

Many of today's best-known consumer brands date from this period: Singer sewing-machines, Coca-Cola soft drinks, Bass beer, Quaker oats, Cook's tours, Sunlight soap, Shredded Wheat breakfast cereal, Kodak film, American Express travellers' cheques, Heinz baked beans and Prudential Insurance are just a few examples.

Hand in hand with the introduction of these brands came early trade mark legislation. This allowed the owners of these brands to protect them in law (indeed, the Bass "Red Triangle" trade mark was the very first registered in the UK in 1876, and the beaming Quaker, who adorns the pack of the eponymous oats, is now well into his second century). The birth of advertising agencies such as J Walter Thompson and NWAyer in the late 19th century gave further impetus to the development of brands.

But it is the period since the end of the second world war that has seen the real explosion in the use of brands. Propelled by the collapse of communism, the arrival of the internet and mass broadcasting systems, and greatly improved transportation and communications, brands have come to symbolise the convergence of the world's economies on the demand-led rather than the command-led model. But brands have not escaped criticism. Recent anti-globalisation protests have been significant events. They have provided a timely reminder to the big brand owners that in the conduct of their affairs they have a duty to society, as well as customers and shareholders [1].

2. ELEMENTS OF THE BRAND

This is a short definition of what a brand actually is:

A brand is an *identifiable entity* that makes specific promises of value.

That sounds kind of text bookish, so let's pull those words apart to see what they mean.

- ***Identifiable*** – you can readily separate one thing from others similar to it by some means. Quite often, this will be a word, colour, or symbol (a logo) that you can see.
- ***Entity*** – I even checked Merriam Webster's Online Collegiate Dictionary for you on this one, and it says that an entity is "something that has separate and distinct existence".
- ***Specific promises*** – This expression may seem a little odd, but not really. A product or service makes claims about what it can deliver to you. Those claims – whether fresh breath, on time delivery, a stress-free tax return, or a kinder, gentler dental visit – are promises.
- ***Value*** – Whatever you get has to be something that you care about to some extent. The basis logic is that if you live in an apartment in city, you probably assign little value to a tractor, no matter how many acres of land it can work in an eight-hour day. However, you may have a high value feeling for a dry cleaner who would delivery to your home. And the cleaner who promises to delivery between 7 and 9 o'clock at night, after you get home from work, has more value to you than one who only delivers during the day.

So when you look at these four components – identifiable, entity, specific promise and value – what kinds of things could be a brand? There are a lot of obvious items, such as shoes and tennis racquets. There are a lot of obvious services, such as accounting, temporary job placement, house cleaning, and lawn mowing. Beyond these, there is a whole world of branding opportunities for tangible things like those we mentioned and for things much more elusive – things you may have never considered before [5].

UNDERSTANDING THE ROLE OF BRANDS

If brands are so demonstrably powerful, and since the definition and benefit of brands embrace every type of business and organisation, the question to ask is why every business and organisation would not want to concentrate their resources, structure and financial accountability around this most important asset. Indeed, there is a clear need for organisations

to be consistently preoccupied with maintaining the sustainable competitive advantage offered by the brand. The clarity of focus that a strong brand positioning gives organisations will always create more effectiveness, efficiency and competitive advantage across all operations;

and from a pragmatic financial perspective, research among investment communities confirms that clarity of strategy is one of the first criteria for judging companies.

So why are brands sometimes not taken as seriously as the data show us they should be? There seem to be several potential explanations.

Lack of understanding

Perhaps the first and most obvious is a lack of full understanding among some senior managers about what successful branding really is. If branding is treated as a cosmetic exercise only, and regarded merely as a new name/logo, stationery and possibly a new advertising campaign, then it will have only a superficial effect at best. Indeed, if this "cosmetic" approach is applied in an effort to make a bad or confused business look more attractive, it is easy to see why these so-called "rebranding" exercises encourage such cynicism. Reputation is, after all, reality with a lag effect. Branding needs to start with a clear point of view on what an organisation should be about and how it will deliver sustainable competitive advantage; then it is about organising all product, service and corporate operations to deliver that. The visual (and verbal) elements of branding should, of course, then symbolise that difference, lodge it memorably in people's minds and protect it in law through the trade mark.

Terminology

The second explanation for why branding is sometimes not central in the corporate agenda seems to be to do with terminology. The term "brand" has now permeated just about every aspect of society, and can be as easily applied to utilities, charities, football teams and even government initiatives as it has been in the past to packaged goods. Yet there still seems to be a residual and stubborn belief that brands are relevant only to consumer goods and commerce. Clearly, this is nonsense when every organisation has "consumers" of some kind; furthermore, some of the world's most valuable brands are business to business, but that does not make them any less "consumers". However, rather than get deeply embroiled in the broader meanings of consumption, it is probably more helpful to talk about audiences for brands today. These can be consuming audiences, influencing audiences or internal audiences.

All of these audiences need to be engaged by the brand – whether it is a product, service, corporate or not-for-profit brand – for it to fulfil its potential. If there are still those who would say "yes, but why does it have to be called brand?", it is worth remembering that every successful business and organisation needs to be set up and organised around a distinctive idea of some kind. To distinguish itself effectively and efficiently from other organisations, it is helpful to have some kind of shorthand: visual or verbal symbols, perhaps an icon that can be registered and protected. To make up another term for all this would seem perverse, as branding is already in existence. Rather, it is worth exploring why some people and organisations might have this aversion or misunderstanding and tackle the root cause. In the case of some arts and charitable organisations, there can be a problem with commercial overtones; for commercial organisations working in the business-to-business arena, or in heavy or technical services, there may be concerns that branding feels too soft and intangible to be relevant.

With the former, it is a harsh truth of the new arts and not-for-profit worlds that they are competing for talent, funding, supporters and audiences, and need to focus their efforts and investment with the effectiveness and efficiency that brand discipline brings. With the latter, there is nothing "soft" about the financial value that strong branding brings, in all and any sector; nor is it "soft" to use all possible competitive levers to gain every customer in a hypercompetitive international market. Price will always be a factor in choice. But acting like

a commodity, rather than a trusted and differentiated brand, will eventually lead only to the lower-price road to perdition.

Ownership

The third area to examine is that of ownership within organisations. Whereas the more established consumer goods companies grew up around their individual brands, more complex and technical organisations may often be run by people who have little experience in marketing or selling. As a result, the brand may simply be regarded as the specialist province of the marketing team, or, since the visual aspects of brands are the most obvious manifestation, brand management may be delegated to the design manager. This is not to cast aspersions on the specialist marketing and design functions, since their skills are vital in maintaining the currency and aesthetics of the brand; however, unless the chief executive of the organisation is perceived to be the brand champion, the brand will remain a departmental province rather than the driving purpose of everyone in an organisation. Although marketing is critical in shaping and presenting a brand to its audiences in the most powerful way, brands and marketing are not the same thing. And as far as the need for attention is concerned, if the brand is the most important organisational asset, it makes rational sense for it to be the central management preoccupation. Business strategy is, or should be, brand strategy, and vice versa. Effective and efficient corporate governance is brand-driven governance.[3]

Tangible and intangible elements

The last area to cover in explaining any remaining ambivalence about brands relates to their particular combination of tangible and intangible elements. The tangible area is always easier, since today's senior business culture is still often happier concentrating on the tangible, rational and quantifiable aspects of business. As far as quantification is concerned, brands can certainly now be measured, and it is critically important that they are. If their financial contribution is not already self-evident, there are many formally recognised ways to put a hard and quantifiable value on them [2].

In terms of semiotics, brands have four levels:

1. *A utilitarian sign.* This is about the practical aspects of the product and includes meanings of reliability, effectiveness, fitness for purpose and so on.
2. *A commercial sign.* This is about the exchange values of the product, perhaps conveying meanings about value for money or cost-effectiveness.
3. *A socio-cultural sign*. This is about the social effects of buying the product, with meanings about membership of aspirational groups or about the fitness of the product for filling social roles.
4. *A sign about the mythical values of the product*. Myths are heroic stories about the product, many of which have little basis in fact.

The association of different values with the brand name can be extremely useful when researching the acceptability of a brand's image. The importance that consumers place on these values can be researched using focus groups, with a subsequent analysis of the key signs contained within the brand, and consumers can be segmented according to their responsiveness to these signs and their relevance to the consumer's own internal values.

2.1 Brand names

It is said that the first face of the brand is its name. With this in mind, it is not difficult to understand why name creation, especially for a brand that intends to cross geographic and cultural boundaries, is a challenge in itself.

When a new product has been developed, the producer will usually give it a brand name. This is a term, symbol or design that distinguishes one seller's product from its competitors. The strategic considerations for brand naming are as follows:

- *Marketing objectives.* The brand name should fit the overall marketing objectives of the firm.
- *Brand audit.* Is a comprehensive examination of a brand involving activities to assess the health of the brand, uncover its sources of equity, and suggest ways to improve and leverage the equity. In comparison to marketing audit, brand audit is a more externally, consumer-focused exercise that involves a series of procedures to assess the health of the brand, uncover its sources of brand equity, and suggest ways to improve and leverage its equity.
- *Brand objectives*. As with the marketing objectives, the overall intentions about the brand need to be specified.
- *Brand strategy alternatives*. The other ways of achieving the brand's objectives, and the other factors involved in its success, have a bearing on the choice of brand name.

Brand name can be protected in most countries by registration, but there is some protection for brand in that it is illegal to try to "pass off" a product as being branded when it isn't.

The brand names should have the following characteristics:

1) They should shock.
2) They should be alliterative.
3) They should connect to the product's positioning in the customer's perceptual map.
4) They should link to a visual image.
5) They should communicate something about the product, or be capable of being used to do so.
6) They should encourage the development of a nickname.
7) They should be telephone and directory friendly.

2.2 Visual and verbal identity

"*Visual identity*" is a recent term that was probably coined to avoid lengthy arguments about the meaning of "brand" versus "corporate identity". In the 1980s, the term brand migrated from soap powders and came to mean virtually anything on the planet with an ability to sustain an attraction or influence among people. Politics, countries, movements, artists, celebrities and educational establishments as well as companies

and chocolate bars all became brands. So brand came to mean more or less what had been described as corporate identity: the total experience offered by a company to its staff, customers and others, a heady and distinctive concoction of intangible promises and tangible attributes and benefits.

Visual identity is a component in branding – the part you see, obviously. As such it is an important part because what you see is more likely to influence you than what you are told or what you comprehend from an 80-deck slide presentation.

Visual identity comprises the graphic components that together provide a system for identifying and representing a brand. The "basic elements" of a brand's visual identity might comprise distinctive versions of the following [2].

- Logotypes
- Symbols
- Colours
- Typefaces

Verbal identity

Verbal identity's "basic elements" aim to make a brand's language distinctive. These might comprise the following:

- The name
- A naming system for products, sub-brands and groups
- A strapline
- Tone of voice principles
- The use of stories

2.3 Brand valuation process

To capture the complex value creation of a brand, take the following five steps:

- **Market segmentation.** Brands influence customer choice, but the influence varies depending on the market in which the brand operates. Split the brand's markets into non-overlapping and homogeneous groups of consumers according to applicable criteria such as product or service, distribution channels, consumption patterns, purchase sophistication,

geography, existing and new customers, and so on. The brand is valued in each segment and the sum of the segment valuations constitutes the total value of the brand.

- **Financial analysis.** Identify and forecast revenues and "earnings from intangibles" generated by the brand for each of the distinct segments determined in step 1. Intangible earnings are defined as brand revenue less operating costs, applicable taxes and a charge for the capital employed. The concept is similar to the notion of economic profit.
- **Demand analysis.** Assess the role that the brand plays in driving demand for products and services in the markets in which it operates, and determine what proportion of intangible earnings is attributable to the brand measured by an indicator referred to as the "role of branding index". This is done by first identifying the various drivers of demand for the branded business, then determining the degree to which each driver is directly influenced by the brand. The role of branding index represents the percentage of intangible earnings that are generated by the brand. Brand earnings are calculated by multiplying the role of branding index by intangible earnings.
- **Competitive benchmarking.** Determine the competitive strengths and weaknesses of the brand to derive the specific brand discount rate that reflects the risk profile of its expected future earnings (this is measured by an indicator referred to as the "brand strength score"). This comprises extensive competitive benchmarking and a structured evaluation of the brand's market, stability, leadership position, growth trend, support, geographic footprint and legal protectability.
- **Brand value calculation.** Brand value is the net present value (npv) of the forecast brand earnings, discounted by the brand discount rate. The npv calculation comprises both the forecast period and the period beyond, reflecting the ability of brands to continue generating future earnings [2].

2.4 Brand perception as a criterion for survival and quality.

For the customer, it is necessary to develop the trust in the ability of an organization to deliver the desired quality consistently and maintain it. General market requirements and customer specific requirements should be then transferred to pre-set specifications which are the basis for subsequent actions on the draft.

A product design should clearly and adequately reflect the quality requirements. However, it is necessary to take into account the specification of such quality characteristics, which are subject to a subjective assessment of the customer. According to the approach that everything that can positively influence the customer should be defined and accepted as a sign of quality, brand may also become a symbol of quality in some cases.

Research shows that there is a relationship between the perception of a brand and purchasing behaviour. It was verified that particular customers with better insight into a certain type of goods focus on particular brand when purchasing. The link to the brand, especially in the situation when the products are essentially the same, is obvious here. In addition to identifying the product, the brand communicates its image, helps in decision-making and also leads to certain consistency in the shopping behaviour.

To understand the brand in relation to customer, need analysis of the following issues is inevitable:

- basic values of the product categories regardless the brand;
- individuality and authority in the major labels in a given product category;
- links with other elements of the communication mix within the analyzed brand and the competition brands [4].

The brand exploratory should uncover the current knowledge structures for the core brand and its competitors as well as potential sources of brand equity. This information can provide the basis for the brand positioning.

Brand positioning requires *analysis* of that information to determine the *desired* brand knowledge structures – *desired* brand awareness, brand image, the necessary points of parity and points of difference with respect to competitors.

Moving from the current brand image to the *desired* brand image typically involves decisions to add new associations, strengthen existing ones, or weaken or eliminate undesirable ones in the minds of consumers.

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BUSINESS PERFORMANCE MANAGEMENT OF SLOVAK COMPANIES DURING THE PERIOD OF GLOBAL ECONOMIC CRISIS

Abstract: On the base of contemporary stage of controlling utilization in business and based on analysis of theoretical and practical approaches we present chosen methods, models and techniques of business controlling. Our primary interest focuses not only on theoretical basis of solution but also on practical application under conditions of Slovak companies, during financial and economic crisis. EVA is both a measure of value and also a measure of performance. The value of a business depends on investor's expectations about the future profits of the interprise. Stock prices track EVA far more closely than they track earnings per share or return on equity.

Key words: Business Performance, Controlling, Costing, Management, Performance measurement, Planning, Recesion

INTRODUCTION

Latest quantitative macroeconomic indicators and results of Slovak economy show negative development in more fields (negative economic growth measured by GDP, growth of unemployment, growth of budget deficit and deficit of public finance). But on the other hand we can say that reached results and its decline is comparable with development in V4 countries.

New Euro currency accepted just in the time of world economic crisis can be mentioned as one important feature which highly differs Slovak economy conditions from those in neighbour countries. Many studies and analysis present that Euro acceptance had many positives from the long run period (more foreign investment, currency stability, business area stability, elimination of currency differencies, simplification of trade, decreasing of transaction costs, lower capital costs, higher transparency of prices etc.). As a negative aspect of Euro it was considered the lost of independent monetary policy of NBS and also higher level of inflation after currency acceptance (temporal effect) and single costs of currency transition.

Contemporary development of Slovak economy under above mentioned non-standard conditions can be characterised that we can see partial and at the same time integrated impact of two decisive important factors:

- world financial and economic crisis,
- new Euro currency acceptance.

New currency accepted just during world crisis causes that many positives and negatives, presented in studies, have not expressed till now or they have different or neutral or contrary impact. As an example we can mention relatively low level of inflation (but it can be transformed into negative deflation) after Euro acceptance because of financial and economic crisis influence. On the other hand we can mention stability of exchange rate which seems to be during these crisis years (currency devaluation in other countries) as a handicap for Slovakia and its chosen branches (retail market, tourism, hotels and restaurants) compared to other V4 countries (Czech republic, Poland, Hungary). When we look at the same problem by the eyes of Slovak consumers, we can see advantages of new currency just now in the times of world economic crisis. There are the following advantages: prices transparency, simplification of tourism and travel, cheaper foreign products and services as it was supposed before conversion into Euro currency. But because of crisis, there are eliminated positive impacts as higher foreign investments and stability of business environment. The same impact (positive or negative) as before Euro acceptance we can specify the following – elimination of currency differences, simplification of trade, decreasing of transaction costs, the lost of independent monetary policy of NBS, single costs of currency transition.

In spite of the above mentioned factors impact we can specify the following decisive negative aspects caused separately by the world financial and economic crisis:

- strong decline of Slovakia export caused mainly by demand crisis in the world markets,
- lower utilization of production capacities within Slovak companies in the chosen branches (automotive industry, engineering, wood processing industry, metallurgy, chemical industry, electrotechnical industry, shoemaking industry etc.)
- lower foreign capital input and lower investment consumption,
- growth of unemployment in the chosen branches, decline of hoseholds consumption, total growth of unemployment,
- decline of investment and consumers loans,
- decreasing of tax income for national budget and its higher deficit.

Given negative trend of the chosen Slovak economic indicators further grow worse because of Euro currency just now, during world financial and economic crisis.

As the decisive influence of both impacts it can be specified the following:

- strong decline of Slovak retail market revenues as a result of consumers foreign purchases which was caused by the decline of ability co compete with prices. This was affected by the both impacts:
  a) new currency acceptance – assessment of the fixed exchange rate SKK/EUR in 30th June 2008 (before new currency introduction). This exchange rate was 15% below the central parity,
  b) world financial and economic crisis – strong decline of national exchange rates compared to EUR in the neighbour countries: Czech republic – 10%, Hungary – 20%, Poland – 30%

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- lower capacity utilization in the chosen branches (retail market, tourism, hotels and restaurants)
- decreasing of budget incomes and its higher deficit because of lower VAT and consumption tax incomes,
- unemployment growth in the chosen branches.

5. CHOSEN MANAGERIAL METHODS AND THEIR APPLICATIONS EFFECTS DURING THE PERIOD OF ECONOMIC CRISIS IN BUSINESS PERFORMANCE MANAGEMENT OF COMPANIES

Fundamental changes in macro and micro environment impact managing process of companies during last years. These changes have initiated modification of traditional managerial systems, conceptions, methods and tools as well as necessity to generate new untraditional managerial techniques. Therefore, there are applied and designed new progressive approaches in the field of economics and business planning. Our project focuses mainly on the field of measurement and planning new and modern performance indicators, on basic knowledge about the latest approaches and methods how to manage them as for example: business management and planning oriented on processes (Activity Based Management, Activity Based Costing), Balance Scorecard (BSC), Shareholder Value Planning and Benchmarking, system of KPI (Key Performance Indicators), EVA conception (Economic Value Added) and many others. Further research and application of the above mentioned methods under conditions of the period of economic crisis seems to be inevitable condition for their survival and successful progress.

Except of that, during last years of companies´ management is impacted by the world financial and economic crisis and by its effects. These above mentioned and many other changes have initiated modification of traditional managerial systems, conceptions, methods and tools for companies managing as well as necessity to generate new untraditional managerial techniques.

Significant Slovak authors of publication "Strategic planning"[72]competently argue about importance and effects of global changes on strategic planning under conditions of world economy globalization. There are also other factors which impact content and methods applied in management of industrial companies, e.g. move from central planning economy to market economy, level of decentralization in companies´ management, latest paradigms in management e.g. integrated management, strategic oriented management, move from functional oriented model to process management, efforts to implement controlling oriented approach and logistics approach into the system of management. And because of that also in the field of economics and business planning there are launched and applied new and more progressive approaches, e.g. in the field of measurement and planning of modern performance indicators. Continuously, there are arising new knowledge about progressive approaches and methods of their optimization, e.g. business management and planning oriented on processes (Activity Based Management), Balance Scorecard methodology, Shareholder Value Planning and Benchmarking, system of KPI (Key Performance Indicators), EVA conception (Economic Value Added) and many others. Further research and application of these above mentioned methods in wood-processing companies seems to be inevitable condition for companies survival and successful struggle with competition.

Nowadays, it is necessary to create complex integrated model for the most accurate performance measurement. Also it should be searched ways and reserves under given economic conditions by taking into account most effective utilization of production inputs. As it is well known, in the past, the most of methods focused mainly on financial performance of a company which can be evaluated by various methods, criterions and indicators. But companies mostly use only partial approaches of performance evaluation. It misses complex approach which would enable to take into account also many important nonfinancial strategic parameters of the future performance. As the most applied methods can be mentioned the following:

- parallel systems of indicators
- pyramid systems of indicators
- rapid creditworthiness and bankruptcy indicators
- indicators based on the theory of managing the value formation
- approaches based on accounting performances, etc.

Many papers of specialists on national and international conferences confirm that this problem is very topical and actual. International scientific conference titled "New theory of economics and management" was held in Prague, VŠE, Faculty od Business Administration, October 2006. Almost one fourth of all papers focused on actual problems of companies performance and modern methods of its management. Among others we can mention one method – Balance Scorecard. Important papers dealing with this topic presented world reputed American authors: Kaplan, R. S., Norton, D. P.[73] or German author with Hungarian roots Péter Horváth[74].

We can also mention Czech authors: married couple of Neumaier who have proposed financial oriented model of performance measurement and benchmarking INFA for the Czech industrial companies and services. In the future they want to focus on strategic oriented dynamic scorecard (DS INFA) – see Neumaierová, I., Neumaier, I.[75]. As an important contribution to the given topic we can consider also results contained in the work of Czech authors Pavelková, D., Knápková, A.[76].

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As the most important effects of the implementation above mentioned methods for the social and economic practice in Slovakia we can consider the following outputs:

- Design of the complex evaluation model for the measurement of companies performance with the sight on particular areas: economic, strategic, area of business processes.
- Design of the complex reporting system for traditional and untraditional indicators of companies performance in areas: financial-economic, investment, strategic and area of business processes.
- Design of the complex managerial methodology focused on increasing of Slovak companies goodwill which is expressed on the base of EVA indicator (Economic Value Added) by the goal-oriented managing of traditional and untraditional indicators for the performance measurement in the following areas: financial-economic, investment, strategic and in the area of business processes.
- Analysis of values reached in Slovak companies during latest years in traditional and untraditional performance indicators for the areas: financial-economic, investment, strategic, business processes.
- Benchmarking of values reached in Slovak companies in traditional and untraditional performance indicators for the following areas: financial-economic, investment, strategic, business processes. Classification of companies into particular performance groups from the point of view of reached performance parameters.
- Design of alternative strategies focused on increasing of complex performance by the performance managing within financial-economic, strategic and business processes areas.

By the above mentioned we expect performance increasing of Slovak companies what will expressed in the transformation process, in the growth of value added, in the higher contribution of companies to the Slovak GDP and finally in the improvement of competitiveness in the EU markets.

2. ECONOMIC VALUE ADDED AS PERFORMANCE MEASURE

In the early 90´s, value-based performance measures, such as Economic Value Added have gained immense popularity. Economic Value Added, commonly known by its registered trademark EVA, is already used by more than 250 large companies. The literature reports that more and more large companies are deciding to adopt the EVA performance measure as the guiding principle for their corporate policy. Frequently, EVA is regarded as a single, simple measure that gives a real picture of stockholder wealth creation. The reports claim that implementing an EVA policy triggers a company's stocks to rise and its leading managers to act more like owners. In addition to motivating managers to create shareholder value and being a basis for management compensation, value based performance measurement systems have further practical advantages. An EVA system helps managers to make better investment decisions, identify opportunities for improvement and consider short-term as well as long-term benefits for the company. Furthermore, studies suggest that EVA is an effective measure of the quality of managerial decisions as well as a reliable indicator of a company's value growth in the future. In summary, constant positive EVA values over time will increase company value, while negative EVA implies value depreciation [2].

EVA is a measurement tool that provides a clear picture of whether a business is creating or destroying shareholder wealth. EVA measures the firm's ability to earn more than the true cost of capital. EVA combines the concept of residual income with the idea that all capital has a cost, which means that it is a measure of the profit that remains after earning a required rate of return on capital. If a firm's earnings exceed the true cost of capital it is creating wealth for its shareholders.

Recognized by economists since the 1770s, residual income is based on the premise that, in order for a firm to create wealth for its owners, it must earn more on its total invested capital than the cost of that capital. Notationally, residual income (RI) for period *t* is:

$RI_t = NOPAT_t – WACC_t \; x \; CAPITAL_{t-1}$

To compute residual income, begin with net operating profits after tax (NOPAT) and subtract the total cost of capital measured as the weighted-average cost of capital (WACC) times the total invested capital (CAPITAL).

NOPAT can be defined as a result of the following formula:

NOPAT = EBIT x (1 – t)

where EBIT is Earnings Before Interest and t is tax rate. NOPAT includes both effect reached by using assets of a company and interest paid to creditors.

CAPITAL represents long term invested capital. It is sum of equity and invested capital. The other way of defining capital is to summarize fixed assets and net working capital (net working capital = current assets – short term liabilities). Both approaches offer the same results.

In EVA model Weighted Average Cost of Capital (WACC) is used for calculation of economic value added and as a discount rate transferring future values of EVA to present value to the date of valuation.

$WACC = rd \; (1-t) * D/C + re * E/C$

In this formula:

r_d is the cost of debt
r_e is interest for external capital provided
t is income tax rate
C is value of balance sum
D is debt
E is equity

A basic construction of EVA measure is clear from following formula:

$EVA_t = NOPAT_t \; - (WACC_t \; x \; C_t)$

If EVA > 0 than we can say a company is successful. This is the only case wealth of shareholders increases because they gain more than what their original investment was. The service to creditors is included there, too. In case EVA = 0 a company produced just as much as it was invested and EVA < 0 leads to destroying of wealth of shareholders.

Developed EVA to help managers incorporate two basic principles of finance into their decision making. The first is that the primary financial objective of any company should be to maximize the wealth of its shareholders. The second is that the value of a company depends on the extent to which investors expect future profits to exceed or fall short of the cost of capital. By definition, a sustained increase in EVA will bring an increase in the market value of a company. This approach has proved effective in virtually all types of organizations, from emerging growth companies to turnarounds. This is because the level of EVA isn't what really matters. Current performance already is reflected in share prices. It is the continuous improvement in EVA that brings continuous increases in shareholder wealth.

Finally, to help you consider whether economic profit is an appropriate performance metric for the company you are evaluating, we have discussed the following strengths and weaknesses (tab. 1).

Tab. 1. Strengths and Weaknesses of EVA [2]

Strengths	Weaknesses
• If you had to rely on only one single performance number, economic profit is probably the best because it contains so much information (mathematicians would call it "elegant"): economic profit incorporates balance sheet data into an adjusted income statement metric. • Economic profit works best for companies whose tangible assets (assets on the balance sheet) correlate with the market value of assets -	• Although some proponents argue economic profit is "all you need", it is very risky to depend on an single metric. • The companies least suited for economic profit are high-growth, new-economy and high-technology companies, for whom assets are 'off balance sheet' or intangible.

CONCLUSION

Fundamental changes in macro and micro environment impact managing process of companies during last years. These changes have initiated modification of traditional managerial systems, conceptions, methods and tools as well as necessity to generate new untraditional managerial techniques. Therefore, there are applied and designed new progressive approaches in the field of economics and business planning. Our project focuses mainly on the field of measurement and planning new and modern performance indicators, on basic knowledge about the latest approaches and methods. EVA is both a measure of value and also a measure of performance. The value of a business depends on investor's expectations about the future profits of the interprise. Stock prices track EVA far more closely than they track earnings per share or return on equity.

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NEW APPROACHES IN THE LOGISTICS MANAGEMENT OF PRODUCTIVE COMPANY

Abstract: Management of logistics as a subsystem of business management starts to use more comples tools as BSC, ABC and SCORmodel. This paper shows onthe necessity of change the system of company´s managing on process managing what is necessary condition for the above mentioned tools application.

Keywords: management, logistics, company, production

1. INTRODUCTION

Searching the appropriate tools for the management of supply chainsis another big issue within logistics.

Some authors call for the creation of complex logistics tools but on the other hand they analyze only managerial levels(top level, configuration level, proces element level) without process dependence because they come from classical,functional,non-processing managerial system.

Process management is not only division of contemporary systems into processes and elements(activities) but i tis mainly about the change of managerial approach where we can mention 3 typical features which are different from functional approach:

- Orientation of a company on processes
- Lateral management
- Philosophy of knowledge based employee.

Processing orientation started in matrix organizational structure and then came through implementation of TQM. The highest level of this development is reengineering. When it is successfully implemented into practice it has 3 necessary features: right and complex process company´s orientation not onlyon production but also including managerial processes, lateral managing and utilization of knowledge based employee.

Lateral management comes from the knowledge that performance which result is value added for a customer doesn´t flow up and down inthe scale of functional hierarchy but it flows horizontally or vertically through organizational divisions. Such a working performance is not managed. Lateral management requires creation of autonomic or semi-autonomic teams which fulfill majority of managerial functions and responsibilities from the traditional hierarchal pyramid. Process teams require couching.

Employee in process oriented organization musthave knowledges: wide knowledge and experiences, handling the whole process and not only his/her operation, fast and independent decision-making,self-control and self-managing, permanent training etc.

Process oriented system must be mentioned as a flow of working performance and activities which has explicitely assessed begining and finish and between them particular number of steps. A flow comes from one performance place to another to meet the end of the whole process. Every process hasits “owner” who is responsible for its running. Process teamswith high competence and independence in decision making are motivated by the result – value added. Processed based organization is flexible and highly oriented on a customer.

2. PROBLEMS WITH LOGISTICS UNDERSTANDING

The first wrong step why logistics is wrong understood is caused by poor translation of the book: SCHULTE, CH.: Logistika. Victoria Publishing, Praha, 1994 where the logistics is divided on supply logistics, production logistics, distribution logistics, business logistics etc. But we emphasize that logistics is integrated system which monitors, plans and analyze material and related information and value flows. Theoretical segmentation of logistics according to transformation process is illogical. More suitable is to use terms like logistics in supply, in production, in distribution etc. These terms don´t break up logistics but they point at particular solutions within integrated logistics system.

The second wrong step lies in logistics organization in companies. It is repeated the same mistake which obstructed implementation of modern managerial systems without adequate competences and responsibilities. We can see mainly function of logistics only at particular divisions where they manage local warehousing or administration activities. Only some companies understood coordinated and integrated function of a logistics, necessity of reengineering changes and mainly restructuralization changes of processes and further reconstruction of an organizational structure. Implementation of logistics principles requires rebuilding of a company according to process oriented organization model.

The third problem is unwillingness to realise given changes because they bring regulation and discipline into company´s system what is basic point of effective employee´s work. And this is hard to understand and accept for traditionally thinking leaders.

Another possible problem in the logistics goals understanding lies in failure of focusing on common company objectives coming from strategies and in failure of teamwork. Problem to see “forest and also trees” requires handling of systemic thinking. Only particular detectionof failures,particular optimization without taking into account the complex system never would lead to company´s development.

Reasons for unwillingness to implementation of new managerial approaches in logistics describes LENORT, R. / 1 / :
1. it must be mentioned that managing of supply chain represents the highest level of logistics principles application in the practice but only minority Slovak and Czech companies reaches this level;

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2. managerial system, analysis and evaluations of supply chain performance works with high level of abstraction which enables to run given activities in the whole scale.This fact can invoke fear that simulation results will not be the same as the reality is.

3. COMPLEX TOOLS FOR THE LOGISTICS MANAGING

Traditional managerial tools for the increasing logistics performance – higher services to a customer, costs and profitability of assets do not always focus on analysis and optimization of the whole supply chain. More suitable are the following tools :

- Balanced scorecard (BSC)
- Activity Based Costing (ABC)
- Supply chain operations reference (SCOR)

SCOR model should be mentioned and apply as the complex basic model suitable for the extension by more detailed models. Basic model is presented in Figure 1.

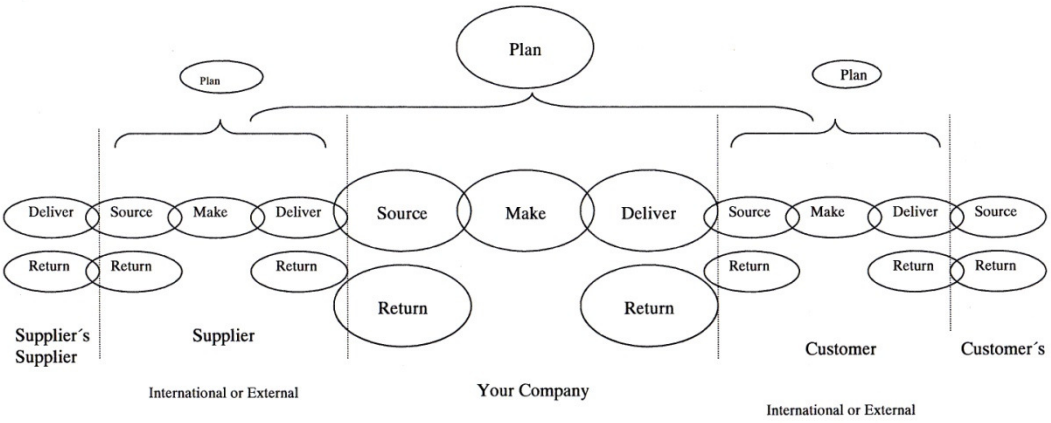

Figure 1. Basic model of supply chain

Managers must understand dependances among all managerial functions and necessity to coordinate them. Appropriate coordination could be assured by controlling. Business controlling can be described as a sub-system for the coordination of business management and its part is also logistics system.

New managerial tools and methods under process changed conditions can increase company´s performance efficiency.

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Władysław Strykowski[78]

FURNITURE CLUSTERS IN EUROPE – SOME ISSUES

Abstract: This paper presents issues connected with operation of furniture clusters in EU with a special emphasis put on establishment of clusters in Poland. The paper also discusses potential created when enterprises form a cluster. Some case studies are given to provide a comparison between clusters operating in various European countries.

Keywords: clusters, furniture industry

INTRODUCTION

Polish furniture industry is capable on the one hand of building a positive image of Poland in the eyes of foreign customers, and on the other of achieving basic goals of producers. Already the furniture industry is a Polish national industry, and in recent years Poland has gain the position of an international furniture power. Keeping the above in mind, this paper analyzes five EU states with the view of presenting operation of furniture clusters.

1. FURNITURE INDUSTRY IN EUROPE

1.1. Internationalized markets and global competition

The furniture industry is an economically important sector in EU-27 area providing employment for 1.4 million people (compared with 90 000 in the three major districts of North Carolina, California, and Mississippi taken together in US) and generating a turnover of 118 billion Euros in 2004 (UEA, 2006; Acharya, 2009).

Furniture manufacturing is an important industry in some European countries, but covers less than 4% from the aggregate manufacturing industry production value (UEA, 2006). That fact can be explained by national concentration of furniture production. Current “Mega sites” are found in UK, Germany, Italy, Austria, and Poland. Future “Mega sites” are

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expected to be set up in Germany and Poland. And furniture clusters are established in UK, Spain, Denmark, Sweden, Germany, Italy, and France (Buehlmann et al., 2003).

The EU furniture industry is highly clustered both nationally and regionally. The four largest furniture producers, i.e. Germany, Italy, France and Spain, covering over 50 % of the total EU production have strong furniture clusters. The same is true also for the next ones, i.e. Poland, UK, Denmark, and Sweden. Furniture sectors are dominated by SMEs. European upholstered furniture producers as well as some their component producer partners have been able to preserve their competitive advantages because of little positive economies of scale. Enterprises in those product groups mostly have suffered from competitive pressure from neighbor low cost producers. Therefore, the upholstered furniture segment has remained SME dominated as an industry.

The producers of standard furniture can and frequently benefit from the design segments. The EU furniture export markets are characterized by demand uncertainty with increasing demand volatility. Furniture mass producers aim to maintain flexible supply portfolio to avoid the dominance of single contractor. Vertical flexible relations are supplemented through horizontal relations. There are large enterprises with multi national production plant network on one end, and single carpentry workshops on the other end. The internal distributions in countries are not the same but in all furniture industry are important from the viewpoint of rural employment. Component producers and finished furniture assemblers frequently manage in non-urban industrial districts. Co-location of producers, often in geographical areas, is a basis for cluster creation. Clusters frequently have industrial district structures with local labor markets. These clusters provide potentials in the EU industry due to general flexibility and high adaptability to market changes among SMEs. Furniture industry enterprises can provide quick deliveries and flexible products and services by applying vertical and horizontal network relations. These networks can provide support in start ups and spin-offs if in this way they can benefit cluster development (Maskell & Lorenzen, 2003).

In Europe shares of national furniture industries is the biggest in Germany (22%), Italy (22%), France (10%), Spain (9%), UK (9%), and Poland (4%) (UEA, 2006).

1.2. European furniture industry clusters

European furniture craftsmanship has long traditions and furniture industry have strong clusters in Europe. Chair manufacturer cluster in Northern Italy and design oriented furniture cluster in Denmark are maybe the best known examples globally. Much of the entrepreneurship in furniture production is still today concerned with small and medium-sized enterprises (SMEs). Much industrialized processes have gradually grown and substituted high skilled carpentry that was strong up to 1960's (Maskell, 1996; Maskell & Lorenzen, 2003; Hogberg, 2007; Buehlmann & Schuler, 2009). The dominance of domestic market production and business has characterized this industry up to 1980's. Only design furniture production and export trade are exceptions. Furniture industry enterprises in EU face strong competition from low cost countries as new and efficient production process technologies are available in the commercial markets and documented key technical knowledge is globally transferable. Major industrial process machinery is traded without geographical or cultural limitations. Enterprises in high cost countries must create new competitive advantages to stay in business because according to Drew (1997) an organization's competitiveness and ultimate survival depends on its ability to develop and launch new or innovative products and services.

Domestic market dominance that earlier supported regional furniture clusters and their individual furniture enterprises in EU countries, but also in US, have gradually disappeared (Grushecky et al., 2006; Buehlmann et al., 2003; Schuler et al., 2007). Grushecky et al. (2006) also noted that continued exploration of new markets, adding more value to current product offerings, and continued exploration of export market opportunities are essential for furniture industry.

The regional furniture clusters, with their historically developed structural features, have supported growth among individual enterprises and groups of enterprises with specific product orientation or that in the whole cluster (Acharya et al., 2009). Growth modes are much dependent on a) the competitive and industrial structure and b) the value chain orientation among the major enterprises. These enterprise concentrations have easy access to key raw materials or skilled employees or both. Cluster enterprises frequently form local production networks with subcontractors, partners and/or horizontal co-operation between operations on the same level of production chain. Many of these networks work like large units of a big enterprise. A cluster can comprise an industrial district with institutions promoting and maintaining co-operation between Chief Executive Officers (CEOs) and their connections with employee organizations. Clusters can provide potential for co-operation towards capacity creation and further towards regional innovation system. The latter implies high mutual trust and learning processes supported by knowledge and capacity supply from industrial service centers, technology centers, and centers for labor training (Isaksen, 1996).

Local clustering and inter firm co-operation development has at least three rationales behind it. The first rationale is heterogeneity of knowledge and competencies, frequently in the form tacit knowledge and competencies that allow fast adaptation to market changes. The second is that enterprises can benefit from localized learning due to the proximity that keeps knowledge well transferable and at the same time supports coherence in regional clusters. And the third consists in the fact that absorptive capacity of enterprises provides more intense learning effects in the cluster due to joint value share and professional relations on CEO and expert levels.

2. SMES IN FURNITURE INDUSTRY

2.1. Enterprise types by the innovation activity

The European traditional industry innovation research has identified three basic functional competence and competition modes (Hirsch- Kreinsen, 2006):

1) Service oriented enterprises that control their process chain and logistics and thereby acquire strong market orientation and flexibility processes in their operations. Frequent service-oriented upholstered furniture producers become understandable through their strong adaptation to customer needs. They are only restricted by the unit cost conditions:

how customer is willing to pay for specialized services. Enterprises acting in non-upholstered furniture categories can benefit from applying this approach by utilizing economies of scale (Schuler & Buehlmann, 2002). Subcontractor position diminishes potential for creation of independent business strategy or other network connections. This type of production is under strong global competition partly due to the need for cost structure advantages. Offshore production characterizing non-upholstered wooden residential furniture business allows utilization of low wage and social costs in addition to low ocean freights because the links between manufacturing and customer delivery can be long.

2) Standard manufacturers acquire their enterprise specific competitive advantages by handling specific product materials in a systematic manner, thereby benefiting from the economies of scope. Access to high quality material has been among the major sources of competitive advantages among them. Standard manufacturers can improve their Innovation Enabling Capabilities (lECs) by horizontal networking. The potentials for competitive advantages and growth potentials tend to be connected with the embedded knowledge in their local clusters. Their position allows only limited options for process innovations if their product design is arranged externally. Modes of production processes frequently have large batches, high set-up times and low interchangeability among parts in different product lines. Standard manufacturers are frequently dependent on traditional distribution channels where competition from mass merchant houses and large retailer networks is strong. Findings from US are valid also in many European countries (Schuler & Buehlmann 2002). According to Buehlmann and Schuler's (2009) findings, in the future furniture manufacturers will outsource more work to specialized entities which allows focusing on managing an efficient supply chain and building and improving efficient distribution operations.

3) Process specialists typically command production line know-how and are experienced in even complex structures to ensure failure-free production flows. Cost leadership is a common and frequently necessary objective among process specialists that are assemblers of component and module subcontracted furniture, mainly in upholstered product segments.

The second major classification of furniture industry enterprises is based on combined major customer/production orientation. A taxonomy identifying the sources of competitive advantages from production and major customers has nine categories (Brege et al., 2001). The product based system focuses on economies of scope and complements the prior functionally determined categories. Furniture enterprise taxonomy with value chain positioning by Brege et al. (2001) covers nine basic categories:

Mass producers	a) independent actors/ partners,	b) global business subcontractors;
Traditional carpentry	c) home furniture manufacturing,	d) office furniture manufacturing;
Design producer	e) home furniture studios,	f) office furniture studios;
Bedroom	g) furniture and interior providers;	
Furniture/ interiors	h) interior carpentry;	
Office furniture	i) focuses office furniture producers and whole assortment providers (airports, theatres, schools etc.).	

The enterprises in subgroups a) production oriented volume producers and b) component and module subcontractors both aim at using positive economies of scale as the basis for their competitive advantages. These enterprises, applying much automation and standardized production processes, are frequently contracting or partner producers of international furniture traders. Independent domestic or export trade is a minor business strategy and they rarely have specific branding (Brege et al., 2001). This way extra quality can be utilized, but only to a limited scale. These enterprises co-operate in value chains of service-oriented enterprises and must search for new customers to expand the impact of a sole furniture trader subcontracts. Historical growth of this enterprise group has been parallel with the international furniture trade expansion (Brege et al., 2001). Component and module subcontractors can conduct their own series modular production in addition to contracting or partner production.

The subgroups c) traditional home furniture producers and d) traditional office/public furniture producers both frequently share family or owner/manager tenure and are characterized by extensive use of tradition and craftsmanship as sources of their competitive advantages. Traditional furniture producers typically benefit and utilize competitive advantages from local cluster when aiming at high product quality and intra enterprise model design as sources of their competitive advantages. Home furniture producers typically have strong downflow connections to specialized furniture traders/merchants, whereas public furniture producers are members in partner networks (producers of complementary products) or have their own delivery shop (small) or dealer network. The brand name and own branding differ among the subgroups. The vast majority of subgroup members are SMEs and frequently small companies. These SMEs can provide product quality precision deliveries and their own intra enterprise design (Brege et al., 2001).

The subgroups e) design home furniture producers and f) design public space furniture producers share independent external designer (or design enterprise) as an essential service provider for their competitive advantages. The name or even brand of the designer is identifiable in the products of these subgroups. Continuous consolidation has happened in this subgroup due to the parallel requirements of quality, ergonomics, price, and delivery time among the customers. It has become common that large enterprises buy and fuse design enterprises to build niche upgrading brands into their portfolio. The designer enterprise tends to be the locomotive enterprise in the value networks among the design oriented enterprises.

The subgroup g) bedroom facility producers contains a variety of enterprises from international scale enterprises to niche oriented focus producers. Strong branding seems to characterize market competition and is inevitable on export markets among the niche producers.

The subgroup h) interior wood furniture producers and joiners covers much SMEs that are mainly customer oriented with narrow product scales. Enterprises in this group have variety of specialties from highly focused tasks to

comprehensive deliveries. Enterprises are frequently interior solution providers with attached complementary subcontractors in the value chain downflow (Brege et al., 2001).

The subgroup i) office facility producers contains big European companies and focuses producers. Majority of enterprises have intra enterprise international production involved. Their share of the total value added is normally higher than their aggregate turnover share. Many of enterprises in this subgroup use production technologies and ICT for business process automation. They operate at an international level more often than their counterparts from the other industry subsectors (Brege et al., 2001).

Value chain positioning has an influence on the modes and potential for innovation activities among furniture industry enterprises and can be used as a taxonomy basis. Companies can have independent position or they are value network dependent as partners or subcontractors of leading enterprises. Horizontal or vertical value chain positioning is the second taxonomy consisting 1) domestic production of SMEs with gradual capacity accumulation through original growth or through takeovers and fusions, 2) partnership in decentralized local or national value networks or 3) subcontracting in a locomotive based business structure. All these major modes of value chain positioning are visible in European furniture industry. Product or product module outsourcing of individual enterprises has become typical in the second mode. The third mode, concerning open global competition of subcontracting participation among SMEs, is common in countries inside EU and also globally.

3. CASE STUDIES

To depict the actual situation in Europe as regards furniture industry clusters some case studies are presented in Table 1.

Table 1. Case studies

Case: Country and county name	Case description
Croatia: Wood cluster of North-West Croatia	The cluster was established in November 2005 by Varazdin County chamber. It consists of 15 enterprises and has 2600 employees. All 15 companies are Croatian property. Firms in the cluster are specialized in sawmilling production, carpentry products, and furniture. Vision of the cluster is to increase competitiveness of Croatian wood industry and to create a strong brand of the cluster which will be recognized as a product with special characteristics and quality of distribution.
Croatia: Cluster Slavonian Oak	The cluster was established in April 2004. It has 150 employees and 13 companies are part of it. Companies in the cluster are specialized in furniture, joinery (doors), parquet and sawn timber, and small hotel furnishing. The vision of all companies is to improve the competitiveness of the Croatian woodworking industry in a new form of organization between companies and by sharing operations both horizontally and vertically with the purpose of optimizing production processes.
Croatia: Tehnointerijeri	The cluster was established in June 2006. It has 966 employees and gathers 19 companies specialized in interior and hotel furnishing, furniture production, and furniture and interior design. A main vision of the cluster is expanding export capacities and increasing added value of the existing export products of cluster members. Next vision is joint development of new producers as well as export to foreign markets and expanding export in the tourism sector via increased quality of family owned hotels with cluster expert help. Also, joint promotion in the international markets.
Estonia: South-East Estonia (Põlva, Valga, Võru Counties)	The cluster was established in 2005 as an initiative of regional public authorities and involves upstream production firms (sawnwood, panels, and components) and also forestry and transportation firms (besides furniture producers). The cluster aims to eliminate different development barriers and encourage the cooperation between local wood-related SMEs. From the start, the cluster activities aims to facilitate mainly knowledge and experience exchange between SMEs; however in furniture part this concerns traditional manufacturers and process specialists of home furniture as well.
Finland: South Ostrobothnia	Joint interest of five local SMEs with their own product lines, but a joint special model line aimed at joint interest customer offerings.
Finland: South Ostrobothnia	Two major business field of interest: a) non-upholstery furniture assortments production for large retail trade networks; b) wholesale trade of furniture equipment with local SMEs.
Finland: Päijät - Häme	a) Interior solutions for cruise ships and public premises (offices, stores and hotels interiors); b) high quality interiors for private houses with mainly Scandinavian suiting Finnish taste and furniture designed for elderly people and their special needs.
Finland: Päijät - Häme	a) Active new product development enabling new model and design implementation, but based on the use of existing product components in manufacturing; module-based production allowing high customer elasticity but in a cost efficient way, b) business activities both in upholstered and non-upholstered furniture manufacturing, applying mainly wooden frames.
Poland: Wielkopolska Furniture Cluster	activity withheld
Poland: West Pomeranian Wood-Furniture Cluster	Basis for building recognizable region brand in Poland and in northern Europe in production of high quality furniture of competitive price and with its own attractive design.
Poland: Mebel Elbląg Cluster	Promotion of associated companies and the region of Elbląg city, as well as raising funds in order to promote the cluster brand.
Sweden	Component and flat-pack producing companies in a geographic region with a strong furniture tradition and where many companies have supplied IKEA and grown with it. Competitive advantage from efficient production and logistics processes as competition has grown from low-cost countries.

Source: Ollonqvist, P. & Nord, T, & Pirc, A. & Ukrainski, K. & Takala- Schreib, V. & Teder, M. & Strykowsky, W. & Viitala, A. 2010. Networks and Local Milieus as Furniture Industry Innovation Platform. COST E 51 Book II

4. POLAND – ESTABLISHMENT OF CLUSTERS

The beginning of clusters establishment in Poland is dated after the social and political breakthrough of 1989. The experiences of the Western Europe and Scandinavian countries, in general of the European Union, were the inspiration for it. In the period of Polish transformation ways to increase economic activity connected with the need for enhancement of competitiveness of Polish companies and regions were intensively sought for. Many programs concerning such areas as industrial policy, raw material policy, innovation policy etc. reflected those issues. In that period various undertakings were aimed at popularization of clusters, already operating in other parts of Europe, in Poland. Researchers looked for some

similarities between domestic organizations and western companies; however the main goals of cluster establishment were: activation of region, reduction of unemployment, and increase in companies' competitiveness.

Industrial similarity of companies was the basis on which one of the first furniture clusters was established. This cluster was set up in the Swarzędz region – one of the biggest furniture centers in Poland – and in was converted into Wielkopolska Furniture Cluster.

The project "'The Support for the development of the Wielkopolska Furniture Cluster" during 2005-2007 aimed to build up in creating stable corporate net for companies and research and development institutions connected with furniture sector in Wielkopolska. Project task was to identify cluster members, non-formal agents who transfer information, examining companies and creating strategy of cluster development, running conferences and presentations and running internet page. This net encompasses 18 companies and two research and development institutions. Most Polish clusters are still at the initial stage of their life circle, thus benefits should be analyzed in ex ante perspective. At the end of 2008 about 120 clusters and cluster initiatives were identified to exist in Poland. Of that 120 clusters and cluster initiatives most of them (22) were located in the Lubelskie Province and also of that 120 clusters 21 were companies and institutions related to a wood sector. Those companies are located in almost each of Poland's provinces and cover different branches of the sector, i.e. renewable energy (3 clusters and 6 cluster initiatives), furniture (3 clusters and 3 cluster initiatives), wood industry (3 clusters) builder's joinery (1 cluster), paper (1 cluster initiative), and printing (1 cluster initiative).

It is worth mentioning that in that period organizational activity was low and the name "cluster" was rarely used. The industrial policy was more focused on other forms of regional organizations aimed at innovation support. It is also worth noticing that companies, including furniture firms, did not want to share their not so long before gained sovereignty with anyone, therefore all new ideas were observed very carefully. In the years that followed the idea of clustering was supported by the state in the form of subsidies for organization of new clusters.

The increased interest in clusters in the furniture industry after 2000 mainly results from:

an increased interest in economic and raw material policy carried out in EU countries which was connected with Poland's preparation for its accession to the EU,

Poland's broader participation in the activities of various international organizations, including industry organizations – International Furniture Federation,

a rapid increase in exports which results in increased interest in new technologies, organization etc.,

constant search after innovative solutions in particular activity areas,

a noticeable greater activity of the Polish Chamber of Commerce of Furniture Manufacturers also in the area of cluster organization promotion in Poland,

preparation of Polish business entities to establish furniture clusters which also would contain companies operating in other branches of the wood industry.

5. CONCLUSIONS

This paper presented some issues connected with creation and potential of furniture industry clusters. Two basic taxonomies of enterprises were presented as well as three basic functional competence and competition modes. As a point of interest a wider discussion of furniture industry clusters in Poland was presented. Additionally, descriptions of chosen case studies were given to depict the actual situation in Europe as regards furniture industry clusters.

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VALUATION OF EXPERIMENTAL SAWING OF LOW-GRADE PINE LOGS (WCO)

Abstract: Valuation of the WCO pine logs were made using data from the article by professor W Dzbeński and K. Laskowski [Dzbeński, Laskowski, 2005]. Authors study assumed on single sawing logs after logs bucking. Technical and economic values from the journal "Rynek Drzewny" and the data from the experimental sawing made possible valuation of 1m^3 of logs.

Calculations showed the usefulness of the proposed valuation formula. The formula showed unsatisfactory profitability of low-quality round wood manufacturing process for standard timber in the second half of 2009, ie in a bad stage of the cycle of market economy on a global scale.

Key words: value of the timber, logs, sawn timber, experimental sawing, profitability.

INTRODUCTION

This paper is a continuation of presentation of the results of work on the issue of raw timber and the wood-derived materials valuation in wood manufacturing process.

Proposed formulas application in industrial practice has led to their modification by including some important factors affecting the calculations results, such as the difference in stocks of finished products. The proposed formula can and should find a practical use in the wood manufacturing companies, because managers are familiar with economic data in their companies. The data, published in the journal "Rynek Drzewny" are valuable and reliable, but limited to average values. For this reason, the proposed method of valuation of round wood may not always be parallel with the results of specific company calculation. However, the method gives some understanding of the realities of the raw material and wood-derived materials trade in a particular period.

THE OBJECTIVE

The objective of this paper is to propose a calculation method of raw material value in wood manufacturing industry and its practical verification based on the results of the experimental logs sawing. Experimental logs sawing was carried out by professor W. Dzbeński and K. Laskowski [Dzbeński, Laskowski, 2005]. Therefore, the paper is an example of the valuation method to be used in a specific wood sector company, where the necessary figures are usually a company's secret.

METHODOLOGY

Valuation of round wood in the industrial process is determined by following algebraic operation:

$$W_i = A_i - B_i + C_i \text{, whereas:}$$

A_i – discounted value of sales revenues of 1m^3 of „i" grade wood-derived materials [PLN/m^3];

B_i – the unit costs of commutation, sawing and drying of raw material with the freezing capital costs in the production cycle [PLN/m^3];

C_i – the unit net income from the sale of waste from raw material manufacturing process [PLN/m^3].

Discounted value of sales revenues of timber from 1m^3 „i" grade round wood can be determined as follows:

$$A_i = \frac{P_i \pm \Delta Z_{pk}}{(1+r)^o(1+m)Q} \text{, whereas:}$$

Q –quantity of raw material sawing [m^3];

$j \in < 1, d >$ - number of the liabilities recovery cycle for the supply of sawn materials;

r – discount rate per one day of capital freezing on the basis of two-year Treasury bond rate (4%). Exceeding the maturity of receivables from customers over one month causes statutory interest, but this case was not included in the calculation.

P_i – total net revenues from sawn products sales [PLN]:

$$P_i = \sum_{k=1}^{s} T_{ki} C_k \text{, whereas:}$$

T_{ki} – the raw material quantity from sawing „i" grades logs [m^3];

C_k – the price of „k" grade product from sawing logs [PLN/m^3];

ΔZ_{pk} - the difference in stocks of „k" grade sawing products [PLN];

m – assumed level of gross profitability from the sale of sawing materials (m=0; 0,01; 0,05; 0,10);

$j \in < 1, d >$ - number of days of liabilities recovery: assumed d = 30, because this point exceeding causes statutory interest for late payment.

The unit costs of raw materials transport, sawing and drying, including costs of capital interest in the production cycle:

$$B_i = \frac{a_i}{a_{A1}} \left[k_t + k_p + k_s + 0{,}5 \sum_{d=1}^{q_1} r_d (k_p + k_s) + \sum_{d=1}^{q_2} r_d \frac{P_i \pm \Delta Z_{pk}}{Q} \right] \text{, whereas:}$$

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a_i – efficiency for "i" grade wood materials processing;
a_{Al} – efficiency indicator of material processing demand for highest grade;
k_t – the unit raw material transport cost from the forest storage to the company [PLN/ m^3];
k_p – the unit raw material sawing cost per $1m^3$ of logs [PLN/ m^3 logs];
k_s – unit sawn materials drying cost per $1m^3$ logs [PLN/ m^3 logs];
$d \in <1, q_1, q_2>$ - number of day of capital allocation (q_1) and timber storage (q_2).

In the valuation formula the efficiency of raw material with reference to the quality grade is particularly useful in the manufacturing of round wood on high-processed materials according recipient requirements.

The unit net income from sale of waste from raw material manufacturing process (without income taxes):

$$C_i = f(1 - a_i)C_0$$, whereas:

The value of the waste from manufacturing process of $1m^3$ raw material is counted to the calculated value as a component C_i after excluding the cost of material preparation for sale and income taxes.
f – the indicator of company share in gross profit;
$C_0 = U_{tr} \cdot (C_{tr} - k_{0tr}) + U_{zr} \cdot (C_z - k_{0zr}) + U_{kr}(C_{kr} - k_{0kr})$ - the unit gross profit from sale of waste from raw material manufacturing process [PLN/m^3];
U_{tr} – share of sawdust;
C_{tr} – sawdust sales price [PLN/m^3];
k_{0tr} – unit cost of sawdust preparation for sale[PLN/m^3];
U_{zr} – share of chips;
C_{zr} – chips sales price[PLN/m3];
k_{0zr} – the unit cost of waste processing into chips [PLN/m^3];
U_{kr} – share of bark;
C_{kr} – bark sales price [PLN/m^3];
k_{0kr} –the unit cost of bark preparation to sale [PLN/m^3].

The data used in the calculation

The data from experimental sawing

Data used in the calculations were taken from the results of professor W. Dzbeński and K. Laskowski, published in the article "Effectiveness of further sawmill plant processing (a selected example)" from 56/2005 issue of Annals of Warsaw Agricultural University SGGW. Forestry and Wood Technology, p. 208-213.
$Q=159,45m^3$
Q_L=> $Q_{WC(1,2,3)}=98,13m^3$
$Q_{WB(1,2)}=23,49m^3$
$Q_{WA(2,3)}=37,85m^3$

The experimental sawing results are the following quantities of timber (Table 1). The average market prices were taken from "Rynek Drzewny" No. 4/2009.
P_i=>T_{ki}; C_k

Table 1. The types of timber from „i" grade logs processing

The grade of timber (i)	Quantity (P_i) [m^3]	Share [%]
$T_{53\ I}$	0,871	0,6
$T_{53\ II}$	19,283	14,9
$T_{53\ III}$	98,081	75,7
$T_{53\ IV}$	1,776	1,4
$T_{47\ III}$	2,403	1,9
$T_{25\ II}$	2,701	2,7
$T_{25\ III}$	4,363	3,4
Total:	129,481	100,0

Source: Authors' own calculation based on experimental sawing [Dzbeński, Laskowski, 2005]

The efficiency of raw material from sawing logs is: a_i = 129,481 m^3 timber/159,45m^3 raw material= 0,80, ie 80%, because the use of gang saws reduces waste to sawdust, whose participation is 1,00-0,80=0,20, ie 20%. Experimental sawing assumed gang saws using, although typically a single sawing is used for valuable raw butt material, mainly hardwood species and the order is to obtain high-quality lumber for furniture and woodwork for demanding customers.

For this reason, calculations assumed a high indicator a_i=0,80.

ΔZ_{pk} - differences in stocks of sawn materials - assumed zero, because the experimental sawing results were used;
k_t – costs of transport for raw materials from "Rynek Drzewny" data by the end of the 3rd quarter 2009: k_t=20 PLN/m^3;
k_p – sawing costs, namely $k_p \cong 161$ PLN/m^3 („Rynek Drzewny", 4/2009);
k_s – drying costs, namely k_s=99 PLN/m^3 (Rynek Drzewny, 4/2009);
U_t – share of sawdust is 100% waste, as a result of single sawing efficiency calculation;
U_z – share of particles is zero, because of the off-cuts, slabs and other waste materials lack;
C_{tr} – unit sales price of chips. According to „Rynek Drzewny" 4/2009, the price is about 20-30 PLN/m^3; 30 PLN were assumed.
k_{0tr} – the unit cost of sawdust providing to sell was estimated at 2 PLN/m^3.
The value of round wood from bucking logs

Discounted values of timber sales revenues per 1m3 of raw material (Ai)

Table 2. Discounted unit value of lumber sales revenues

Number	Discounted values of lumber sales revenues [PLN]				Discounted lumber sales revenues per 1m of raw material [PLN/m^3]
	Lumber type	The unit sales price [PLN/m^3]	The value [PLN]		
			nominal	discounted	
1	$T_{53\ I}$	861	750	749	441
2	$T_{53\ II}$	630	12148	12136	
3	$T_{53\ III}$	533	52277	52224	
4	$T_{53\ IV}$	334	593	592	
5	$T_{47\ III}$	533	1281	1280	
6	$T_{25\ II}$	575	1558	1556	
7	$T_{25\ III}$	403	1758	1756	
		TOTAL:	70365	70289	

Source: Authors' own calculations based experimental sawing [Dzbeński, Laskowski, 2005], lumber prices by „Rynek Drzewny", 4/2009.

Analysis of Table 1 data shows that the cost of delayed payback of liabilities for 1 month is: 70365-69942=423 PLN, with sales volume of 129,5 m^3 of timber. For example, in the wood processing of 25000m^3, the cost of trade credit would be around 82000 PLN and in case of further delayed payment – significantly more.

The unit costs of commutation, sawing and drying of timber, including the costs of capital freezing in the production cycle (Bi)

The relation of raw material efficiency $\frac{a_i}{a_{A1}}$ were assumed as 1, because all logs grades were sawn and no efficiency of specific grade were given. The lumber quantities were shown in Table 1, the results of B_i in Table 3.

Table 3. The unit costs of raw material transport, sawing and drying, including capital interest during the production cycle

Unit costs [PLN/m^3 of raw material]				
transport (k_t)	Sawing (k_p)	lumber drying (k_s)	capital interest*	Total
20	161	99	2	282

Source: Authors' own calculations

*The capital interest is associated with a short (from one to several days) production cycle, but more important is the lumber drying cycle – a one month for thicker pine assortments. The method of capital interest account was shown in 3.2 (a B_i component).

The interest rate will be as follows:

$$0{,}5\sum_{d=1}^{30} r_d(k_p + k_s) + \sum_{d=1}^{q_2} r_d \frac{P_i \pm \Delta Z_{pk}}{Q} = 0{,}5 \cdot 30 \cdot 0{,}0001(161+99) + 30 \cdot 0{,}0001 \cdot \frac{129{,}481 \cdot 441}{159{,}45} = 0{,}39 + 1{,}07 = 1{,}46 \approx 2PLN/m^3$$

Table 3 analysis shows a very marginal effect of capital interest in sawing and storing of 1m^3 raw material, but manufacturing a 200 000 m^3 gives a more important value, but do not have a significant influence on the financial results of economic activity even a large companies.

Unit net waste sales profits (Ci)

In experimental sawing does not occur off-cuts for chips producing, only sawdust at a price 30 PLN/m3, the bark was omitted due to insignificant value per 1m^3 of raw material.

$$C_i = f(1-a_i) \cdot C_{tr} = 0{,}81(1-0{,}82) \cdot 30 = 4{,}6 \cong 5PLN/m^3 \text{ of raw material}$$

The value of 1m3 WCO logs

The logs bucking were obtained various grades logs in the proper market prices and therefore the calculation of raw material value in unedged timber production included average weighted market price of raw material (see p.2.4.1):

98,13*155+23,49*170+37,85*208=15210+3993+7872=27075,

ie 27075 PLN/159,45m^3=169 PLN/m^3.

Table 4. The value of WCO grade raw material

Costs of commutation, sawing, drying and capital interest (B_i) [PLN/m^3 of raw material]	Revenues of waste sales (C_i)	Gross margin (m)	Raw material value [PLN/m^3](A_i-B_i+C_i)	Average raw material sales market price [PLN/m^3]
281	5	0	165	169
		0,01	162	
		0,05	148	
		0,10	132	

Source: Authors' own calculation

Analysis of results of logs value calculation shows low profitability of wood processing into the timber, close to the break even point, because the wood market price with a gross margin of approximately 2% is close to the wood value.

SUMMARY

The results of low-grade timber quality (WCO) calculations were shown insufficient profitability of wood processing for this type of timber, which is offered in the market as much as 71% of all types supply. It should be noted, however, that it was the single experienced sawing – further wood processing may give higher profitability. At the same time, processing of low-grade timber quality causes more waste and lower efficiency, but high wood products prices, mainly wood chips,

reaching even the price of wood for paper production, and thus significantly increase the profitability of round wood processing.

An insignificant is the impact of capital interest in process of wood manufacturing per $1m^3$ of raw material – with the exception of liabilities recovery cycle (see p.3.1). It should also be noted, that in the analysis the data from the period of economic crisis were used, ie the second half of 2009, when the lowest prices of timber made impossible adequate profitability of raw material processing and probably caused a temporary problems with sales and export. The recession effects are disproportionately affected a small sawmills with a low level of technical equipment and technologies. Many of them offering high-processed products to improve profitability, but using a thin low-quality raw material limits their opportunities.

There are more opportunities to achieve higher profitability in the case of thicker materials processing. It happens, that butts from logs bucking are collected and profitably sold to veneers and plywood factories. If the sawmill cooperates with a nearby carpenter's workshop which can merge by glue wood pieces together, the value of raw material calculation may be significantly better.

CONCLUSIONS

1. The value of low-grade pine wood (WCO) is close to its average market price with a gross margin of about 2%, which is affected by thought-provoking high cost of sawing and drying;
2. Timber market prices are too low in relation to production costs if only raw material sawing is taking place without the implementation of profitable elements production;
3. The cost of capital freezing in liabilities is important, especially at higher values of production; in the production cycle is insignificant or zero;
4. The results of raw material value calculation should be analysed carefully due to the significant dispersion of the output data. The precise calculation of raw material value is possible only in known company.

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COMPETITIVE STRATEGIES FOR FUTURE SUPPLY CHAIN MANAGEMENT IN EUROPEAN UNION ON THE FOOD EXAMPLE - PART I

Abstract: In the first part of the paper there is presented *logistic* and specially *informational infrustucture* based on the megatrendes influenced on the Eurpean Market. To rebuild traditional supply chains management are presented two main strategies, based on M. Porter's: *leader cost and heterogenity strategies* applied to information technology environment. First of them is *Transparency Strategy* that improve chain effectiveness. The second one is *Flexibility Strategy* based on outsourcing techniques that gives possibility "*to meet the needs of the present without compromising the ability of future generations to meet their own needs"*. The *Transparency Strategy* is the main strategy and *Flexibility Strategy* is secondary strategy. The *Traceability System* is necessary to apply both upper strategies. It's a part of GS1 system build in the informational environment.

Key words: information technology, transparency strategy, Food Chain Supply Management.

INTRODUCTION

Acceleration of changes in the market occurring after Poland's accession to the European Union in 2004 caused an increased *variability* and *fragmentation* of the *food market*. As a consequence, the significance of *quality* for the buyers is rising continuously. Higher importance of quality is driven by the principles of quality management, having roots in the principles developed by E. Deming. The *fragmentation* of the food market and the rising significance of *quality* and *security* of products and servicies are accompanied by the needs to reconstruct the traditional and build modern food supply chains and networks.

MEGATRENDS AND THEIR IMPACT ON EU MARKET

The enlargement of the European Union in May 2004 by ten new states has boosted the earlier trends in the conditions of food market in terms of *economics, demography, social and cultural, and legal aspects, as well as technology and the*

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protection of natural environment, leading to increased competitiveness (Trienekens, van der Vorst 2006, Szymanowski 2008).

The phenomena of business expanding beyond the national borders has been strengthening since the 1960s. It has been related to the lifting of barriers in international trade, expansion of super-national corporations in charge of almost three quarters of all trade, and revolution in transport and communication. Among the key drivers of globalisation is *networking*, i.e. the use of Internet resources (World Wide Web) in trade as a business tool for the creation and exchange of a new value and execution of low-cost e-transactions. E-commerce crosses all barriers of time and space by providing Internet-integrated logistics to support business.

Partnership-based logistic chains and networks are an instrument able to meet the aforesaid market needs, in particular with respect to the emerging markets. Such chains and networks should be financed with public funds and joint public and private undertakings.

The development of logistic chains on the international scale is related to certain prerequisted factors that can be grouped as follows: higher needs and expectations of customers and the market in respect of products and services (Szymanowski 2008);

- globalisation of supply and distribution markets;
- availability of natural and human resources;
- deregulation and the economic policy;
- development of information and communication technology (ICT).

Following are the key conditions that drive the needs and expectations of customers and the market:

- *Fragmentation of buyer markets*. The creation and satisfaction of individualised needs and expectations of smaller buyer groups leading thanks to ICT, establishment of a market with symmetric one-to-one relations;
- *Product life.* The majority of sectors are mature and need tools to retain customers rather than win new buyers. Such tools include product line management, handling of promotional activity, adding new value for customers, e.g. via extra information;
- *Higher degree of innovation*. This tendency is reflected in the large number of new products, production processes and organisational solutions, all leading to shorter product life (*time pression*) and higher logistic requirements in terms of both size, time, destination and services, which apart from transport, storage and packaging also include: servicing, insurance, financing, payment monitoring and information to customers;
- *Compressed prices.* The above conditions lead to higher competition on the domestic markets giving rise to fights for customers and price reductions.

The main drivers of supply chain development are, in respect of globalisation of supply and distribution:

- *Centralisation and geographic concentration* of distribution via closing of local and domestic hubs in the 1990s in favour of Pan-European logistic centres. The process of minimising the quantity of logistic hubs is accompanied with their stronger geographic presence in the area of Benelux, with the Netherlands holding to almost 56% of hubs. These logistic centres are ready for multi and inter-modal transport, transport that occurs across various platforms and means and provide comprehensive logistic services via virtual logistic platforms;
- *Logistic services outsourced through specialist logistic service providers*, called Fourth Party Logistics, or 4PL. Their mother companies are in possession of own transport and storage resources and establish logistic operators that provide high-quality service across entire Europe for reduced prices;
- *New production and storage technology invented* based on the development of the production, infra-structure and in particular the implementation of new IT solutions that provide new interactive ways of supplier-buyer contact. The new technologies used in the organisation of production include flexible organisation of production- processes synchronised with order flow, inventory management (*Continuous Replenishment Process*) leading to a large reduction of stock required from suppliers.
- *New techniques in demand and sales planning* initiative by large retail networks acting in cooperation with large food producers, a concept of Efficient Customer Response has been connected at the beginning of 1990s. *Efficient Customer Response* means *a customer - oriented supply chain* intended to better satisfy the needs and cause higher sales and cost reduction. These issue are addressed in the *Collaborative Planning, Forecasting and Replenishment (CPFR)* concept, which supports the synchronisation of forecasting and planning across retail networks and producers, yielding higher effectiveness of both. At the same time, it provides grounds to separate daugher companies specialising in logistics.

Deregulation means the creation of *the European transport policy*, which aims are at developing the *Trans-European Network (TEN),* as a consequence of the Maastricht Treaty of 1995. The network is the primary component in the infrastructure of logistic networks that process large and frequent cargo. In 1997, *Transport Infrastructure Needs Assessment* was founded by the European Union, as a programme intended to procure financing for the core investments in the transport infrastructure. The programme for the development of the logistic centres as hubs able to provide comprehensive servicing for all transport and *intermodal cargo,* will contribute to a lower burden for the truck transport, less impact on the natural environment and improved quality of life in the conurbations.

FRAMEWORK OF STRUCTURAL DRIVERS AND ITS INFLUENCE ON SUPPLY CHAIN STRATEGY

1. Supply chain management approaches can held us in the analysis and redesign of product and information flow throughout the chain from the pimary producer up to the final consumer, that reached all the stakeholders (producers, government, consumers) needs. (Trienekens, van der Vorst 2006).We provide visual framework for supply chain decision making on figure 1. On fig.1 relations between competitive strategy and strategy of supply chain management under the influence of information technologies to the supply chain structure drivers as: facilities, inventory, sourcing,

transportation, and production are presented. (Chopra, Meindel 2004):Influence particular drivers into competetive strategy is as follows:

2. Facilities and their coresponding capacities to perform their functions are a keys drivers of supply chain in the terms of *responsiveness* and *efficiency.* Components of *facilities decision* play a crusial part of supply chain design. Location of facilities as: fabrication and assembly, warehouseing and their corresponding capabilities are the main drivers to design a supply chain in terms of *responsiveness* and *efficiency.* Companies can gain *economies of scale,* when a product is manufactured and stored in one localization; this *centralization increases efficiency.* The opposite is also true. Locating facilities close to customers increases the number of facilities needed and consequently *reduces efficiency.* This *decentralization increase responsiveness;*
3. Inventory exists in the supply chain because of a mismatch between supply and demand. This mismatch is in *manufacturing,* where it is economically to produce a large lots that are then stored for future sales. The mismatch is also at the retail store, where inventory is held in anticipation of future demand. Inventory is spread throughout the supply chain from raw materials to finished goods that: suppliers, manufacturers, distributors, and retailers hold. So *inventory* plays a significant role in a supply chains ability to support firm's competitive strategy. The trade-off implicit in the inventory driver is between the *responsiveness* that results from more inventory and the *efficiency* that results from less inventory;

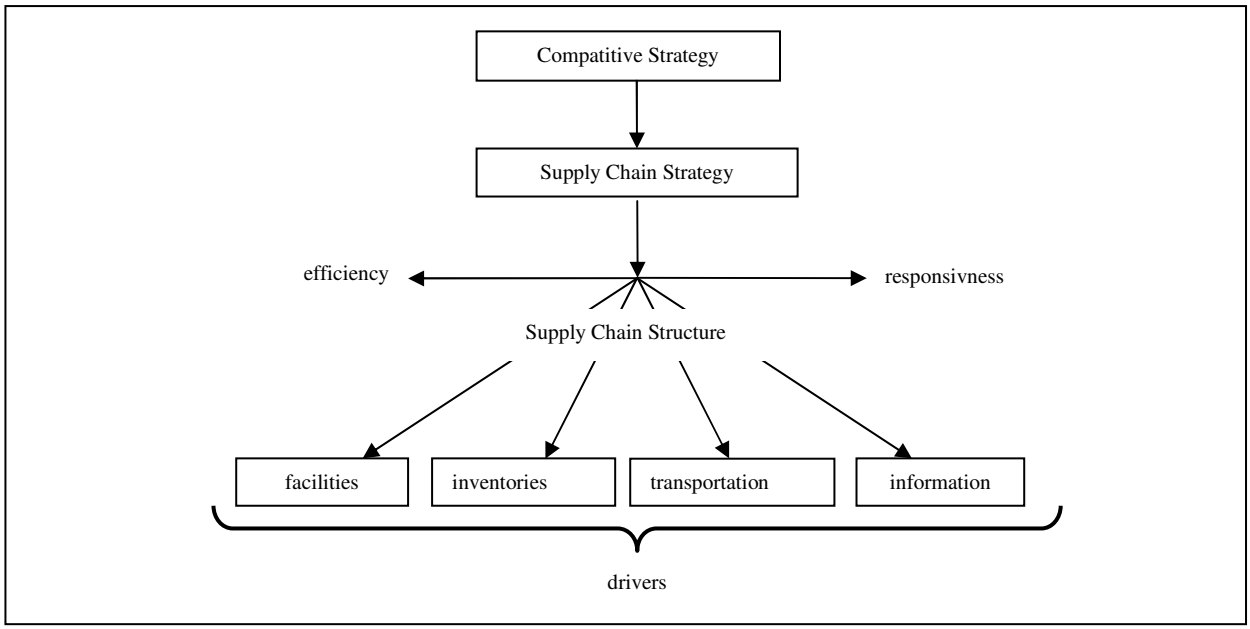


Figure 1. Supply Chain Decisiion-Making Framework
Sorces: Chopra,.Meindl,2004 p.53

4. Transportation moves products and services between different stages in a supply chaim and has a large impact on both: *responsiveness* and *efficiency.* Faster transportation, whether in the form of different modes of transportation or different amounts being transported, allows a supply chain to be *more* responsive but *reduce its efficiency.* The type of transportation also affects on the level of inventory and facility *locations in the supply chain. The role of transportation in a company's competitive. strategy targets a customer that demands is very high level of responsive needs and that customer is willing to pay for this,* then firm can use transportation to lower the cost of the product, so one driver for making the supply chain is more responsible. The opposite situation is as follows, if the company's competitive strategy targets of customers, whose main decision criterion is price. The company can use transportation to lower the cost of the product at the expense of responsiveness.

IMPACT OF INFORMATION AND COMMUNICATION ENVIRONMENT TO DEVELOP TRANSPARENCY STRATEGY FOR COMPETITIVE SUPPLY CHAINS

The last group of conditions that determine the development of supply chains is related to the Information and Communication Technology (ICT). This includes the needs to design *a global all-industry information standard* that would assure compatibility of basic data across products and services offered by various trade partners. Such standard is satisfied via *Global Data Synchronisation (GDS)*, a model built based on a certified network of national electronic product catalogues, developed using EAN-UCC - *European Article Number Association and Unified Code Council.* It is commonly refered to as the barcode system used in wholesale and retail, as well as in logistics and transport. The applications of EAN-UCC expand and today it is the key language in digitisation of trade. EAN-UCC is used in *Electronic Data Interchange (EDI),* a technique leveraging non-paper carriers of information to connect IT systems of trading parties and send standard documents such as: invoices, orders, production schedules in the electronic version. EDI's advantages include full independence of any single hardware or software platform. The global standard for EDI is WebEDI, that uses the World Wide Web to connect trading parties.

The change from *the production-oriented approach towards customer focus* is possible via *cooperation with supply chains and networks* that should operate based on the principle of partnership and use joint resources to track and monitor

the flow to: increase the added value by enabling international sales of products and services, observance of quality standards and food safety, incorporation of expertise, technology and new organisational models. It necessitates designing *the strategy for remodelling of supply chains*, which will increase the competitiveness of entire chains rather than singular actors. The strategy will incorporate information technology to improve its *transparency based on quality standards, food safety and innovation in the introduction of new products, technology and organisational models for the market.* This aim will be realised based on the above mentioned prerequisite conditions, by applying *the process-based approach* in accordance with *Deming's PDCA principle (Plan-Do-Check-Act) that enforces sustained improvement.*

The key aim of this paper is the presentation of new market challenges to the use of information technology to support the reconstructon of supply chains and networks based on *the transparency strategy* by improving the chain effectiveness, and *build partnership relations* between the actors by increasing their competitiveness. To cover future needs it's necesary to reach higher *quality* and *security* of products and services To reach this there are several substrategies. To fulfil upper strategies the following main integrators can take a part: *processing factories and network retailers* or *all stakeholders (industry, government and customers).*

The differences between both main strategies are presented in Table.1

Table 1. Comparison of Efficient and Responsive Supply Chains

Criterion	Efficient Supply Chains	Responsive Supply Chains
Primary goal	Supply demand at the lowest cost	Respond quicly to demand
Product design strategy	Maximize performance at minimum Product cost	Create *modularity* to allow postponement of product differentiation
Pricing strategy	Lower margins because price is prime customer drivers	Higher margins because is not a prime customer drivers
Manufacturing Strategy	Lower costs through high utilization	Maintain capacity flexibility to buffet against demand and/supply uncertainty
Inventory Strategy	Minimaxe inventory to lower cost	Maintain *buffr inventory* to deal with demand and/supply uncertainty
Lead Time strategy	Reduce but not at the expense of costs	Aggressively reduce even if the costs are significant
Supply strategy	Select suppliers based on cost and quality	Select based on speed, flexibility, reliability, and quality
Transportation Strategy	To selekct mode of transportation or numbers of supplieres to minimaxe the cost	To select mode of transportation or number of suppliers on the base of reliability and its quality

Source: Chopra, Meindl 2004, s. 40.

The conclusions from this analysis (see table 1) are the following:

- There is no right supply chain strategy independent of the competitive strategy;
- There is right supply chain strategy for a given competitive strategy.

SYSTEM GS1 AND ITS INFLUENCE ON TRANSPARENCY AND FLEXIBILITY STRATEGIES

The creation of *global infrastructure* for cargo *identification and tracking* in the form of the GS1 system will enable formulation and implementation of supply chain strategies that incorporate *the principle of transparency* and are realised in two forms – *cost leadership in food supply mass markets, which use outsourcing, and the differentiation strategy, which ensures food safety on niche markets.*

Global Standards & Global Solution-GS1 is a leading organisation dedicated to the design of global standards for modern supply chain management.GS1 is entering a new level of activity by offering new products and services:

- Global Data Synchronisation Network (GDSN); and
- Global Registry (GR), which enable easy and effective synchronisation of trading partner data across the world;
- Electronic Product Code (EPC);
- Traceability, i.e. solutions for tracing the movement and origin of goods along the whole supply chain.

The GS1 Global Office will be helping to carry out the above-mentioned tasks. One of the pioneering concepts, planned for the years 2006-2009, was the implementation of GS1 standards in the area of raw materials, semi-finished goods and packaging, called *upstream integration*. Similar moves will be taken on a national scale in Poland. The goal will be to work out a concept for the implementation of upstream solutions on the Polish market (Gawrońska 2006) (see Table 2).

Table 2. GS1 Strategic Plan 2006-2009

Objectives	Projects
Supporting key standards	Barcodes eCom GDSN EPCglobal
Diversification of the service line – introducing new standards and services	•Traceability •Upstream initiative •Patient safety •Learn (GS1 Institute) •Certification •Global Data Driver
Implementation activity in new sectors	EPCglobal, Traceability, Upstream, Patient safety

Source:. Gawrońska, 2006.

In Poland, an important development in 2005 was the establishment of *EPC Forum – Poland*. It enables business to share experience with other EPCglobal members committed to the implementation of new EPC technology. The Forum also provides access to information about EPC, research findings and software specifications.

Electronic Product Code and the EPCglobal system

Data transfer standards in the GS1 system use the Electronic Product Code (EPC) and form an open global network (EPCglobal). EPC combines two identification technologies: via radio frequency (RFID) and through the Internet. The ability to monitor cargo movement in real time is the primary advantage of *the EPCglobal system,* as it ensures the transparency of the whole supply chain. The architecture of the *EPCglobal Network* contains a description of standards and specifications for the whole network and its individual elements.

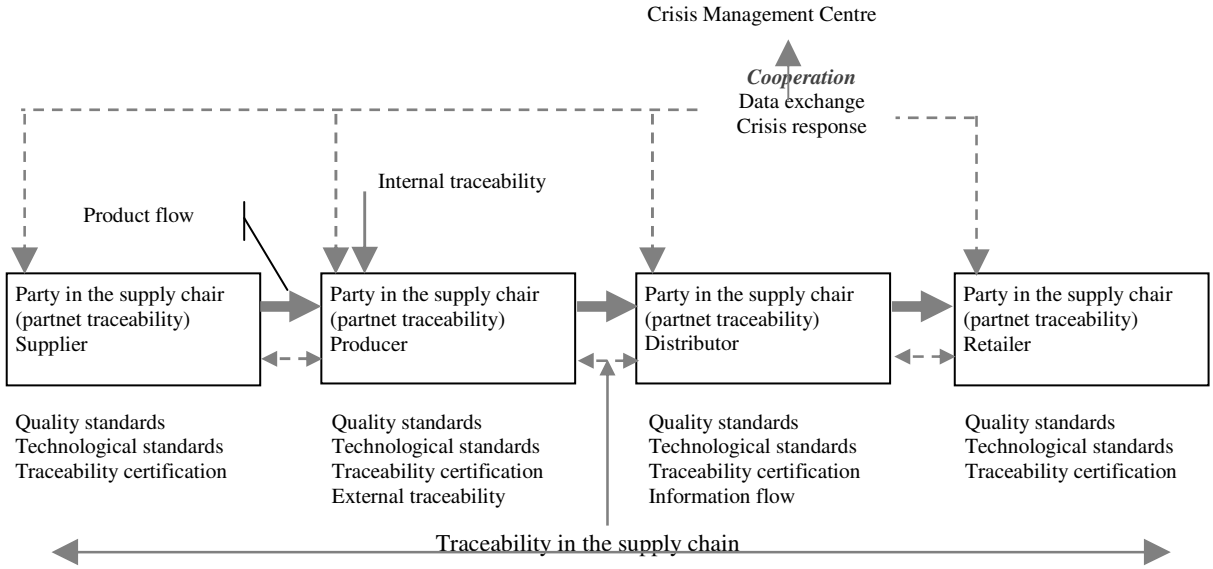
The architecture of EPCglobal consists of three sets of standards:(ECR Europe 2004)

- *EPC data exchange standards* – covering users of the EPCglobal Network; through the exchange of information with other members, they increase their knowledge about the physical movement of cargo after it has left the enterprise;
- *EPC infrastructure standards* – they define standards of interfaces for infrastructure associated with collecting and storing EPC data;
- *Standards for the physical exchange of EPC objects* - covering EPCglobal Network users who physically exchange cargo between each other; it is identified by unique numbers written in the EPC tag. In Poland, the database of EPCglobal members is administered by the Institute of Logistics and Warehousing in Poznań.

THE PRINCIPLES OF TRANCEABILITY SYSTEMS, ITS INTEGRATORS AND BENEFIITS FOR PARTICIPANTS

Food tracing in global supply chains requires combining internal data (*internal traceability*) - like for example product serial number, batch number and production date (GTIN) – with external data (*external traceability)* – like for example the location number of the partner (GLN) and number of the logistics unit (SSCC). On Fig 2. is presented the role of *Crisis Management Center* in the supply chain traceability system. The traceability system functionally supports the exchange of information between the Crisis Management Centre (CMC) and participants in the food supply chain. The data should be shared by supply chain participants within 24 hours. After analysing the level and scale of the threat, the CMC may order the withdrawal of the product from the market and all supply chains. The system proved effective in 2007 when bird flu cases were discovered in Poland.

Figure 2. Role of the Crisis Management Centre in the supply chain traceability system.



Source: Śliwczyński 2008, pp.137-148.;

THE TRACEABILITY CONCEPT IN FOOD SUPPLY CHAIN AND NETWORK MANAGEMENT

The traceability concept is the key to effective and efficient use of information technologies in food supply chain network management. Successful food policy defines the role of traceability for animal feeds and food components by implementation of appropriate procedures. Directive of the European Commission EC/178/2002 determines the importance of traceability as the instrument to warranty food safety. That Directive specifies that as of January 1, 2005, the producers must identify the suppliers of their raw materials and consumers of their final products on the basis of transactions. The basis of traceability information is the possibility of determining the source of action of specific structure and places where other actions possessing corresponding structure are positioned in the supply chain. That is why tracking products movement and tracing their origin represent the concept of traceability:

Among many other definitions, two *definitions of traceability* deserve consideration by Trienekens & van der Vorst (2006). Those are:

- the ability to track the movement of food, animal feeds or other components that could become components of food throughout all stages of production and distribution (EC/178/2002); and

- *traceability* is the quality management system ability to track the history, application or identification of the object or activity or similar objects or activities thanks to their identification (ISO 8402).

Traceability can be defined in the narrow or wide meaning of the term. *In the narrow* meaning it allows people to determine where the products are at any moment of time. The real time tracking function allows identifying the history of not only the product but also of its components as well as the use of every final product. *In the wide* meaning traceability means that information on products and processes of producing them can be used for optimization and control of processes within and between individual links of the supply chain offering the possibility of decreasing costs, increasing productivity and assuring quality.

Traceability of information has a separate importance for organization and supply chain. At the enterprise level it allows supplying information on location of products and their history. At the supply chain level, it allows determining not only information on product location, but also information on products origin.

As a consequence of participation of many actors (industry, government-administration institutions, consumers) in the chain, it is of particular importance for entrepreneurs participating in the supply chain to be able to guaranty the composition and genesis of their products through building the information system allowing cooperation in supply chain. Information system for traceability in case of a supply chain is presented in Figure 2. It allows:

- *identification of production and products* within the supply chain. The purpose of identification is the obtaining data concerning individual activities using codes (barcodes, lab);
- *tracking movement of objects* allowing locating them along all their path within the supply chain;
- *traceability of movement of objects* within the food chain allows identifying their composition at individual stages of the supply chain. *In the lower part* of the supply chain the purpose of tracing is to determine the history of the object and sources of problems causing their damage. *In the upper part* of the chain the purpose of tracking is to determine location of products made using, e.g. contaminated raw materials.

The concept of traceability offers benefits for supply chain participants, i.e consumers, industy and government administration institutions are presented in Table 3 below.

Table 3 .Benefits of traceability concept for supply chain participants

CONSUMERS	INDUSTRY	GOVERNMENT ADMINISTRATION INSTITUTIONS
Maintaining food safety thanks to the system of returns Allowing avoidance of foods and food components causing civilisation diseases.	Protecting public health through food withdrawal procedures. Protection against adulterations that cannot be detected through analysis. Help in protecting human and animal health in situations of threats.	Compliance with applicable legal regulations. Have the right to withdraw products from sale. Possibility of diagnosing production conditions assuring quality of food in the market and confidence of consumers.

Source: Trienekens, van der Vorst:, 2006. p. 447.

Management of Food Supply Chain Networks (FSCN) is linked to development of Information & Communication Technology – (ICT) defined as the technically available resources, knowledge and attitudes allowing organization of their application for performance of business and communication activities through by van der Vorst, Beulens, van Beek (2005):

- more effective and efficient use of the resources by their users;
- development and application of ICT technology for better management of supply chain and network and the individual links within them;
- development and application of ICT tools and infrastructure for building the business strategy within the food supply chains and networks.

SUMMARY

The influence of megatrends on the Eurpean Market provides necessity to rebuild traditional supply chains management into modern one. As a result are presented two main strategies, that are based on M. Porter's: *leader cost and heterogenity strategies* applied into information technology environment. First of them is *Transparency Strategy* that improve chain effectiveness. The second one is *Flexibility Strategy* based on outsourcing techniques. The *Transparency Strategy* is the main strategy and *Flexibility Strategy* is secondary strategy. To cover future needs it's necesary to reach higher *quality* and *security* of products and services. To reach this in second part of the paper there will be proposed *Quality substrategies* to manage food supply chain to competitive environment. Next to fulfill upper strategies the following *Logistique outsourcing strategi*es can be applied. In the last part of the paper will be presented. Choice one of them depend on the sphere of logistic activities that can be outsource. To overcome this constraints in the last part of the second part of the paper there are presented the principles of the platform *Food for Life,* witch will be build for all it's future users and stakeholders.

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Wacław Szymanowski

COMPETITIVE STRATEGIES FOR FUTURE SUPPLY CHAIN MANAGEMENT IN EUROPEAN UNION ON THE FOOD EXAMPLE - PART II

Abstract: In the first part of the paper there is presented *logistic* and specially *informational infrustucture* based on the megatrendes influenced on the Eurpean Market. To rebuild traditional supply chains management are presented two main strategies, based on M. Porter's: *leader cost and heterogenity strategies* applied to information technology environment. First of them is *Transparency Strategy* that improve chain effectiveness. The second one is *Flexibility Strategy* based on outsourcing techniques that gives possibility "*to meet the needs of the present without compromising the ability of future generations to meet their own needs"*. The *Transparency Strategy* is the main strategy and *Flexibility Strategy* is secondary strategy. To cover future needs it's necessary to reach higher *quality* and *security* of products and services To reach them there are proposed 3 substrategies: *Compiance Strategy, Substrategy Oriented at Improroving Processes* and *Market-Oriented Substrategy.* To fulfil upper strategies the following outsourcing strategies can be applied: *Lean, Agility and Leagility Strategies.* To choose one of them its depends on sphere of logistic activities that can be outsource. To overcome this constraints in the last part of the paper there are presented the principles of the platform *Food for Life,* which will be build for all it's future users and stakeholders.

Key words: information technology, transparency strategy, Food Chain Supply Management, Platform "*Food for life"*

INTRODUCTION

The *fragmentation* of food tha food market and the rising significance of *quality* and *security* of products and services are accompanied by the needs to reconstruct the traditional and to build modern food supply chains and networks. To rebuild traditional supply chains management in part one of the paper were presented two main stategies, based on M. Porter's: *leader cost and heterogenity strategies* applied to information technology environmentFirst of them is *Transparency Strategy* that improve chain effectiveness. The second one is the *Flexibility Strategy* based on outsourcing techniques.To cover both strategies in competitive environmet will be presented Quality competitive substrategy as well as a *Logistique outsourcing substrategies.*

QUALITY COMPETITIVE STRATEGIES IN FOOD SUPPLY CHAIN MANAGEMENT

The use of information technologies, as presented above, enables the effective application of both strategies – the transparency strategy and the flexibility strategy – which complement each other. In food supply chain management, where quality and safety are most important it's possible to apply three substrategies supporting the transparency strategy (Trieneckens, van der Vorst 2006)

- *Compliance Substrategy*, i.e. supporting the achievement of the quality assurance level through quality management methods at each link of the supply chain with the use of IT. It focus on the registration of incoming and outgoing materials and leaves the process as a black box. No optimisation activities take place. The chain is usually fragmented since each company individually compliance with demands. All *treacibility systems* employ similar principles, in that they lay down standards and procedures which must be observe by private and public institutions and which are monitored to unsure *compliance.* This strategy together witg Good Practice in Agriculture –GPA will be aplied as a new instrument of *Common Agriculture Policy after 2013*;
- *Substrategy Oriented at Improving Processes* – concerning the implementation of traceability principles only in selected links of the supply chain, i.e. with a limited use of IT. Each organization strivess for control of product traceability within its links by means of production—integrated measures in order to achive compliance with legal regulations as well as improved proces efficiency and thus better return. As an example is the introduction of local ICT that provides traceability and also enables a more efficient handling of logistics flow;
- *Market-Oriented Substrategy* – concerning the implementation of traceability principles and monitoring supply sources at each link of the supply chain with the full use of IT. i.e. by creating added value in the market place. This may require the redesign of processes to separete: small production lots, standardization of information carriers, adjusted planning and control of production processes and so on. The traceability performance is the result of the joint effort to design and produce product.

Quality management systems (on the area of pork chains) in Nortwestern Europe increasigly cover the whole chain, supported by integrated logistics and information systems. This systems now even extend to small and medium-size companies Souther European counties are following swiftl, while Eastern European countries have just started to catch up with EU legislative quality demands. (Trienekens, Nel Wognum 2009)

LOGISTIQUE OUTSOURCING COMPETITIVE STRATEGIES IN FOOD SUPPLY MANAGEMENT

New demand on attributes of *food* such as: quality, integrity, safety, diversity and associated information (services) increase enormous cross-border flows of food products and creates international forms of cooperation. The structure of food supply chain has been changed in last decades, which increased the complesity of managing. *Outsourcing* some of logistics functions and involving *of Logistic Service Provider* into the networks might help to solve the problems complexity to achieve superior efficiency and *outsourcing* is defined as a process that involve the use external logistics companies to perform activities that have traditionally been performed with an organization ,where the shipper and logistics company enter into an agreement for delivering services at specific costs over some indentifiable time horizin (Hiao 2009 p.21)

Logistics activities can be classified into four levels: *execution level, value –adding level and planning/control level* and *design network* (see table 1). Activities at *execution level* includes: transportation (inbound and outbound) and warehausing. Labeling, packing and some selected manufacturing activities (e.g. materials mixing) are in categories of *value adding activities.* The purpose of *planning and control* is to unsure cooperations run effectively and produce products and services as expected.. Last level contains design of transportation network and location new factories and warehauses.

The selection of activities to be outsourced is influenced by the *company's logistics competitive strategy*, because on logistics strategy influences the control of logistical activities and thus the design of logistics systems Adopting M. Porter's framework, a typology of competitive strategies can be clasified as follows:

Table 1. Logistics activities tah can be outsourced by food manufacturers.

Classification	Logistics activities	Charakteristics
Planning/control level	Network design Inventory management. Transportation Network Management. Production management	Location and site analysis. Sales forecasting, Stock control Tracking and event control
Value adding level	Product labelling/packaging. Select product manufacturing activities	Route planning and scheduling; Carriers selection, mode selection, Rate negotiation; Tracking and event control Material requirement processing; Production planning; tracking and event control
Execution Level	Warehousing/transportation	Storage receiving, order-packing, delivery

Source: Hsiao,. Van der Vorst,.Omta2006, pp.. 139, Hsiao 2009

at a generic level, *logistics compatitive strategy* can be distinguished into lean and agile strategies:

- *Lean strategy* seek to achieve a lower price than competitors, that means for similar value product or service offered lower price than competitors.
- *Agile strategy* seeks to provide products or service unique or different from those of competitors in terms of dimentions widely valued by bayers. Its logistics aims are to achive higher market share than competitors by ofering better service (flexibility) at the same price.

Leanagility seeks both differentiation and a price lower than of competitors(flexibility and low costs).

We can clasify complexity of food systems on the base of: *product comlexity (*perishibility of finished products, size of products, dencity), demand fluctuation, *process complexity* (sensibility of time, manufacturing cycle) and *network comlexity (*number of trading companies countries) can choose different degree of complexity to justify outsourcing decisions. *Core activieties* should be kept *internally,* because this activity is central activity of company successfully serving the needs of potential customers in each market. An activity with potential to yield competitive advantage is *core activity.* Thus, the core activities should not be outsource.

As a result of Hsiao, van de Vorst, Omta (2006) and Hsiao (2009) companies with *lean strategy* tend to *outsource execution level of activities. ,*while companies with *agile objectives* appear to be differentiating themselves in terms of service (flexibity). Differentiation can be achived by enhaucing their operational capabilities to respond quickly and effectively to future changes in the market. To manufacture products until last minute and to achieve delivery reliability, companies tend to outsource *some value added activities. Contractual relatioships* between *Logistic Service Providers* and their clients are often limited to one year or less.

Leagly as a third type of strategy emphasized similar objectives as agile companies with the exeption that they put flexibility and maximization of product value as their top objectives. Thus, companies with *leagile objective* are likely to outsource the plaanning\control activities.

On the base of Williamson's transaction cost theory and Resource Based View the higher assets specificity of a logistics activity, as well as higher transaction uncertaties has to be keep them as *internally activities* rather than keep them out-house. Last level of outsourcing – *total outsourcing* take care of *all logistic activities* concern: the logistics network design and orchestrate the logistics flow of the network, as well as established *platforms* dedicated on a European or smaller scale, which are at strategic planning and control level, and made supply chain restructuring.

TRANSPARENCY IN THE FOOD CHAIN - EUROPEAN STAKEHOLDERS INTEGRATION: CONCEPT-FRAMEWORK TO REACH THIS OBJECTIVES

European Commition together with University of Bonn and European Platform "*Transparency in Food"* organized project "*Quality and integrity in food: a challenge for chain commmunication and transparency research"* as a part of Seventh Framework Programm. General objective of the project is to "*contribute to the devepment of transparency in the sector by supporting understanding of its complexities, identifying the present state of the art, learning from experience, making stakeholders aware, specyfying deficiencies research needs, and formulating a research framework for facilitating future research initiatives"*

This general objective is captured in the following four concrete and verifiable project objectives:

1. **Identyfication of the state-of-the art on transparency knowledge and understanding of:** transparency needs, solutions, and potentials as derived from research and best practice experiences;
2. **Identyfication of deficiences in stakeholder transparency and needs for future research initiatives:** This objective will be served by *strategic research agenda* based on a research framework for the identyfication of transparency dificiencies, research needs, and research priorities;
3. **Providing transparency uptake support:** This objective will be served by the specification of a *information backbone scheme,* that could support the development of a European Communication Network and facilitate interaction between existing and developing transparence initiatives.
4. **Developing transparency awareness:** This objective will be served by the establishment of a *transparency platform* and dedicated dissemination initiatives with stake holders on a European scale.

To fulfil upper project objectives an "appropriate transparency" with the food sector is of crutial importance and a critical success factor for:

- the *sustainable development* of the sector;
- the ability of food chain actors and policy to *guarantee food safety and quality;*
- providing *consumers* with the information they need for exercising their preferences in buying behaviour, and
- the dentification of a suitable *policy regulatory environmet* that acconts for societty's preferences regarding environmental, social, and ethical concerns.

Transparency can be reached through following a stepwise approach starting from the transparency needs of consumers and policy:

1. Identification of signals that support cunsumers' preferences in the selection of products and policy's interest in the development of a suitable regulatory framework;
2. Identyfication of suitable information sources and information generetors along of food value chain that could serve the signals assuring access feasibility and access right;
3. Specification of suitable transformation rules that link information tith signals;
4. Design of a suitable communication system concept involving agreements on technology, content, frequency, and management responsibility, which builds on standards wherever possible, allows to integrating existing solutions employs a flexible design for easy adaptation to changing scenarios;
5. Organization (implementation) of a suitable flow of information and signals along the food value chain which offers easy and open access and provides for communication breaks between enterprises along the chain. The different approaches are linked to a framework, which will guide the analysis and provide the basis for future transparency research. The framework for analysis builds on a "layer approach" that account for that complexity in transparency discussions (see fig.1).

The different layers identify different communication needs. One needs to be aware that all layers build on a **total chain view** reaching from the source of production to the customer. In the organization of transparency schemes, the drivers for the identyfication of its client are: first, the needs of the ultimate stakeholders (consumers and policy) and

secondly, the follow-up needs of enterprises for supporting them in serving markets and dealing with regulatory envuronments. The actual organization of the scheme is being built from the bottom, from raw data to be collected at the source towards the provision of the appropriate signals to stakeholders.

The framework distinguishes the following four layers:

1. **The first layer** (bottom layer) provides the **communication infrustructure** and serving tracking and tracing needs. This level includes: the technical, organizational and manageral prerequistes for successful transparency development, also involving agreements on communication units;
2. **The second layer** serves the **collection of information** about the various project domains (food safety, food quality, chain integrity). This layer represents classical information collection and communication approach;
3. **The third layer** involves the **transformation of information into signals** which serve the transparency needs of the various stakeholders (consumers, enterprises, and policy);
4. **The fourth layer** characterized the **transparency needs** of consumers, enterprises, and policy, that consider differences and, the different situations they are including: cultural background, market environment, responsibilities. In the project, the specification of the layers is supported by **best practice experiences** from various socio-economic, cultural or legal environment and builds on a broad stakeholder base partly represented by the National Technology Platforms.

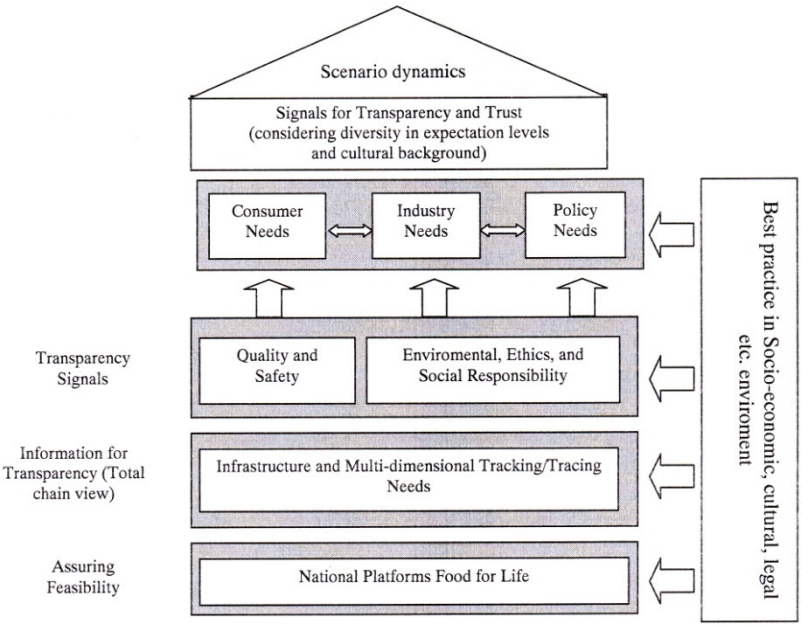

Figure 1.Framework scheme with layers and stakeholder integration
Source: Transparency in the Food Chain, Situation, Expectations, Barriers, and Research ,University of Bonn, May 2010 p.6.

SUMMARY

The influence of megatrends on the Eurpean Market provides necessity to rebuild traditional supply chains management into modern one. As a result are presented two main strategies ,that are based on M. Porter's: *leader cost and heterogenity strategies* applied into information technology environment. First of them is *Transparency Strategy* that improve chain effectiveness. The second one is *Flexibility Strategy* based on outsourcing technics. The *Transparency Strategy* is the main strategy and *Flexibility Strategy* is secondary strategy. To cover future needs it's necessary to reach higher *quality* and *security* of products and services. To reach this there are proposed 3 substrategies: *Compliance Strategy, Substrategy Oriented at Improving Processes* and *Market-Oriented Substrategy.* To fulfill upper strategies the following outsourcing strategies can be applied: *Lean, Agily and Leagility Stategies.* Choice one of them depend on the sphere of logistic activities that can be outsource. To overcome these constraints in the last part of the paper there are presented the principles of the platform *Food for Life,* witch will be build for all it's future users and stakeholders.

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***Juraj Šebo*[81]**

THE COMPARISON OF ECONOMIC EFFICIENCY OF CONSUMER PRODUCTS DISMANTLING

Abstract: One of the possibilities still often used also in advanced countries is manual or hybrid dismantling of end-of-life products. Because there are quite high work force costs in manual dismantling, it seems to be more efficient to manually dismantle bigger consumer products as small products. Our study is trying to verify this statement through evaluation and comparison of economic efficiency of manual dismantling of two different consumer electronic products (washing machine and mobile phone). In the case of washing machine, there is a much of metal (about 60 %) in its body in comparison with mobile phone which contains only about 4 % of metal parts in its weight, so the revenues and final loss of dismantling are accordingly influenced by this. The total loss from dismantling of one washing machine is calculated as -3,112 EUR and for one mobile phone is equal to -0,5538 EUR. From the calculated numbers we found out, that for comparison of economic efficiency of dismantling of different products would be better not to compare absolute loss for one product, but to compare ratio of loss to average product price.

Key words: Dismantling, costs, comparison, consumer products

INTRODUCTION

In the continuous effort of society to reuse the most of the materials from end-of-life products, there are designed and evaluated different types of technologies and equipments for recycling. One of the possibilities still often used also in advanced countries is manual or hybrid dismantling of end-of-life products. Because there are quite high work force costs in manual dismantling, it seems to be more efficient to manually dismantle bigger consumer products as small products (Fig. 1). Our study is trying to verify this statement through evaluation and comparison of economic efficiency of manual dismantling of two different consumer electronic products (washing machine and mobile phone (MP)).

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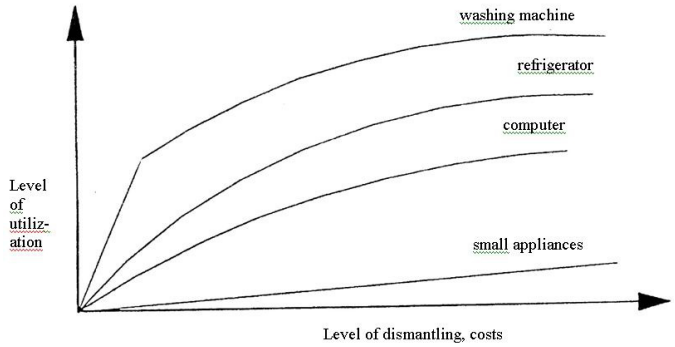

Fig. 1: Relation between level of dismantling, costs and level of utilization [1]

There are many factors which are influencing the building of recycling/dismantling facilities. Some are identified as economic (return of investment, construction costs, prices of secondary materials, price of human work, transport costs, waste disposal costs and also employment possibilities) and some as environmental (recycling rate, energy saved, materials saved) [2]. One way of comparison of selected products could be multi-criteria evaluation [3] of the factors.

In our economic evaluation we will use only one integrated indicator (total profit/loss) based on calculations of few types of costs and revenues. On the side of costs we analyze human work costs and waste disposal costs. There are not included construction costs, which could be a real case for example when a recycling facility is built through EU Funds. Also transport costs for delivery of separated materials to final treatment (e.g. steel mills) are not counted. On the side of revenues the revenues from selling of secondary materials are counted. The profit or loss is calculated on the base of above mentioned costs and revenues.

1. ECONOMIC EVALUATION OF RECYCLING ORIENTED MANUAL DISMANTLING OF WASHING MACHINE

For the calculation of the overall profit/loss for one dismantled product, in this case washing machine, we will need to count first two types of costs (personal and disposal) and one type of revenue (revenues from selling secondary materials).

The calculation of personal costs for one dismantled washing machine

For the counting of the personal costs we assume the worker will work 2000 hours a year. The total yearly cost of work force are counted from total monthly costs 997,36 EUR (counted as the average monthly gross wage in Slovakia in 2008 733,35 EUR [7] + social security payments (36 % of the gross wage)) times 12 months and are equal to 11968,32 EUR. Dismantling time measured by Pecha [2] is 46 minutes, so rounded 0,77 of hour. From this data we could calculate personal costs for one washing machine, which are after rounding equal to 4,61 EUR (11968,32 EUR / 2000 hours * 0,77 of hour).

The calculation of disposal costs of unsaleable secondary materials (wastes) from one dismantled washing machine

The calculation is based on the data described in Table 1. If we assume that only metals are saleable, the weight of unsaleable secondary materials (wastes) from one dismantled washing machine is 35,19 kg. The disposal costs of 1 kg of wastes are 0,0246875 EUR/kg (197,50 EUR per 8000 kg container [8]). The disposal costs of unsaleable secondary materials (wastes) from one dismantled washing machine, based of above mentioned numbers, are rounded equal to 0,869 EUR (35,19 kg * 0,0246875 EUR/kg)

Tab. 1. Material structure of Whirlpool washing machine fulfilled from the top

Material	Percentage from washing machine weight [%]	Weight of material [kg]
Metal	49	33,81
Plastic	24	16,56
El. components	10	6,9
Rubber	3	2,07
Other	14	9,66
∑	100	

Source: [2] and own calculations on the base of the average weight (69 kg) of this type of Whirlpool washing machines

The calculation of revenues from saleable secondary materials (wastes) from one dismantled washing machine

In Tab. 1 is the amount of metals indicated as 33,81 kg (as we mentioned, only metals we consider as saleable secondary material) and the buying out price is 0,07 EUR [6] so the overall revenues for one dismantled washing machine are rounded equal to 2,367 EUR (33,81 kg * 0,07 EUR).

Total profit/loss from one dismantled washing machine

On the set conditions, the prices in 2008 and above calculated costs and revenues, the loss from one dismantled washing machine is equal to - 3,112 EUR (2,367 EUR - (4,61 EUR + 0,869 EUR)).

2. ECONOMIC EVALUATION OF RECYCLING ORIENTED MANUAL DISMANTLING OF MOBILE PHONE

For the calculation of the overall profit /loss for one dismantled product, in this case mobile phone, we will calculate the same costs and revenues as in the case of washing machine.

The calculation of personal costs for one dismantled mobile phone

For the counting of the personal costs we assume, as in case of washing machine, that the worker will work 2000 hours a year and the total yearly costs are 11968,32 EUR. Dismantling procedure is described in Table 2. The average

dismantling time is presented in Table 3 is equal to 5 minutes and 32,37 seconds so it means rounded 0,0923 of hour. From this data we calculate personal costs for one mobile phone, which are after rounding equal to 0,5523 EUR (11968,32 EUR / 2000 hours * 0,0923 of hour).

Tab. 2. Mobile phone dismantling procedure

Task	Tool
Removing top cover	manually
Removing battery	manually
Dismantling of MP body	screwdriver
Removing keyboard, headphones, rubber protection of	manually
Removing metal part and small parts from bottom part of MP	manually, screwdriver
Dismantling of display from motherboard	manually
Dismantling of display (removing of plexi-glass, plastic leaf and	manually, screwdriver

Source: adapted from [4]

Tab. 3. Average dismantling time of 9 mobile phones

Mobile phone	Dismantling time [min. : sec.]	Average dismantling time [min. : sec.]
Nokia 1661	00:05:13:64	00:05:32:37
Nokia 3310	00:04:24:84	
Nokia 3510i	00:07:05:35	
Siemens A50	00:03:53:17	
Siemens C60	00:03:42:50	
Siemens MC60	00:11:19:02	
Siemens ST55	00:06:29:62	
Motorola T192	00:04:24:60	
Sony Ericsson T300	00:03:18:58	

Source: adapted from [5]

The calculation of disposal costs of unsaleable secondary materials (wastes) from one dismantled mobile phone

The calculation is based on the data described in Table 4. If we assume, as in the case of washing machine, that only metals are saleable, the weight of unsaleable secondary materials (wastes) from one dismantled mobile phone is 0,089683 kg. The disposal costs of 1 kg of wastes are same as for washing machine 0,0246875 EUR/kg. The disposal costs of unsaleable secondary materials (wastes) from one dismantled mobile phone, based of above mentioned numbers, are rounded equal to 0,0022 EUR (0,089683 kg * 0,0246875 EUR/kg).

Tab. 4. Average material structure of mobile phone

Material	Percentage from mobile phone weight [%]	Weight of material [kg]
Metal	9,452	0,009361
Plastic	26,999	0,02674
El. components	25,267	0,025025
Rubber	3,912	0,0038746
Other	34,373 (27,254)	0,034044 (0,026993)
∑	100	0,099044

Source: [5] Remark: The average weight is calculated from the dismantling of 9mobile phones shown in Tab.3

The calculation of revenues from saleable secondary materials (wastes) from one dismantled mobile phone

In Tab. 4 is the average amount of metals in one mobile phone measured as 0,009361 kg (as we mentioned, only metals we consider as saleable secondary material) and the buying out price is 0,07 EUR [6] so the overall revenues for one dismantled mobile phone are rounded equal to 0,000655 EUR (0,009361 kg * 0,07 EUR).

Total profit/loss from one dismantled washing machine

On the set conditions, the prices in 2008 and above calculated costs and revenues, the loss from one dismantled mobile phone is after rounding equal to - 0,5538 EUR (0,000655 EUR - (0,5523 EUR + 0,0022 EUR)).

CONCLUSION

The data for calculations of dismantling costs of washing machine and mobile phone are reached by experimental dismantling in the laboratory conditions and based on actual prices and wages in Slovakia in 2008. In the case of washing machine, there is a much of metal (about 60 %) in its body, so revenues and final loss of dismantling is highly influenced by this. The total loss from the dismantling of one washing machine is calculated as - 3,112 EUR. In comparison, the total loss calculated for dismantling of mobile phone, in the same conditions as washing machine, is equal to - 0,5538 EUR. Big difference in comparison with washing machine is in amount of saleable metal parts (only about 4 % of the mobile phone weight) what influences negatively revenues and final loss.

From this calculations we found out, that for comparison of economic efficiency of dismantling of different products would be better not to compare absolute loss for one product, but to compare ratio of loss to average product price. This ratio could give us also a clue, whether there is a real chance for incorporation of dismantling/recycling fee to a product price, with the aim of internalization of dismantling/recycling costs as an external costs for society.

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***Lenka Štípalová, Josef Drábek*[82]**

SOURCES OF RAW WOOD FOR WOOD-WORKING INDUSTRY OF SLOVAKIA

Abstract: In this work we deal with questions of raw wood sources for wood-working industry of Slovakia. The tasks were found and evaluated development of resources and possibilities of utilization in regions of Slovakia. For this purposes there were use data of forest economy of Slovakia in 2009 (green report), a data from summary information of forest condition in Slovakia and prognosis of their resources and utilization. On basis results we suggest more intensive utilization of domestic raw wood.

Key words: wood-working industry, raw wood sources, resources development, wood acquisition.

INTRODUCTION

Slovakia is included of his forestation amid countries in Europe with the highest proportion of forest area to the state.

Long-term availability of raw materials and growing forest resources in the Slovak Republic are the potential for effective development of the forest industry, it is necessary to build the best wood industry and to provide him the necessary information about the producers of wood raw material, the available quantities, assortments and quality.

In connection with the growing demands of the company on energy and material consumption are increasingly getting into the fore the question of renewable energy and raw material resources.

For a thorough assessment of potential uses is necessary to analyze the resources and prices of raw timber and his potential feeling. Based on this analysis can then consider using the wood supply in the future.

It should be aware of that we are a legal member of the European Union, and thus for our country, opening new market, business, and contact options. It is also important developments in neighboring countries, which are basic customer of timber exported from the Slovak Republic to abroad. In this context becomes pressure in the future, which is becoming evident already today, because demand for wood will grow thats increasing its value.

All at once also future possibilities of production and timber production depend on the state indicators, which consists mainly of forest areas of wood supply and increments of wood. Felling options of wood are influenced by health status of forest resources, the level of care about forests and relevant legislation. An important factor that will influence forest farm in the future will range of climate change.

1. OBJECTIVE AND METHODOLOGY OF THE WORK

Objective of work will identify the sources and felling of wood raw material for the claim timber industry in Slovakia in years 2010 – 2025. In this work we find the stock development and manufacturing capacity, the volume of wood raw material in the sawmill operations by individual areas of the Slovak Republic, divided in middle, eastern and western Slovakia.

To meet the target it is necessary to process the following targets:

- Analyze the forest resources of the SR, the state in 2008,
- Assess realized logging in the forests of Slovakia, the state in 2008,
- Analyze the species composition in the regions of Slovakia and species representation made in mining.

The work is compiled on based documents from the Green report, Summary information about state of forests SR and forecasts development felling. In work is mainly used methods of analysis and synthesis of theoretical and practical knowledge, data and information from the National Forest Centre in Zvolen, but also from other available literature.

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2. RESULTS OF THE WORK

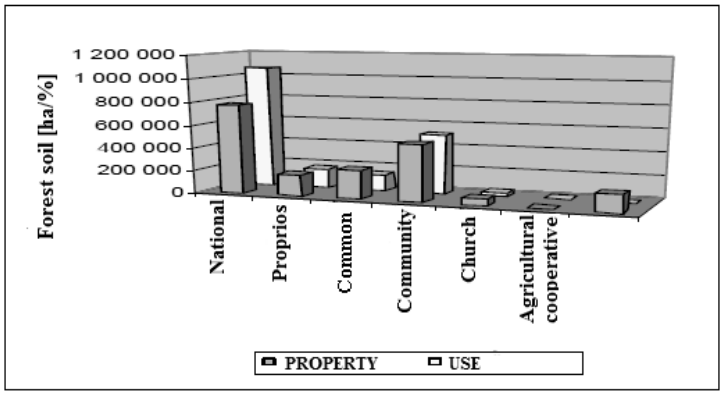
2.1. Development of resources of wood raw material and their property in Slovakia

The structure of ownership and maintenance of forests SR resulting from the register owners and agriculturalist of forests.

The use of state subjects is the total area of forests SR 55,1%, while state-owned, their 40,2%. Highest proportion of not provided forests are in the privately property. The reason is that it is mostly forest land in the small individual ownership and mutual co-ownership, which can´t be identified in the field and there are also property owners who, for various reasons did not request about their return.

Table 1. The structure of the forests by their property and use for year 2008

Property type							
Category	National	Common	Private	Community	Church	Agricultural cooperatives	Unknown
Forest soil [ha/%]							
Property	777 107	187 818	252 192	495 051	57 818	4 438	159 167
	40,2	9,7	13	25,7	3	0,2	8,2
Use	1 067 124	170 264	139 080	519 361	32 530	5 232	-
	55,1	8,8	7,2	26,9	1,7	0,3	-



Graph 1. The structure of the forests by their property and use for year 2008

2.2. The availability of forest resources in Slovakia

The data of customs statistics show that in 2008, 2289 thousand m^3 timber exported in worth 3165 million EUR. Owners and users of forests have been sold abroad in the amount of wood 355 thousand m^3. It was 290 thousand m^3 coniferous and 65 thousand m^3 broadleaves. Difference 1 934 thousand m^3 exported others subjects, especially companies. Forest subjects only slightly reduced exports and exported about 70 thousand m^3 wood less than the previous year. Business not forestry subjects increased exports by 686 thousand m^3. Such a situation where exports up 19% of domestic raw material without additional added value, it is not advantageous for domestic wood processors and company, but also for forestry subjects, that such a trade with foreign countries do not receive anything.

Table 2. Export of assortments raw wood abroad

Assortment of wood	2007		2008	
	th. m^3	%	th. m^3	%
Coniferous cut-out (I. - III. quality class)	544	35,5	1 010	44,1
Coniferous wood (IV. and V. quality class)	379	24,7	746	32,6
Broadleaves cut-out (I. - III. quality class)	122	8,0	100	4,4
Broadleaves wood (IV. and V. quality class)	412	26,9	337	14,7
Firewood	76	4,9	97	4,2
Together	1 533	100	2 290	100

The export of timber from Slovakia has fallen from 2000 to 2005. The increase in 2005 to 1,815 thousand m^3 was result of the abortive need to processing of calamitous timber. From Slovakia in 2008 exported 392 thousand m3 of coniferous and 50 th. m^3 broadleaves lumber, of which forestry subjects exported 12 th. m3 of coniferous and 1 thousand m3 of broadleaves lumber. Data on imports of raw timber assortments from abroad between 2007 and 2008 are shown in the next table.

Table 3. Import of assortments raw wood from abroad

Assortment of wood	2007		2008	
	th. m^3	%	th. m^3	%
Coniferous cut-out (I. - III. quality class)	15	3,6	9	1,1
Coniferous wood (IV. and V. quality class)	46	11,2	218	27
Broadleaves cut-out (I. - III. quality class)	74	18,0	23,0	2,8
Broadleaves wood (IV. and V. quality class)	265	64,3	500	61,9
Firewood	12	2,8	58	7,2
Together	413	100	808	100

2.3. The development of timber prices in Slovakia

The volume of timber sales increased year on year to almost 14%, mainly along of to higher exports of timber to foreign countries (+27.9%). The increase in sales shared mainly coniferous wood. Average realization of the wood in forest economy SR nevertheless decreased up to 12%. Especially at the end of 2008 for the realization assortments of wood and demand after them showed financial and economic crisis. The difference in average realization of the state and private sector was minimal (0.5% for state sector).

The development of prices of wood since 2004 was recorded in Tab. 4, the fact that we focused on the prices assortment of cut-out III. A, B, C classes, and we also divided according to their development in the eastern, western and central Slovakia.

West Slovakia include: forest SR, s.e. Branch plant – Levice, Palarikovo, Považská Bystrica, Prievidza, Smolenice, Šaštín, Stráže, Topoľčianky, Trenčín.

Central Slovakia include: forest SR, s.e. Branch plant – Beňuš, Čierny Balog, Krasno n. Kysucou, Kriváň, Krupina, Liptovský Hrádok, Námestovo, Revúca, Rimavská Sobota, Slovenská Ľupča, Žarnovica, Žilina, SLŠ Banská Štiavnica, ŠLP TU Zvolen, VLM Pliešovce, s.e.

Easter Slovakia include: forest SR, s.e. Branch plant – Bardejov, Košice, Prešov, Rožňava, Sobrance, Vranov, LPM Ulič, s.e., School grange Cemjata, ŠL TANAP, Tatranská Lomnica, s.e.

Table 4. Development of price assortments III. A,B,C

Woody plants	Assortment	2004			2005			2006		
		Eastern	Central	West	Eastern	Central	West	Eastern	Central	West
Coniferous	III. A,B,C	52,58	60,28	52,15	51,68	55,67	50,52	56,16	58,35	53,84
	fibrous	25,13	26,75	23,60	24,60	25,89	22,97	25,69	28,55	24,93
Broadleaves	III. A,B,C	59,32	60,78	56,30	57,33	57,62	52,65	58,49	56,66	54,74
	fibrous	29,54	31,34	30,54	33,43	33,46	31,93	35,68	36,58	35,25
Woody plants	Assortment	2007			2008			2009		
		Eastern	Central	West	Eastern	Central	West	Eastern	Central	West
Coniferous	III. A,B,C	60,91	63,07	57,53	53,28	54,11	52,25	42,77	45,22	45,16
	fibrous	29,58	30,37	28,51	24,07	25,13	23,97	20,54	22,69	22,08
Broadleaves	III. A,B,C	60,48	59,12	57,66	60,41	56,43	57,79	46,39	47,38	44,53
	fibrous	40,60	42,22	38,94	37,14	37,28	36,18	32,81	32,00	31,42

2.4. Prognosis in use of wood raw material for years 2010-2025

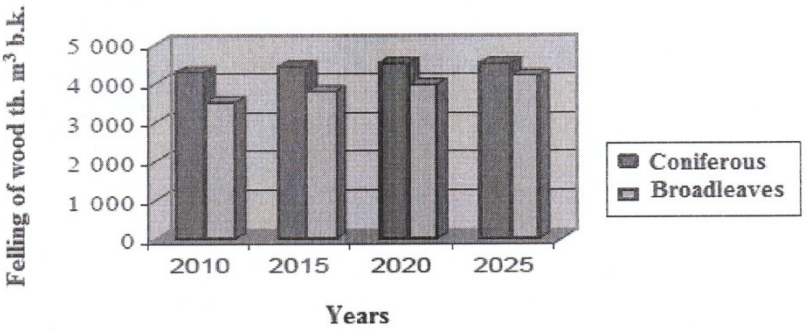
In the context of rising timber felling its bind also him allowable cut, therefore lots, that is to be felled from forests work out without that disrupt yield concinnity. Allowable felling wood is a standard for comparison, whether in the forest fell many or little. Given the alleged importance of allowable cut is a very important method of determining, the basic data on the state forest, which calculates the allowable cut, but also detailed analysis of the calculated amount and structure of the allowable cut.

In to knot to felling timber will be the development of the stock in the next term, 30-40 years increased. Forecast the total volume of felling are shown in Tab. 5.

Decrease in felling wood is expected for the period 2040-2050. A significant reduction occurs because the current under-representation of 20-50 year forest. The resulting rate reduction, but also the future age composition of forests affects the way regulation of felling during possibility felling wood.

Table 5. Prognosis of timber harvesting in the forests of Slovakia

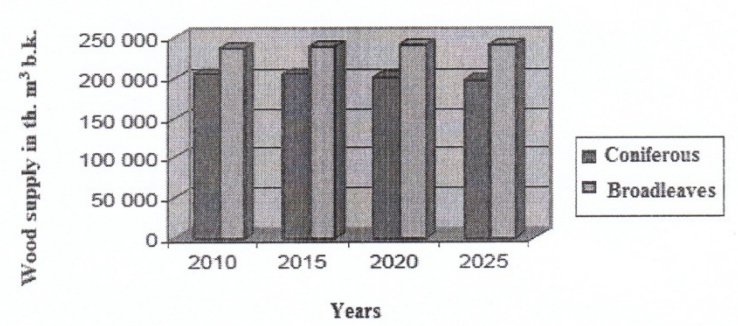
Year	Felling of wood in thousand m^3 b.k.		
	Coniferous	Broadleaves	Together
2010	4 282	3 523	7 805
2015	4 434	3 781	8 215
2020	4 538	3 993	8 531
2025	4 512	4 222	8 734



Graph 2. Prognosis of development timber harvesting in the forests of Slovakia

Table 6. Prognosis of development wood supply in the forests of Slovakia

Year	Wood supply in th. m^3 b.k.		
	Coniferous	Broadleaves	Together
2010	204 114	237 123	441 237
2015	204 078	238 871	442 949
2020	201 511	241 059	442 570
2025	197 638	240 690	438 328



Graph 3. Prognosis of development wood supply in the forests of Slovakia

2.5. Specifications of wood resources in the regions of Slovakia

Forests in the Slovak Republic covers about 2,000,000 hectares, which is 40% of the whole territory. In comparison with neighboring countries peculiarity Slovak forests is that a relatively small area is very varied natural conditions and different types of forests, from lowland to alpine forests. During the past 40 years, the total area of forests in more than 10%. Total overgrow forest resources stock has almost doubled and is still growing.

Extension of trees in the forest relative closely follows on the macrorelief territory. Plains and rolling hills of southern and eastern Slovakia broadleaf captured and in the mountains of northern and central Slovakia dominated by mixed coniferous-dominated forests.

The quantity and quality of wood produced materials, as well as the degree of implementation of socio-beneficial function depends on the structure of the forest. In essence, the representation of plants and spatial distribution of trees in the overgrow.

Formation of the forest as an integral part of production activities is one of the main articles of the forest, which decides on the total production of wood, but also the effects of forest functions.

The mission of Forest Management is to detect a condition of wood supply, its production and felling opportunities, natural, social, technical, ecological and economic conditions of farming and management to determine objectives, monitor and evaluate development and forest management plans for them to be permanently ensure compliance with all of their capacity, while maintaining consistency of public interests and the forest owner. The result of elaborating HUL are forest management plans in total forest management plans and other works that are the basis for professional, systematic and purposeful management of forests, forest management and application of forest policy.

3. CONCLUSIONS AND RECOMMENDATIONS

Forestry in Central Europe, particularly in Slovakia is located in deep crisis. Its main cause is the lack of financial resources. We can say that it decides whether to retain their status forestry as an important industry, which is indispensable for a company to provide economic, environmental (ecological) and social function, or will be followed by further marginalization.

Economic necessity today is becoming wider and more intensive use of domestic raw material base. Its sources include not only the deposits of mineral resources, but essentially the wealth of forests. Cut off tree and use the wood mass, it is little compared to the time at which the seed of this giant among the plants grow. In this respect, not to mention that the wood we need more and more, we should use every felled tree literally the last filings.

Woodworker, broadleaf and coniferous saw logs, consider the actual situation in the timber market as critical, as sales of timber and sawmill products across Europe is complicated. There are problems with the sale of wood, also with sales of total wood fuel, reducing demand for coniferous fibers, which is hardly selling in the higher classes, the first and second class, however, and it can be said that this problem affects all types.

Share for the years 2008 and 2009 are shown actually lower of encashment wood. Preferentially is felling calamitous wood. However, for any subject such as the wood can be sold. As a result of low prices of the last two years show such gains as in previous years, so it is worth considering whether it is better to use wood raw material for energy purposes. Climate change and permanence of power supply is the biggest challenge for scientists, politicians, farmers and foresters to work in common goal to replace fossil renewable energy sources. Slovakia has commit the proportion in the total consumption of primary energy sources in 2012 to 10% and electricity production to 19%. Slovakia lags far behind the average of 27 EU member states, which are currently more than 13% of the biomass cover 7.5% of total consumption PEZ.

Despite the approved document in 2008 (Biomass Action Plan) failed to significantly increase production and domestic consumption of fuel dendromass. The reason was: mitigate rising prices for fossil fuels incoordination politician interested departments and difficulty of using financial support from the Structural Funds. It was not built any significant energy source, using wood biomass. State enterprise forest SR produced 140 thousand tons of chips, the rest were produced by other producers. Export chips remained at the same level as in 2007.

Slovakia has dispose a sufficient base of forest biomass, which creates good conditions for its effective energy use. Significant sources of forest biomass are essentially immediately available and section has already used for energy purposes. Creating the necessary economic and technical conditions can optimize the use of forest resources biomass achieved in relatively short term. Considering that the optimal initiating steps to increase the share of forest biomass for make heat and electricity to investor support, who want to provide replacement of fossil fuels for made heat and electricity. Production of biomass for energy purposes can be in the medium term to increase substantially in acceptable economic conditions. Is concerned especially, cultivation of energy crops of fast-growing plants on plants unused agricultural soils. A significant benefit of this solution is an increase in ecological stability and conservation biodiversity of the territory. A necessary condition for achieving the goals in the production of forest biomass for energy use is the implementation of a program of afforestation agricultural unavailable lands for production of biomass as a renewable resource.

CONCLUSION

Based on the analysis of processed documents, we found that the forests of the Slovak Republic are several forms of ownership. Forests have the largest representation in the use of state agents and 55.1% of the total forest area.

Raw wood on industrial processing showed for export growing trend in value but the weight was decreasing trend and increased the average price of exports. Imports of wood for industrial growth showed a similar trend as the average price of imports, however, was significantly lower than the average price of exports. Year on year decline for the first two months in 2009 as exports and imports in the current decline in average export prices and rising import prices shows an average deterioration of the competitiveness of wood and it seems that it would be appropriate to create the conditions for effective recovery in domestic processing, where production capacity is underutilized.

Local, Slovak saws are usually small and use outdated technology. In consideration can be observed imbalance between the volume of wood supply and supply capacity of the individual mills. In general, the growth in this sector mainly due to foreign investment. In general, the growth in this sector mainly due to foreign investment. Most Slovak originally saw it was taken over by foreign companies. An example is Bučina in Zvolen, formerly one of the major processors of wood of deciduous trees, which was purchased Austrian company Kronospan. On the other hand, Smrečina Banska Bystrica, coniferous wood processor is still in the hands of the Slovak owners.

One of the characteristics elements of developed economies is used efficiently and a high degree of recovery of domestic raw materials and resources, for what Slovakia is for the use of a high degree of recovery of wood raw material. It follows that the phenomenon of efficient development of wood industry in the coming years is greater finalization of wood products, resp. invention and innovation in all areas related to this issue.

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DEVELOPMENT AND APPLICATION OF BAR CODES

Abstract: The road leading to the establishment of the UPC bar code standard, which initiated the development of a family of line codes is discussed. Based on the UPC code the structure of a bar code is presented together with the principles of its reading using a laser scanner. The structure of the EAN-13 code is characterised and its evolution towards a global standard, i.e. the GS1 system, currently predominant in logistics is shown. The area of the GS1 system applications and the structure of the logistics label applied within this system are presented.

Key words: Bar codes, cod UPC, cod EAN-13, Global system of identification GS1

GENESIS OF BAR CODES

A bar code is used for automatic identification (AI) of goods and other objects as well as their recording in computer systems. In accordance with the general definition a bar code is a graphic image (representation) of digits, letters and other

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signs of the American Standard Code for Information Interchange (ASCII), read visually. It is found in the form of dark and light elements of various widths, which arrangement was created according to the principles of structure defined for a specific code type. The description of the construction principles for individual types of codes, i.e. the manner in which signs of the printed writing are represented in systems of light and dark elements, is referred to as symbolism.

The appearance of the concept for an automatic identification of goods dates back to 1932. At that time at Harvard University a prototype was presented of a system developed by a team headed by Wallach Flint, in which customers selected goods by pulling out a respective perforated card from a catalogue. After the card was placed in a reader, the system automatically supplying the goods to the cashier was activated and a receipt was printed, while the stock on hand was updated. However, proposals contained in this pilot project were not implemented.

New solutions in this field appeared as late as 1948. At that time Bernard Silver and Joseph Woodland, employees of the Drexel Polytechnic in Philadelphia, started working on a system for automatic reading of information on products. In 1949 they patented (US Patent #2 612 994) a solution called "Equipment and methods of classification". The patent specification contains two versions of code presentation. The first version took the form of a pattern composed of straight, white lines presented against a dark background (http://kody-kreskowe-historia.dlawas.com/). The concept for this type of a code was taken from the Morse alphabet, which dots and dashes were extended downwards. Information was coded in the occurrence or absence of one or more lines. According to the other version the code consisted of a series of concentric circles and is referred to as the bull's eye. However, the inventors did not solve the problem of sign reading and its transformation into an electric signal. Focused light was required, which would give an adequate effect of reflection. Equipment for sign reading, constructed by Woodland, did not prove practical, since it was too big and dangerous to use. Its operation required the application of a light bulb of considerable wattage (500W), resulting in fire hazard. The fiasco of experiments with the reading equipment led to the sale of the patent to Philco in 1962. Patent rights to the coding system expired in 1969 (http://www.komputerswiat.pl/).

New attempts to the application of bar coded were undertaken in 1967 by the National Association of Food Chains (NAFC), which prepared a system using a variant of the bull's eye code. At the same time an engineer, David J. Collins, solved the problem connected with the need to use a sufficiently focused light, necessary to read the code. He used laser light for this purpose. Finally competition for the commercial application of bar codes was won by IBM (International Business Machines Corporation), which used a variant of the code in the form of vertical lines. It turned out that this type of code requires simpler printers and in case of smudges of dirt and damage it more frequently yields appropriate readings than in case of the bull's eye code. In 1970 producers and retailers from the USA and Canada established the Universal Code Council (UCC), which on the basis of solutions developed by IBM prepared uniform principles of goods labelling and approved them in 1973 as a standard. In this way the Universal Product Code (UPC) was created. The practical application of UPC in retail dates back to 1974, when a product code was scanned for the first time – it was a packet of 10 Juicy Fruit chewing gums by Wrigley, sold in a supermarket in Troy, Ohio (http://www.satoeurope.com/pl/).

STRUCTURE OF UPC AND EAN-13

The UPC system is composed of a system of black and white lines and 12 digits. A set of two black and two white lines of varying width corresponds to each digit. The first digit is a prefix (a numerical system) and indicates the destination or group of goods, e.g. 3 – medications. The next five digits identify the producer and the following five indicate the product. Both identifiers have a constant number of digits. The first and the last digits are printed on both sides of the code, while two 5-digit groups of identifiers are placed below the code. The last digit of the code is used to verify whether it was properly read. It is calculated according to a special algorithm, on the basis of the other digits of the bar code. If the control numbers, i.e. the scanned and the calculated one, are identical, then it is highly probable that the entire bar code was properly read. Longer lines on the left and right side of the code denote Start and Stop, while the longer middle lines are the intersign gap.

The UPC is found in the full 12-sign version (UPC-A) and a shortened, 6-sign one (UPC-E). Figure 1 presents an image of the complete UPC version.

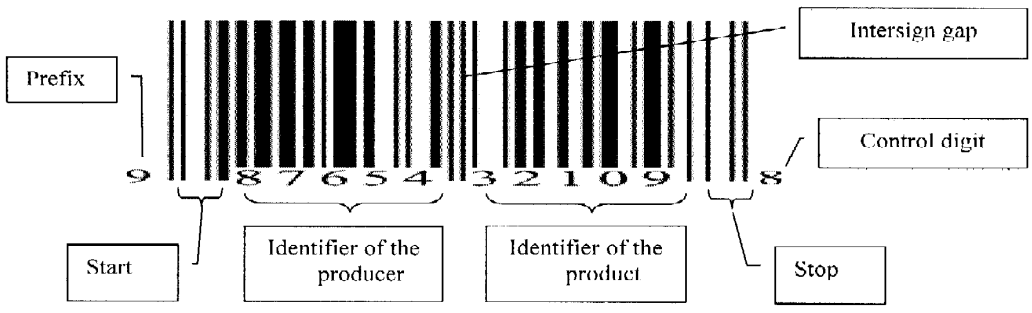

Fig. 1. Complete version of the UPC (12-sign, i.e. UPC-A)
Source: based on http://www.komputerswiat.pl/, modified by the author.

Information included in the UPC is only used to identify the producer and the product and does not contain other data. Read identification numbers are sent to the computer data base and there they are associated with other data, describing the producer and the product in more detail, e.g. indicating the address of the producer, the price of the goods, date of production, etc.

On the basis of the UPC-A the European standard for product coding, i.e. the European Article Numbering (EAN-13), containing 13 digits was developed and next approved in 1976, as well as its shortened, 8-digit version, EAN-8. The European code standard was created by the extension of the numerical code (prefix) of the UPC from one to two or three digits. Such a solution was adopted due to the number of countries covered by the EAN system. Poland is ascribed the identification number of 590. In 1977 the European Article Numbering Association (EANA) was established with its seat in Brussels, which in 1981 was transformed into an international association, the International Article Numbering Association (IANA).

The structure of the EAN-13 code is presented in Fig. 2, where the first three digits identify the country of the producer (or the economic region). Codes with a prefix "2" are exceptions in this respect. They are internal codes (of manufacturers and retailers) as well as codes of goods of varying amounts (bulk goods to be weighed), and goods denoted with prefixes "978" and "977", reserved for books and magazines. The next four to seven digits of the code denote the producer (or distributor). The code of the producer is a unique series of digits assigned to the manufacturer by the national recording organisation of the EAN system. The higher the number of products to be covered by coding, the shorter the applied code of the producer. Then more digits are used to code products. The code of products may be formed by two to five digits. They are assigned by the producers and they are responsible for their uniqueness. The number of digits, which indicate the producer and the product, varies (differently than in case of the UPC). In turn, similarly as in the UPC, the last digit is used to verify the accuracy of the code reading. It is placed under the bar code (see Fig. 2).

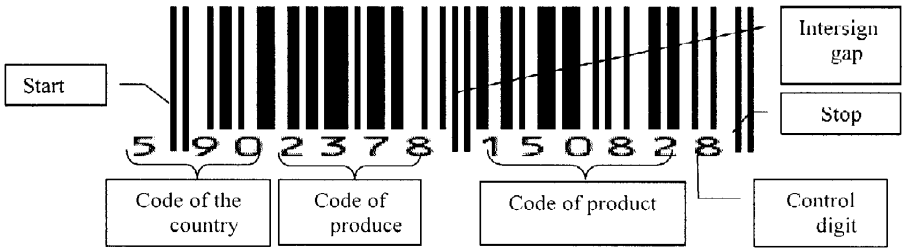

Fig.2. Cod EAN-13
Source: a study by the author.

Adding a zero to the beginning of the UPC-A code transforms it into the EAN-13 code.

Reading of the bar code by the scanner is facilitated by a beam of light emitted by a laser or a strong light-emitting diode (Light-Emitting Diode - LED). Figure 3 presents a manual laser scanner MS9544 Voyager PDF. It reads all line codes and 2-D codes such as RSS and PDF417.

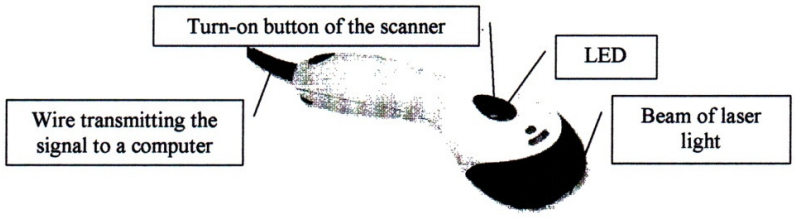

Fig. 3. A manual laser scanner MS 9544 Voyager PDF
Source: http://www.gold.com.pl/index.php?d=produkt&id=99.

A beam of light sent by the scanner is moved over a surface with a printed bar code. Figure 4 presents the sequence of a bar code reading by a scanner.

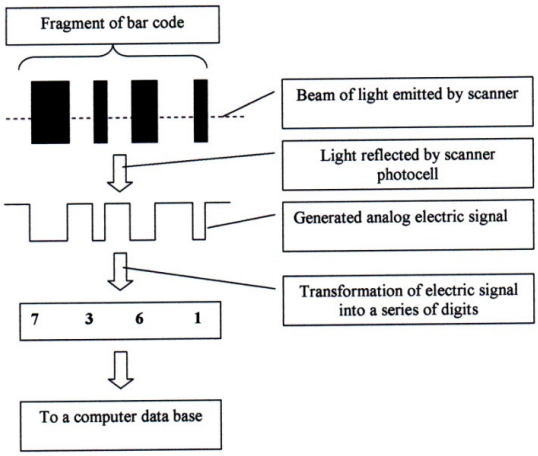

Fig. 4. Reading of a bar code by a digital scanner
Source: a study by the author.

The black ink of the code bars absorbs light and the white areas (gaps) reflect it. Both effects are recorded by the photodiode incorporated in the scanner. Next it transforms it into electric impulses, which are changed into digits or signs by a chip and further sent to the computer. Light reflected from light areas induces stronger electric signals, while weaker impulses are a result of a lack of reflection (black bars). The duration of signals depends on the width of bars or gaps. In this way a series is formed of electric impulses with varying current strength and duration. Produced electric signals may be presented in the form of a binary record. Then a dark, narrow band represents the digit 1, while a light, narrow band is equivalent to a zero. Figure 5 presents the system of black and light lines recorded as a series of digits 1011, i.e. a single black band (1), a single light line (0) and a double black band (1, 1).

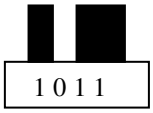

Fig. 5. The system of black and light lines of the code in the binary record

Source: a study by the author

Protection bands "Start" and "Stop" are coded as a series of 101. In turn, the gap between signs (middle lines) are coded as a series of 01010.

Starting from 1989 the EAN system includes also the alphanumerical EAN-128 code. In this code additional information may be recorded, such as date of production, expiry date, series number, etc. EAN-128 is used first of all to label dispatched packages.

Poland joined the EAN system in 1990, as the 47th member country. At that time a national organisation was established - the Bar Code Centre (Centrum Kodów Kreskowych - CKK), which assigns identification numbers to producers as well as coordinates and supervises the application of bar codes within the EAN system. The Centre is based at the Institute of Logistics and Warehousing (ILIM) in Poznań. In 1992 IANA was renamed to EAN International.

GLOBAL SYSTEM OF IDENTIFICATION GS1

In 1998 EAN International and UCC decided to integrate the UPC system with the EAN system. In this way a worldwide, inter-branch system of labelling and automatic identification of goods and commercial entities, as well as the exchange of commercial information, using bar codes. In 2005 EAN International was renamed into Global System One (GS1). At the same time the name of the national organisation CKK was changed into GS1 Polska (Hałas 2005).

The area of application for the GS1 system was considerably extended in relation to the solutions offered by the EAN coding system. The GS1 system contains not only standards of identification for companies and goods found in the wholesale and retail turnover, but is also includes identification standards for logistics entities created for transportation purposes, physical locations as well as resources and services. Thus the following identification numbers are distinguished (Majewski 2008):

- Global Trade Item Number (GTIN) – for commercial units (goods).
- Serial Shipping Container Code (SSCC) – for logistics units, such as bulk transport units, such as packets, pallets, barrels, bags, boxes, etc.
- Global Location Number (GLN) – to identify companies and locations in those companies.
- Global Individual Asset Identifier (GIAI).
- Global Returnable Asset Identifier (GRAI).
- Global Service Relation Number (GSRN).

In the GS1 system a significant role is played by the logistics label (transportation label). It is composed of three parts. The first (upper) part contains the address of the company and optionally its logo. The second (middle) part comprises a text, which was included in the bar code, while the third part (bottom) contains the bar code. Thus information found in the label is presented in two basic forms: visually eligible and read automatically. The first form comprises texts and possibly graphics, while the other consists of bar codes. Texts are to provide access to information contained in the bar code, irrespective of the automatic reading.

In the logistics labels of the GS1 system the code of GS1-128, previously named EAN-128, is applied. This code is a variation of Code-128, reserved solely for the GS1 system. This makes it possible to record all signs (alphanumerical and special), included in the ASCII standard. The GS1-128 code facilitates high compaction of data. Moreover, in relation to the EAN-13 code brings much more information. This makes it possible to code not only identification numbers, but also data used in the management of a chain of supply. In coding of data the Application Identifier is used. The Application Identifier is a prefix of two to four digits, which defines the importance of the data following this identifier, such as date of production, expiry date, the amount/quantity of product, etc. Identification numbers are also preceded by respective Application Identifiers.# In the logistics labels of logistics units (bulk packages) the only obligation is to place the SSCC identifier. It is preceded by prefix 00, which is the Application Identifier appropriate for the SSCC number. Incorporation of the other data is only recommended. The List of Application Identifiers of GS1 contains appendix 3 to guidelines for appropriate labelling of logistics units (www.gs1pl.org/). Several series of data may be blocked in one symbol of the bar code (one bar code).

CONCLUDING REMARKS

Application of bar codes makes it possible to introduce information in real time, which potentially increases the scope and accuracy of management of flow of goods and products in an enterprise. The use of bar codes results in a reduction of errors during the acceptance of goods and their unloading and during the dispatching of products to customers. This also

contributes to enhanced accuracy of information on the status of stocks and to reduced outlays on conducted inventory taking.

However, the utilisation of information read from bar codes requires appropriate Warehouse Management Systems (WMS) software –supporting the management of warehousing processes, or Supply Chain Management (SCM) software – supporting the management of the chain of supply. Only the application of the IT system makes it possible to benefit from bar codes. However, the purchase and installation of software not only increases the volume of necessary outlays, which have to be incurred and taken into consideration in business calculations. Thus many producers, particularly smaller, are reluctant to introduce bar codes.

Pioneers in the use of bar codes are first of all large production and commercial enterprises. At a larger scale of business activities the profitability of such investments increases. However, with an increasing frequency it is not a detailed account of profitability that is a factor determining the introduction and utilisation of bar codes. It is determined by business partners, who already apply bar codes in their enterprises and presents the introduction of codes by their suppliers as a condition for further cooperation.

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***Marek Tabert, Wojciech Lis, Jan Chudobiecki*[84]**

CHARACTERISTICS OF THE RFID SYSTEM AND ITS APPLICATION IN LOGISTICS

Abstract: The origin of technology was has talked over the technology of automatic identification of objects using radio waves. Currently the RFID technology is one of the most dynamically developing methods of automatic object identification. It is replacing or co-existing with the semi-automatic (the so-called human-assisted) identification, realized on the basis of an optical bar code. The structure of system was introduced tags RFID (also called transponders – micro radio transmitters) are small-size communication elements, in which required information may be recorded. Despite a significant decrease in prices of tags, as well as the other components of the RFID infrastructure, the cost of installation of this system is several times higher than that of the implementation of the bar code technology. In Poland the RFID technology was implemented for the first time in the furniture industry in 2008.

Key words: the technology of automatic identification, RFID labels, tag RF, readers, properties of the RFID system

INTRODUCTION

The beginnings of the technology of automatic identification of objects using radio waves (Radio Frequency Identification - RFID) date back to the 1940's and initially this method was used to signal the presence of objects. Its concept stemmed from the mode of operation of metal detectors. In the beginning a commercial application for the RFID technology was found in the anti-theft systems used in supermarkets, where it started to be implemented in the 1960's. The scope of applications for the RFID technology increased considerably after the introduction of microchips and the establishment of global label data recording standards. In the 1970's the Tiris system, the first comprehensive RFID system, was developed by Texas Instruments. General Motors (USA) was a pioneer in RFID applications in production processes. The first goods identified using the RFID technology appeared in American hypermarkets in 1974 (http://www.rfid-lab.pl).

Currently the RFID technology is one of the most dynamically developing methods of automatic object identification. It is replacing or co-existing with the semi-automatic (the so-called human-assisted) identification, realized on the basis of an optical bar code. It is used in wholesale and retail, in mail-order companies, in theft protection and counterfeit protection, in libraries, in parking systems, at toll fee calculations, as well as in the support of traffic control processes. However, it is particularly useful in the control of goods and product flow in logistics and in production processes, under difficult environmental conditions. This facilitates the reading of information identifying objects and other data, also in a situation when access to this information is complicated. This makes it possible to identify many goods at the same time (Majewski 2008).

In its present form the RFID technology consists in the automatic, remote-control reading of data using a reader of low frequency radio waves, emitted by RF tags, which are attached to products or logistics units (bulk packages). Tags are microchips, which are equipped with a micro-antenna. They are placed in the encapsulation facilitating their attachment to objects. Tags receive signals and send them back to the reader. Each tag contains a unique identification number of an

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object – analogous to that which is transmitted by the bar code, but it may also store other information, e.g. date of production or expiry date of a product, etc. Tags take very different forms. They are found in the form of stickers (labels) with additionally printed bar codes, they may be placed in a plastic packaging or sealed with plastic. Labels with tags are becoming increasingly important due to the fact that they combine a conventional system of identification based on a bar code with the new radio reading technology.

STRUCTURE OF THE RFID SYSTEM

The RFID system is formed by the following components:

- labels with a passive or active tag,
- a transmitting-receiving antenna,
- a reader which contains a receiver and a decoder,
- communication and application software.

RFID labels are also referred to as smart labels. They contain tags of small dimensions, programmable during printing using RFID printers. On such labels it is possible to:

- record and read open data,
- record and read encrypted data,
- add data at any given moment,
- delete previously recorded data.

Moreover, chipless RFID labels are also used, in which the role of a chip is played by a dedicated modulating-demodulating circuit, which makes it possible to considerably reduce costs of labels. The process of data identification consists in recording of information in the tag memory and its reading at the required moment. The RFID labels may be printed by thermotransfer printers, equipped with an RFID decoder. This makes it possible to record data in the memory of a tag and at the same time to print them on the label in the form of a bar code and text. Such labels are a special carrier of data, which are recorded once in the electronic form (RFID) and thanks to the possibility for an additional printing - this is done for the second time in the form of a bar code and in the form of a visually eligible text. The RFID system may completely replace information contained in bar codes or supplement them.

In the RFID technology the identification of goods is realized on the basis of the Electronic Product Code (EPC), which is also called a radio bar code. It is an equivalent of the Global System One (GS1) standard used for bar codes. The GS1 and EPC codes have the same functionality and may be used interchangeably. EPC is a 96-bit identification number, unique worldwide. Management of the EPC standard and commercialization of this solution is performed by EPCglobal Inc., a non-profit organization. On the basis of the read identification number of goods access is obtained to a data base of an enterprise, in which other information on the product and manufacturer is contained, including also other data used in the logistics chain (http://www.epcglobalinc.org/).

Communication of tags used in the RFID labels with readers occurs via radio technology in several frequency standards (Sweeney 2005):

- low frequency (LF), 10-500 kHZ, in which the frequency of 125 kHz is used most often, with a reading from a distance of approx. 0.5 m,
- high frequency (HF), 10-15 MHz, of which 13.56 MHz is used most often – at a range from 1 m to several meters,
- Ultra High Frequency (UHF), 860-960 MHz, and microwave frequency, of 2.4-5.8 GHz, at a range of up to 3, or even 6 m (http://www.rfid-lab.pl/).

Operating frequency of the RFID system is one of its most important parameters. The maximum distance between the reader and the tag depends on frequency. Frequency also affects the speed of data reading. When selecting frequency the environment in which the system is to work is taken into consideration**.** For example, a different frequency is used when working with the detection of non-metallic elements and another one when metal elements are detected.

The RFID labels, depending on the type of applications, are of different sizes and are made from different materials, such as paper and plastic. The average cost of one RFID label ranges from € 0.5 to 1 Euro. Figure 1 presents an RFID label.

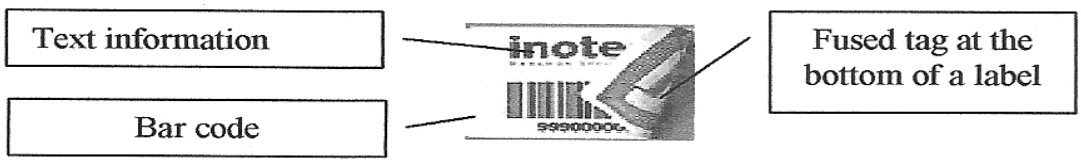

Fig. 1. The RFID label

Source: the author's study based on http://www.logismarket.pl/etykiety-rfid/736384472-cp.html

RFID tags (also called transponders – micro radio transmitters) are small-size communication elements, in which required information may be recorded. A tag is a chip equipped with memory (from several dozen bits to several thousand bits) or a processor and a micro transmitting antenna, sprayed onto a layer of an insulator. Tags are approx. 50 microns in thickness and may be less than 1mm*1mm in area, or even be of 0.4*0.4 mm, as in case of passive tags (http://www.rfid-info.pl/aktywne-tagi-rfid.html). Figure 2 presents a tag with enlarged dimensions in relation to the actual size.

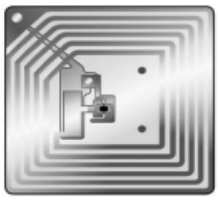

Fig. 2. A tag (enlarged dimensions)
Source: based on http://www.hdf.com.pl/index_hdf/page_h_398.html/

Tags are placed in a compact encapsulation of different forms, e.g. a plastic card, a paper label, a token, a rivet, etc. In labels the RFID tag together with an antenna is sealed in thin foil connected with the upper layer of the label (see Fig. 1).

RFID tags are divided into passive, passive–active and active. Passive tags do not have their own power supply and take energy from the radio wave emitted by a transmitter (reader). In the embedded condenser they accumulate energy, which is used to send feed-back information through a micro antenna to the transmitter. A passive tag has to be induced by energy from outside. Thanks to this property it has a longer life, but still a smaller range of operation in comparison to an active tag. Active tags have their own power supply (a battery) and emit an electromagnetic wave with recorded information. Thanks to this, they may have a higher power of the transmitted signal from the tag, while the transmission itself lasts shorter. This is used most frequently for the identification of vehicles.

Moreover, we may distinguish tags, which are for reading only (Read / Only - R/O) – the EPC number is coded in the tag during its production, such which may be read and recorded only once (Write Once, Read Many Times - WORM) - the EPC number is coded by the user, and such which may be read and recorded many times (Read / Write - R/W). Tags are characterized by high resistance to adverse external conditions.

Readers are equipment, which task is to read information recorded in tags from a certain distance. Readers have an embedded RFID antenna, which activates passive tags. Communication is realized in two directions. First the reader sends a signal denoting a request for object identification. In response all activated tags send signals with feed-back information. Read data are sent by the reader to a computer in real time. Most readers provide wireless communication (Wi-Fi - Wireless Fidelity or Bluetooth) with a computer.

In terms of the manner of utilization, RFID readers are divided into manual (portable), stationary and decoders integrated with a label printer. Figure 3 presents portable and stationary readers. Portable readers are integrated with terminals (data collectors).

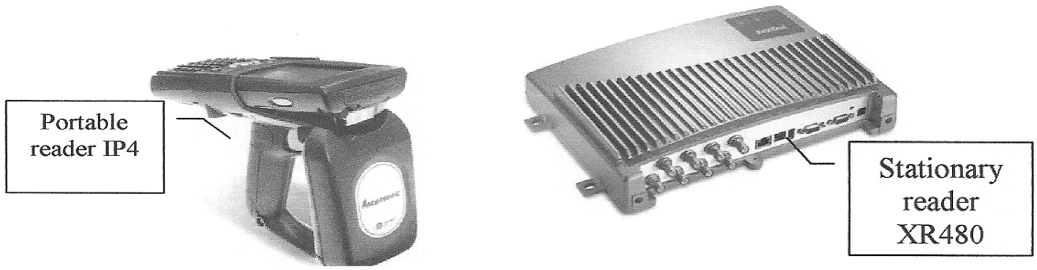

Fig. 3. A portable RFID reader integrated with a terminal and a stationary reader
Source: based on http://www.rfid-lab.pl/rfid-technologia-budowa-tag./

To read data coded in RFID tags it is necessary to have a **transmitting-receiving antenna**. The task of such equipment is to emit radio waves, which are to activate passive tags, when they are found within the range of operation of the antenna. An antenna may be an integral part of a reader (e.g. a RFID gate) or a component of a mobile RFID system. Figure 4 presents mobile antennas.

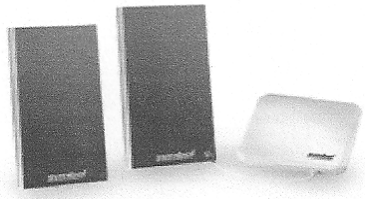

Fig. 4. Mobile antennas used in the RFID technology
Source: based on http://www.hdf.com.pl/index_hdf/page_h_398.html

The principle of operation of the RFID system was presented comprehensively in Figure 5.

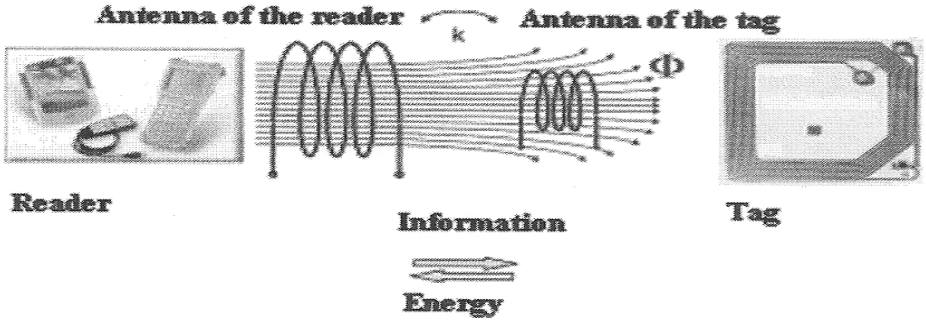

Fig. 5. A flow chart for the RFID system
Source: the author's study based on http://www.rfid-lab.pl/rfid-technologia-budowa-tag

PROPERTIES OF THE RFID SYSTEM

The RFID technology is characterized by several advantageous properties in comparison to traditional bar code systems read with laser or diode scanners. Its most important properties include:

- resistance to adverse environmental conditions, such as dust, moisture, high and low temperatures,
- resistance to dirt of a tag - does not affect reading quality (in this case the bar code may be illegible),
- possibility to identify a product stored in hard to reach locations, where optical methods fail, a tag does not have to be visible during the reading,
- a possibility of simultaneous reading of up to several thousand tags,
- a bigger range of reading of information recorded in tags and a possibility of reading with other objects,
- a possibility of recording and reading of data repeated many times,
- a possibility to program one tag many times,
- safety of data recorded in a tag - they may be encoded in it and access to data is realized on the basis of a password,
- simple operation of RFID equipment (printers, readers, terminals).

When working in a warehouse, using a system of bar codes, a warehouseman accepting goods has to approach every packaging directly and scan its label with the bar code using a reader or terminal. Next he places the scanner in the communication scanner so that the collected data can be transmitted to the IT system of the enterprise. In a similar situation, when applying the RFID system the involvement of a warehouseman is not required and it is not necessary to scan every label individually. It is enough if e.g. a fork lift with tagged packagings moves through gates with RFID readers, then the IT system automatically records the acceptance of all goods found on the fork lift.

The RFID labels do not have to be located in an easily accessible and visible place as it is the case with labels with bar codes. Thus it is possible to tag goods even before they are placed in bulk containers. Tags attached to goods inside the package are less prone to damage, which prolongs their life. Due to the place where it is glued on and its structure, a standard label with a bar code is more frequently at risk of physical or chemical damage, which as a consequence may result in it being impossible to read. Then such a label needs to be replaced.

Without the application of RFID in logistics and production processes stock taking and completion of orders may not be fully automated. Only current knowledge on the volume of stocks on hand makes it possible to optimize the ordering process and prevents depreciation of stock value.

Efficiency of application in case of the RFID technology is enhanced as a result of its integration with IT systems used in the enterprise such as Enterprise Resource Planning (ERP), Supply Chain Management (SCM) or Warehouse Management Systems (WMS). An example of such an integrated solution may be Agilero^{TM}, a middleware platform, which mediates in the communication between scattered and incompatible applications of different types and such equipment as radio terminals, RFID gates, scanners, bar code printers and RFID tags. After combining the RFID technology with computer software used in the enterprise we obtain information on goods on stock on the on-going basis, it is possible to follow the chain of supply, production processes, order placement and returned goods.

The application of RFID results in a high degree of automation of object and data identification processes**.** It is enough for the object with a tag to be found in an adequate distance from a reader or to move through an RFID gate for the information encoded in the label (tag) to be read. At the same time information on the content of the entire bulk container may be read. This increases the efficiency of the identification process, since in its realization a smaller number of employees may be involved. At the same time complete control of the flow of goods is realized in real time. The reduced role of people in this process is also accompanied by a decrease in the number of errors appearing in the system.

Equipment of the RFID system is not difficult to operate. Short, in-plant training is enough for employees to be able to perform their job efficiently. Thanks to the implementation of the new technology it is fast and effective.

FINAL REMARKS

Despite a significant decrease in prices of tags, as well as the other components of the RFID infrastructure, the cost of installation of this system is several times higher than that of the implementation of the bar code technology. In certain applications the RFID technology faces limitations. Metals contained in goods or warehouse structures and equipment may interfere or hinder radio transmission. In such a case it is necessary to select an adequate frequency at which equipment is to operate, which may increase the cost of the system. A key element, which makes it possible to take advantage of benefits offered by RFID, is middleware software of an adequate quality. This facilitates processing of radio signals into ASCII

signs and links with the internal software of the enterprise such as ERP, SCM or WMS. However, purchasing such software is costly. An important problem, which may occur during the implementation of the RFID technology, is the psychological barrier, resulting from the fear of employees of full monitoring of their activity, which is made possible by this technology.

The more numerous the assortment and the more scattered locations of warehouses with a large number of product storage, the higher the profitability of the implementation and operation of the RFID system in an enterprise. An advantageous effect on profitability is also observed in case of a rapid rotation of goods and a high degree of complexity of warehousing operations (e.g. order completion). Examples of companies which meet such conditions and have successfully implemented the RFID technology include the Wal-Mart chain and the airport in Hong Kong (38 million passengers annually) in terms of handling passenger luggage (http://www.rfid-lab.pl). In Poland the RFID technology was implemented for the first time in the furniture industry in 2008. It was realized by Jantar Sp. z o.o at their Agmar upholstered furniture factory (http://www.jantar.pl/). The RFID system was applied in the production environment to follow production and support warehousing processes in the final product warehouse.

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Peter Trebuňa[85]

MANAGEMENT MODELS OF PRODUCTION SYSTEMS

Abstract: Content of the presented paper is to describe a consistent approach from planning to actual implementation of the production. This consistency is achieved by the sequence of decision-making levels of the appropriate information related flows. In the area of production systems can distinguish at least three basic levels (planning, scheduling and management).

Keywords: models of management of production systems, planning, scheduling and management of aggregate production, the precedent relation.

STAGES IN THE MANAGEMENT OF PRODUCTION SYSTEMS

The aggregate production planning contains of detailed scheduling details in the longer term. At this stage it is debated production capacity, while other phases are assumed to be already determined. Some models are used rather than individual products, but a group of products that are in other stages will be considered disaggregated.

Scheduling of a production is solving the problems of production in shorter timeframe. There are analyzed the production facilities and capacity in terms of what, where and when it will be implemented.

Management of production takes place in real time and it is needed to correct implementation plans and schedules. At this level, we can get feed back information to adjust plans and schedules.

In complex production systems, it is possible to distinguish several levels of decision analysis in the production process. High planning horizon is relatively long in comparison with the production cycle. Product flows are aggregated into product groups and discrete time models is the amount of products in each time interval approximated continuous-time variables. These plans are based on the aggregated production forecast of aggregate demand and resource constraints. Results from aggregate planning levels are disaggregated in time and by product lines and by the fundamental limitations on the operational level. The aggregate planning is to propose a general production schedule that meets demand, expressed in common units of output. Demand and supply are given in units which are aggregated to assess the capacity of production system in the period. Planning an aggregate production function is the internal production system, which results in later stages, a detailed production schedule. The purpose of aggregate planning is to determine when and under what conditions can the production schedule.

The planning process begins with a strategic business plan; the company has established product mix and resource availability. The plan shall designate what resources can be used and their use over time in order to satisfy expected demand. Scheduling of production works with specific resources that are allocated to meet the actual awards.

Production scheduling has two levels: the assignment of contracts and procurement arrangements. The first level of the contracts assigned departments are equipped and staffed human resources for the aggregate planning. The second level is determined by the order in which contracts are made to individual departments. There is comparison of projected and

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actual realized demand. The decision on the processing of contracts significantly affects customer satisfaction in terms of delivery time and also affects costs.

The target of aggregate production planning (APP - Aggregate Production Planning) is to determine levels of production, inventory and human resources to meet demand in time. This problem belongs to the strategic level of decision-making. APP models represent the aggregated level of production systems. Aggregation has different aspects, which include the following:

- similar products are assembled into groups, which reduced the uncertainty in demand and easier to forecast demand,
- time is discrete at longer intervals, which produced a greater number of product groups, but production is not designed in detail at a time,
- resources are grouped into work stations and is not intended to be used by the processor to process a contract.

When such aggregation is to achieve a detailed schedule of production, but the basic idea of what will be produced. In the literature there are a number APP models differ in assumptions and the complexity of modeling the relationship [1, 2, 3].

1. THE BASIC MODEL OF APP

Considered is the N product groups ($i = 1,2,\ldots,N$). The time horizon is divided into T intervals ($t = 1,2,\ldots,T$). The demand forecast D_{it} for each product group ($i = 1,2,\ldots,N$) at various time intervals ($t = 1,2,\ldots,T$). There are M types of sources ($m = 1,2,\ldots,M$) with limited capacity R_{mt}, which varies in different time intervals ($t = 1,2,\ldots,T$), due to repairs and maintenance of equipment and the placement and adoption of human resources. The production unit $\mathbf{i}$ of the production units r_{im} of a needed resource m. Let us denote x_{it} the quantity of production i of the product over time and to supply products at the end of time interval t and I_{it}, the initial stock i for the item identified. Stock levels not due to the uncertainty of demand drop below the safety level for each product group and time interval. Let us denote c_i the unit holding costs per unit of product groups i for one time interval. The plan is the amount of production and stocks of individual product groups at intervals so as to satisfy the demand forecasting at minimum storage costs.

The basic model can be formulated as a linear programming task:

$$\sum_{t=1}^{T}\sum_{i=1}^{N} c_i \mathrm{I}_{\mathrm{it}} \rightarrow \min$$

Objective function expresses the objective of minimizing the total storage cost over the horizon with restrictions

$$x_{it} + \mathrm{I}_{\mathrm{i,t-1}} - \mathrm{I}_{\mathrm{it}} = D_{it} \quad i = 1,2,\ldots,N, \quad t = 1,2,\ldots,T \ .$$

The restriction reflects the balance between demand and production with the change in inventories from previous and current period

$$\sum_{i=1}^{N} r_{im} x_{it} \le R_{mt} \qquad t = 1,2,\ldots,T, \quad m = 1,2,\cdots,M$$

The resource limitation compared to their limited capacity

$$\mathbf{x_{it} \ge 0, \quad I_{it} \ge I^{*}_{it}, \quad i = 1,2,\ldots,N, \quad t = 1,2,\ldots,T} \cdot$$

When the restrictions are set lower limits for non-negative quantity of production and stocks, under elevated security level.

If the model was omitted source restriction then we got the type of JIT production system and bypassing security levels to deal with getting $x_{it} = D_{it}$ [4].

2. EXTENDING THE BASIC MODEL

In the basic model there can be made a series of extensions. The basic model does not have a solution given the lack of resources but the capacity of the original formulation is found where the resources are overloaded. Therefore it can be the limit of resources by introducing a variable $\mathbf{z_{mt} \ge 0}$ reflecting the source of congestion in the time interval t:

$$\sum_{i=1}^{N} r_{im} x_{it} \le R_{mt} + z_{mt} \qquad t = 1,2,\ldots,T, \quad m = 1,2,\cdots,M \cdot$$

Then we can modify the objective function to form

$$\sum_{i=1}^{T}\left(\sum_{i=1}^{N} \mathbf{c_i y_{it}} + \mathbf{p}\sum_{m=1}^{M} \mathbf{z_{mt}}\right) \rightarrow \mathbf{min} \ ,$$

where p is the source of congestion penalty. When a sufficiently large penalty will be activated congestion variables only if the original model did not address. Using soft resource bottlenecks can be detected and properly respond to this situation. Soft limiting resources may be used if the intended work overtime or to supplies from other producers.

Modification of APP model takes into account the fluctuating levels of the workforce and the possibility of deferred demand. The level of the workforce W_t is supplemented by the possibility of using overtime O_t and the ability to hire H_t and fire workers $\mathbf{F_t}$.

Stock level is divided into two parts $\mathrm{I}_{\mathrm{it}} = \mathrm{I}^{+}_{\mathrm{it}} - \mathrm{I}^{-}_{\mathrm{it}}$ for the full expression of the variable with two non-negative variables. Deferred demand is modeled as a negative stock levels. Expense ratios $\mathbf{c^{+}_{it}, c^{-}_{it}}$ reflect storage costs and penalties to be postponed to meet demand. The entire model can be formulated as a linear programming task

$$\sum_i \sum_t \left(c_{it}^+ I_{it}^+ + c_{it}^- I_{it}^-\right) + \sum_t \left(w_{t_t} W_t + o_t O_t + h_t H_t + f_t F_t\right) \to \min$$

the restrictions

$$x_{it} + I_{i,t-1}^+ - I_{i,t-1}^- - I_{it}^+ + I_{it}^- = D_{it} \qquad i = 1,2,\ldots,N, \quad t = 1,2,\ldots,T,$$

$$\sum_i r_i x_{it} \le W_r + O_t \qquad t = 1,2,\ldots,T,$$

$$W_t = W_{t-1} + H_t - F_t \qquad t = 1,2,\ldots,T,$$

$$x_{it}, I_{it}^+, I_{it}^- \ge 0 \qquad i = 1,2,\ldots,N, \quad t = 1,2,\ldots,T,$$

$$W_t, O_t, H_t, F_t \ge 0 \qquad t = 1,2,\ldots,T\ .$$

3. PRODUCTION SCHEDULING

Scheduling theory deals with the challenges of the time distribution of certain activities to certain equipment. An example of scheduling can schedule production of products for the number of machines or shift schedule tasks by the computing system. Basic concepts are the processor and the batch.

The processor is a device in which the activities will be implemented. Generally we think m of processors. Set of processors $P = \{P_1, P_2, \ldots, P_m\}$, referred as indices.

The batch is called the comprehensive action to be taken to processors. Generally we think of n batchs, set of batchs $\mathbf{D} = \{\mathbf{D_1}, \mathbf{D_2}, \ldots, \mathbf{D_n}\}$ or batchs referred as indices. Benefits may consist of different operations are carried out on different processors.

Scheduling models can be divided by the number of processors on a 1-processor, a general n- processor. If the processor can distinguish more parallel processor models and models with processors arranged in series. The parallel processors can be implemented at any batch processor. The series ranked batch processor has several or all of the processors in turn. The batchs may pass any order or equivalent processor.

For each batch D_j , known duration and possibly other input data - the duration of execution of the batch. If the batch is composed of several operations are also known as operating times for each operation - the earliest possible start date of the lot - the required completion date of the batch - the batch weight, which reflects its importance and may constitute an example. unit costs or penalties for failure to comply with the deadline by which it claims are the benefits (independent of input location benefits schedule are marked with small letters).

If these data are clearly known we can talk about deterministic model. If any of these values are random variables we can talk about stochastic model. Scheduling models can also be divided in static and dynamic. Static models assume that the number of batches is known from the beginning and does not change over time. In dynamic models, the number of batches depends on time at random points in time may subsequently be assigned additional batches.

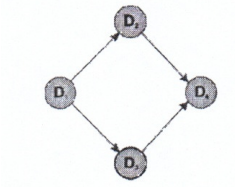

Fig.1. Precedent graph

Between the batches or different operations may be a precedent session (referred to $\rightarrow$), it expresses the continuity of batches or operations. The following batches or the operation can not be processed before they are completed and the previous batch operations. Precedential session may make case-graph, where graph nodes represent operations and the benefits or oriented edges are the following.

According to the case expressed precedent chart shows the fig. 1 can realize the batches D_1, D_2, D_3, D_4 or in order D_1, D_3, D_2, D_4 .

Network analysis models are special cases of scheduling models. It describes the role of treating a single batch (project), consisting of several operations (activities) and processed on separate processors (realization of activities). The operations (activities) there are in precedent relation, expressed by case (AC) chart.

Suspension is a division of batches specified time interval to achieve batches in two or more time intervals to each other directly and not connecting the gap between them. The batches are the time intervals in which the processor is not at any batch, called downtime. This creates the batches doesn't connecting directly to each other in time.

Schedule R is a set time intervals of data to the realization of particular batch to the individual processors can be expressed in different ways. The schedule is a clear expression of Gantt chart. Example schedule of two batches of a single processor, expressed Gantt diagram on fig. 2.

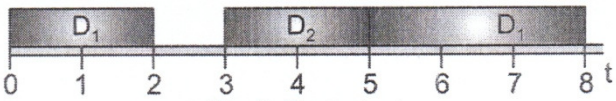

Fig. 2. Gantt chart

From Figure 2 it is clear that execution times of batches are $t_1 = 2+3 = 5,\ t_2 = 2$. At a batch D_1 interruption occurs, the first portion $\langle 0,2 \rangle$ of the batch is realized over time and the second time interval $\langle 5,8 \rangle$. The batch D_2 is realized in the time interval $\langle 3,5 \rangle$. In the interval (2,3) there is downtime. It is not possible to realize in the same time to more batches at the same time, and no batches can not be performed simultaneously on multiple processors. Realization of benefits can begin before the earliest possible start date. Schedule must comply with the entered precedent session and other conditions depending on the particular formulation challenges.

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MONITORING AND MAINTENANCE IN THE PROCESS OF TOOL CONDITION IN DRILLING

Abstract: Requirements for flexible manufacturing have been increasing in the last years. In order to insure effective operation of expansive manufacturing equipment, which has to run automatically and unattended, tool monitoring is important. Therefore, the essential problem to be overcome to achieve the full potential of unmanned machining is the development of effective and reliably sensors systems to monitoring the process and corrective action in case abnormal operation. The ultimate goal of the development of such production equipment is to enhance the overall economic of the manufacturing process. Even when there are at present many monitoring systems commercially available in the market for tuming processes, serious difficulties still remain to be solved to apply monitoring systems successfully in machining centers. Being these difficulties mainly related with the limited accessibility to the rotating tool for sensing purposes in tool driven machining processes. Therefore, the primary objective of this paper assess the feasibility of using force signal analysis as means for monitoring tool condition in drilling.

Key words: monitoring, drilling, cutting forces, manufacturing, coherence function, maintenance, failure rate, overall equipment effectiveness

INTRODUCTION

Requirements for flexible manufacturing have been increasing in the last years. In order to ensure effective operation of expansive manufacturing equipment, which has to run automatically and unattended, tool monitoring is important. The essential problem that must be overcome to achieve the full potential of unmanned machining is the development of effective and reliable sensors systems to monitor the process and corrective action in case of abnormal operations. From the global point of view, results of conducted experiment described below, gives initial information to production sector, applicable when dealing with maintenance planning and organizing. From the scope of the production process, the highest machine efficiency rate is expected.

The primary objective of this paper assess the feasibility of using force signature analysis as means for monitoring tool condition in drilling. After consulting the available literature it is obvious, that only some features of static force component are proposed for drill wear monitoring. The really important task in such roughing drilling operations is to avoid catastrophic failure. It is desirable to make the most of the economic use of the cutting tool without reaching catastrophic failure. Traditionally, the usual approach to tool condition monitoring in drilling was to detect breakage as fast as possible and avoid overloads in the machine tool. These strategies are not enough to ensure the optimum economic performance of the machining process.

With increasing wear in the twist drill margin wear causes the increase of the frictional forces between the margin and machined hole's wall and leads to torsion vibrations in the cutting tool. This in turn will cause further tool wear and vibrations. If the cyclic process continues - catastrophic failure will occur at a short time. At the moment when these torsion vibrations appear, it is the appropriate time for drill bit change, since from this point on, wear increases rapidly due to the phenomenon of torsion vibrations.

Quante et al. [4] recognized the importance of sensing vibrations in the twist drill for wear monitoring as a mean to overcome the difficulties of the slight sensitivity of the static component of the thrust force to wear. They proposed the use of the distance sensor without contact measuring deflections of the drill in a plane normal to the drill axis. A synchronization device was attached to the spindle emitting 256 pulses per revolution. The signal of the distance sensor

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was high pass filtered at 60 Hz to avoid the effect of the spindle speed frequency at 12 Hz. An increase ranging to 5 to 8 times in the signal for a worn drill with respect to the initial value when sharp was reported. The advantage of the system is that since it senses without contact at the tool shank, as was the case with the eddy current torque sensors proposed by Brinksmeier, it can by applied to almost any existing machine tool without structural changes. The sensors are expensive and do not interfere with machining process.

El-Wardany et al. [2] presented a study on monitoring tool wear and failure in drilling using vibration signature analysis techniques. Discriminate features sensitive to tool wear and breakage were developed in both in time and frequency domain. In the time domain a monitoring feature based on calculating the kurtosis value of both the transverse and thrust vibration for on line detection of drill breakage was reported.

ECONOMIC FACTORS AND MAINTENANCE BACKGROUND WITH INFLUENCE ON THE MACHINING PROCESS

Failure investigations help to prevent failures, extend component service life, and establish inspection intervals. Industrial research studies are often focused on conducting analyses to:

- determine the causes of failure,
- identify design and operating deficiencies,
- improve reliability and safety,
- lower operating costs,
- provide impartial evaluations.

Failure rate (λ) is the frequency with which an engineered system or component fails and is expressed for example in failures per hour. The failure rate of a system usually depends on time, with the rate varying over the life cycle of the system. Within few years is usually much greater than in the beginning of the machine life cycle. More likely, in the production instead of a failure rate, the perception - mean time between failures (MTBF = $1/\lambda$) is being used to express the average time between failures of a machine/system during operation.

For better understanding of a necessity of the failure investigation and the whole maintenance process, Smithsonian Institution represented by A. Pride brings up the words of the key representatives of United Airlines, F. S. Nowlan, Director, Maintenance Analysis and H. F. Heap, Manager, Maintenance Program Planning: "Despite the time-honored belief that reliability was directly related to the intervals between scheduled overhauls, searching studies based on actuarial analysis of failure data suggested that the traditional hard-time policies were, apart from their expense, ineffective in controlling failure rates. This was not because the intervals were not short enough, and surely not because the tear-down inspections were not sufficiently through. Rather, it was because, contrary to expectations, for many items the likelihood of failure did not in fact increase with increasing operation age. Consequently a maintenance policy based exclusively on some maximum operating age would, no matter what the age limit, have little or no effect on the failure rate."

Furthermore, the institution defines Reliability Centered Maintenance as a maintenance strategy that logically incorporates the optimum mix of reactive, preventive, condition based and proactive maintenance practices.

The costs of failure prevention and/or failure detection rise exponentially from phase to phase: planning, engineering, production planning (PP), manufacturing and final check before delivery to the customer, as may be seen on Figure 1. [7] That's why the plays a significant role in a whole failure prevention process. The predictive maintenance is based on periodic or continuous (online) equipment condition monitoring, determining the condition of the equipment in use, in order to predict when maintenance should be performed.

Fig. 1. Turnover increase in failure prevention/detection costs

Industrial engineers lay emphasize upon the importance of the right processes functioning, effective performance, safety, including effective maintenance – all processes are related. Production companies calculate effectiveness rate of their factory in order to analyze the quality of their processes and then their improvement. When assessing sources of loss within effective production, it depends up to factories, though in automotive industry the rate for causes of loss for tools changeover may range round 6, 2 % and micro-failures and slowdowns round 3, 1 %. The key measure for the process control constitutes the production efficiency rate.

Key points of the process control consist of:

- to improve machine efficiency, the actual state of the machine must be measured precisely
- operators must be trained to log a breakage themselves and promptly react to fix it or inform responsible person.

To achieve machine reliability, a few key points were determined for effective use of a machine:

- method 5 S (eliminate, straighten up, clean, standardize, respect)

- recording efficiency rate and six causes of loss
- distinction between true breakdowns (i.e. stoppage > 5 min.) and micro-failures (i.e. stoppage < 5 min.)
- tracking on the percentage of breakdowns and mean time between failure (MTBF)
- maintenance plan built mainly upon failure process observation
- reliability must be taken into account right from the design phase.

Implementing the modified Deming PDCA cycle (PDCA – plan, do, check, and act) upon the practical experience shows the importance of the following steps: measure efficiency rate, analyze non-effective processes, establish action plans and implement action plan. That is the non-stop approach towards achieving the progress in the production effectiveness.

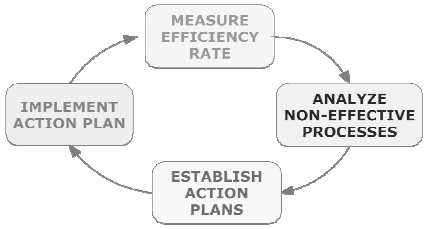

Fig. 2. PDCA Deming cycle modified on process effectiveness

The maintenance process is one of the most important elements within the overall scope of plant and facilities engineering function. It is a broad-based technology area for the industrial, commercial, institutional, and business communities. The broad scope of plant and facilities engineering is continuously changing and growing in importance as a key contributor to the success of a total operation, including maintenance as one of key elements contributing on the success of the total operation.

Establishing one of the key performance indicators for unmanned work that can be used to measure the overall effectiveness of a maintenance operation [6]:

Overall equipment effectiveness (OEE): A world–class metric that originated from the total productive maintenance (TPM) movement, which evaluates critical equipment in terms of equipment availability, equipment performance, and the quality of output. Improving OEE focuses on eliminating the six major losses:

Availability issues: 1. Breakdowns
2. Set-up and adjustments
Performance issues: 3. Idling and minor stoppages
4. Reduced speed
Quality Issues: 5. Process defects
6. Reduced yield

The average OEE factor is in the 40-50 % range before an improvement process starts. A world-class OEE factor is around 85 %, which means that all three elements must be around 95 %, i.e. 0, 95 (availability) x 0, 95 (performance) x 0, 95 (quality) = 0,857 x 100 = 85, 7 % OEE factor.

$$\text{The OEE factor} = \text{availability}\,\% \times \text{performance}\,\% \times \text{quality}\,\%$$

Rotating machines and machines with large inventories of hydraulic and lubricating oils lend themselves to predictive maintenance (PdM) surveillance methods. On the other hand, such machines that might be involved in high-speed packaging may be better inspected using traditional preventive maintenance (PM) methods. Machines that have critical timing adjustments, which tend to loosen and require precision adjustments, or that have many cams and linkages that must be reset over time lend themselves to preventive maintenance activities. The strategy for selecting the appropriate or predictive approach involves the following decision process:

- consider the variety of problems (defects) that develop in your equipment,
- use the predictive method if a predictive tool is adequate for detecting the variety of maintenance problems; one or combination of several methods may be required,
- use preventive maintenance if predictive maintenance tools do not adequately apply,
- determine the frequency of particular inspection tasks.

In most operations, it is wise to apply a combination of methods to ensure that equipment defects do not go undetected.

Vibration analysis with today's instruments can detect, with accuracy and repeatability, extremely low-amplitude vibration signals. They can assign a numerical dimension to the amplitude of vibration and can isolate the frequency at which the vibration is occurring. When measurements of both amplitude and frequency are available, diagnostic methods can be used to determine the magnitude of a problem and its probable cause. Vibration analysis, when properly done, allows the user to evaluate the condition of equipment and avoid failures. Using electronic instruments in an organized and methodical program of vibration analysis, a man is able to:

- detect machine problems long before the onslaught of failure,
- isolate conditions causing accelerated wear,
- make conclusions concerning the nature of defects causing machine problems,
- execute advance planning and scheduling of corrective repair so that catastrophic failure may be avoided,
- execute repair at a time that has minimum impact on operations.

Next, the complex procedure - drilling experiment for prediction of catastrophic failures will be detailed including calculation formulas. Such prediction techniques may help to overcome undesirable machine/system breakdowns, even organize their

planning.

CONDITIONS OF EXPERIMENTS

A series of drilling experiments were carried out on a FV 25 CNC A that is a vertical console milling machine equipped with continuous control, used for milling operations, drilling, finishing thread cutting and more technological operations. Control system is extended by Heidenhain company. Experiments were performed using HSS twist drill bits of diameters 2, 2 mm. The work material after ISO 630-80 – cladding Ti AlN. The experimental work piece was a disk of 160 mm in diameter and 100 mm in thickness.

Thrust force and torque generated by the drilling process were measured by means of a Kistler four-component piezoelectric dynamometer type 9272. The signals were amplified by charge amplifiers Vibrometer AG type T A-3/C with two individual channels. The amplified signals were sampled using a data acquisition card on the hard disk of the computer for further analysis. The configuration of the experimental set-up is shown on Fig. 3.

For data acquisition the software Matlab with Real Time Toolbox was used in order to sample cutting force signals from dynamometer. The sampled data (Fig. 4) were saved on the hard disk of the computer for further processing and analysis. For the analysis a program called “Editace” was used. This program is based on Matlab and is able to import the sampled data.

The measured signal can be displayed and edited, unwanted parts of the signal can be deleted, and zero can be adjusted. It is possible to compute basic statistical parameters of the selected part of the signal and also to perform regression analysis and fit a curve [3]. The advantage of this program is that it is very user friendly and easy to work with.

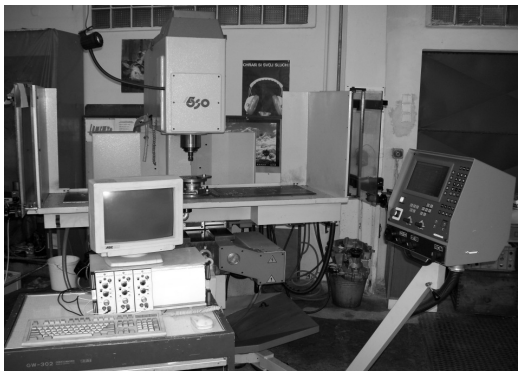

Fig. 3. Experimental system set – up

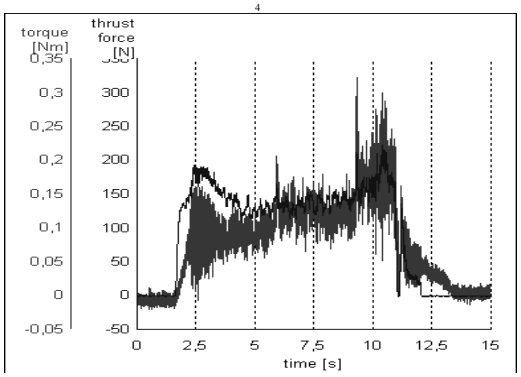

Fig. 4. Experimental data extracted from program “Editace”

FAILURE PREDICTION BY MEANS OF THE COHERENCE FUNCTION BETWEEN THRUST FORCE AND TORQUE SIGNALS

There is approach presented for catastrophic failure prediction, based on the detection of that specific wear mechanism that has been mentioned before, which occurs in the third stage of tool life, called stage of final accelerated wear. The coherence function indicates the extent to which two signals are correlated with each other. In other words, it could be said that the coherence function gives a measure of the validity of the assumption that both signals results from the same particular generating mechanism or source. The coherence function $\gamma_{xy}(f)$ is defined by:

$$\gamma_{xy}^{2}(f) = \frac{\left|F_{xy}(f)\right|^{2}}{F_{xx}(f) \cdot F_{yy}(f)}; \qquad 0 \le \gamma_{xy}(f) \le 1,$$

where: $F_{xy}(f)$ and $F_{yy}(f)$ are the power spectra of each one signals, also called often autospectra and $F_{xy}(f)$ is the cross spectrum. The cross spectrum $F_{yy}(f)$ of $f_x(t)$ and $f_y(t)$ is the forward Fourier transform of the cross correlation function $R_{xy}(\tau)$, which is, in tum, defined by the equation :

$$R_{xy}(\tau) = \lim_{T\to\infty} \frac{1}{T} \int_{-T/2}^{-T/2} f_x(t) \cdot f_y(t+\tau) dt$$

and gives a measure of the extent to which two signals correlate with each other as a function of the time displacement between them. The cross spectrum can alternatively be obtained from the individual Fourier spectra $F_x(f)$ and $F_y(f)$ as follows:

$$F_{xy}(f) = F_x^*(f) \cdot F_y(f),$$

where: $F_x^*(f)$ is the complex conjugate of $F_x(f)$.

Therefore, three cases are possible. The coherence function can be zero, one or greater than zero and less than the unity. In case $\gamma_{xy}^2(f)=0$ for all frequencies both the signals are completely uncorrelated. In case $\gamma_{xy}^2(f)=1$ for all frequencies both the signals are completely correlated. If $\gamma_{xy}^2(f)$ is between zero and one for all frequencies one or more of the following conditions exist:

a) even when both signals $y(t)$ and $x(t)$ are caused partially by the same phenomenon or generating source, each is also caused in part by the other phenomena which affect it individually but does not affect the other signal,
b) extraneous noise is present in the measurements,
c) bias errors are spectral estimation.

Coherence function is shown in Fig. 5.

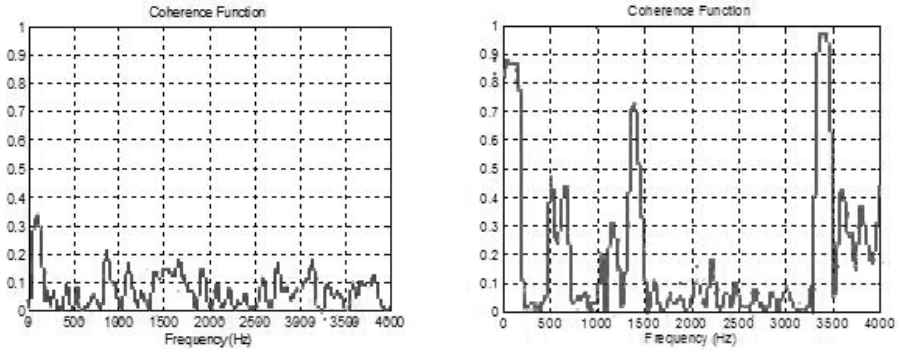

Fig. 5. The course of coherence function during drilling the first hole (left) and during drilling the last hole before the destruction of the tool (right)

CONCLUSIONS

A method for prediction of catastrophic failure in drilling based on the detection of a specific wear mechanism operating at the end of tool life when severe wear is present and leading unavoidably to catastrophic failure has been presented. The basic characteristic of this wear mechanism is that it excites strongly torsion vibrations of the cutting tool. The proposed method relies in detecting the rise of harmonics in the spectrum of torque signal when the wear mechanism begins to operate.

A strong emphasis in the production sector is set on performance effectiveness. Maintenance control falls into the fundamental operation processes tree when reflecting plant and facilities engineering function. Hence, such experiments as one detailed in this paper imply an added value in the complex value chain on the way to reach best performance the most effective way.

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ASPECTS OF THE RECEIVABLES MANAGEMENT BASED ON CONTROLLING IN THE SMALL AND MIDDLE ENTERPRISES

Abstract: In the present paper is primarily focused attention into some aspects of the receivables management based on controlling in small and middle enterprises. Following the analysis of the current method of managing claims, their status, structure and development are identified fundamental deficiencies and proposed selected options for solving problems. The solution is focused on the area of determining the credibility of customers and determining the optimal payment terms in centralized business enterprises.

Key words: receivables, controlling, customer credibility, payment terms

INTRODUCTION

Receivables are the important field of assets of the each enterprise, their volume, and structure substantially impact on the business effects. Every entrepreneurial subject has to pay attention for issues of the available assets, which are in significant rate impacted exactly by receivables. Therefore it is necessary to have prepared clear and transparent receivables management system – controlling system. The system is enabling not only to decrease the amount of the receivables, volume of the available asset sources, but above all it eliminates the financial insolvency risk, which is particularly important for small and middle enterprises (SaME).

The goal of the work is to point out several possibilities for increasing efficiency of the receivables management with utilization of controlling components in the SaME.

1. RECEIVABLES MANAGEMENT BASED ON THE CONTROLLING

Receivables controlling represents the set of tasks, methods and tools, it is possible to impact the loan risk effectively, and the risk of generation the related secondary insolvency. Receivables controlling shall express in addressed knowledge of the risk, its possible diversification, elimination, undertaking timely actions in case of default to fulfill the agreed conditions. During achieving the mentioned goals enterprise solves three fundamental issues (Bobáková, 2004):

- How much capital is optimal to block in receivables
- How to differentiate the access to the each customer
- How to ensure payment for the accrued receivables

Referring to the above listed principal questions, there are resulting from the receivables controlling the following main tasks (Melicheriková, 2008):

- Determining the optimal level of the business credits provided to customers,
- Definition bilaterally acceptable sales and payment conditions,
- Determining credit limits for customers,
- Systematic control of the receivables after the term of payment and initiation subsequent actions (requests for payment, sanctions…),
- Credibility verification – customer credit rating,
- Contract securing the payment (partial payments, advance payments, letters of exchange, letters of credit, and guaranties of payment…),
- Negotiation and control the payment conditions,
- Receivables monitoring (turnover ratio, turnover period, age of the receivable...),
- Communication with the marketing, sales, and price fixing department,
- Monitoring the non-standard conditions of sale.

As it is resulting from above presented, the whole process of receivables management based on the controlling is possible to divide into three main stages (Volčko, 2005):

1. Stage before creation of receivables – preventative stage
2. Stage after creation of receivables – monitoring and treatment of the receivables
3. Stage of the receivables after the term of payment – recovery of the receivables.

On the ground of the knowledge and experiences, it is possible to allege that underestimation of the attention in the each stage has a substantial effect on the available assets requirements, naturally with a negative impact on the expected business effectivity.

2. PRESENT STATE ANALYSIS OF THE RECEIVABLES MANAGEMENT IN THE SELECTED ENERPRISE

Present state analysis of the receivables management in the SaME has shown, that for prevention and timely solving the receivables is not paid the adequate attention.

In enterprises it is often missing the internal prescription for receivables management, which would be determining exact steps in their management in the each stage. In the area of the receivables prevention it is not laid stress on obtaining exact and detailed information about customers, and there is no customer credit rating. Information given by customers enterprises do not verify and evaluate. There are no exact data available about financial situation and payment morality of the potential customer. How is the given issue ensured in the selected enterprise we are presenting with the following indicators.

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The agreed payment term is most often 14 days. Enterprises credit limits for their customers do not determine. As a motivation for payment they do not utilize the possibility to allow a discount although for ensuring payment for receivables they utilize contractual penalty about 0, 05 % from the debt for the each day of the payment delay. We expect that penalty has no impact on the customers who are in a commercial insolvency. Another utilized securing instrument is the advance pay.

Seeing that receivables management in the present time is in the competencies of the company CEOs, monitoring of the receivables is performed upon their impulse. Monitoring takes place irregularly and does not include tracing the conditions and development by another suitable indicators (relation of the receivables and revenues, age structure…).

The analysis of the state, structure and development of the receivables points out the low effectivity of the receivables management, what obviously results from up to now ensured sufficient liquidity of the company (Table. 1).

Table 1. Liquidity indicators, 2007 – 2009

Liquidity indicators	Unit	Optimum	Years		
			2007	2008	2009
I. level	index	0,2 - 0,6	1,41	1,11	1,35
II. level	index	1,0 - 1,5	3,25	3,09	1,82
III. level	index	1,5 - 2,5	4,08	3,79	2,70

The worst development is viewable in the indicator of the payment time of the receivables (receivables turnover ratio), which in 2009 significantly increased and reached the value of 108 days (Table 2). Compared with the time of expiration of liabilities it was found out, that the company credited his customers up to 59 days.

Table 2. Indicators of the receivables turnover, 2007 – 2009

Indicator	Invoices payment time	Years		
		2007	2008	2009
Payment time of the receivables	days	68	69	108
Expiration of the liabilities	days	35	24	49
Receivables turnover ratio	index	5,36	5,29	3,38

Year to year increasing trend is recorded in the ratio of the total amount of the receivables to the revenues from sales, so called receivables productivity. Development of the average age of the receivables in 2009 was unfavorable as well, indicator of the age structure of the receivables sharply raised at the end of the year (Table 3).

Table 3. The age structure of the receivables in 2009

Age classification of the receivables (EUR)	Mid of the time band	Receivablesdevelopment in 2009				Receivablesabundance in %			
		31.3.	30.6.	30.9.	31.12.	31.3.	30.6.	30.9.	31.12.
In the payment time	7	78 064	179 269	346 985	132 715	17,13	32,15	38,95	23,92
14-30 days	22	105 117	92 403	139 686	78 361	23,07	16,57	15,68	14,13
30-90 days	60	38 354	30 092	145 472	45 716	8,42	5,40	16,33	8,24
90-180 days	135	86 928	37 284	44 610	62 994	19,08	6,69	5,01	11,36
180-360 days	270	46 686	123 517	97 056	64 314	10,24	22,15	10,90	11,60
over 360 days	540	100 559	95 006	117 007	170 561	22,07	17,04	13,13	30,75
Total after expiration time		377 644	378 302	543 831	421 946	82,87	67,85	61,05	76,07
Receivables – total		455 708	557 571	890 816	554 661	100	100	100	100
Average age of the receivables		188	170	123	222				

The present state analysis shows, that for the company it is necessary to determine clear credit policy and to design effective management system for receivables based on the controlling with the main emphasis on the preventative stage. The main reasons of the unfavorable situation in the receivables management resulting from the carried out analysis are:

- there is not determined exact procedure and rules for managing receivables,
- there is no credibility verification of the customers based on financial criteria,
- there are not considered the possibilities of utilization flexible and optimal varieties of payment conditions with a possible discount utilization,
- ensuring instruments are not utilized sufficiently,
- receivables are solved when they are out of expiration time,
- there is no determined a suitable motivated responsible person for receivables monitoring,
- weak cooperation of the economic department with the company management.

With regard to the scope of the issue in the next part we are focusing on the credibility determination of the customers and on the optimal payment conditions for the selected enterprise.

3. CUSTMER CREDIBILITY VERIFICATION

Concerning that the enterprise do not aim to utilize external companies for receivables management there were designed procedures which allows by qualitative methods to sort the customers into three credibility groups:

I. group – solvent customers,

II. group – average customers,

III. group – less solvent customers (substandard customers).

To divide potential customers into credibility groups we used credibility and bankrupt models, which are utilizing data predominantly from the financial reports. These models allow to find out the present and to predict the future financial situation of the customer (Zalai, 2008).

Practical application of these models for credibility evaluation of the customers we will show on the example of five customers. For maintaining anonymity of the customers we are introducing them in alphabetical marking (Fig. 4).

Table 4. Basic data about the customers

Customer	Business sector	Subject of the order	Order value (EUR)
A – Ltd.	Business trade and services	Building a gas boiler room	61 521,60
B – Ltd.	Building industry	Gas installation of the new operation	21 637,30
C – Ltd.	Agriculture	Heat distributor piping reparation	5 618,17
D – Ltd.	Food industry	Central heat distributor piping	12 821,65
E – Inc.	Building industry	Sanitary facilities & central heating installation	51 890,59

The results from the credibility models and classification the enterprises into a credibility group are shown in the table 5.

Table 5. Enterprises classification into the credibility groups

Indicator	Marking	Customer				
		A	B	C	D	E
Quick test	enterprise	good	bad	excellent	good	excellent
Altman's model Z-score	situation	very good	gray area	very good	gray area	very good
Credibility index	situation	good	problems	excellent	good	excellent
Classification into the		II. group	II. group	I. group	II. group	I. group

Except from considering the financial situation of the each customer there were verified other information, namely:

- if it is concerned a newly established enterprise, company,
- if it is not concerned a company whose CEO is in relation with other enterprises, companies,
- if the enterprise is not figuring in a debtor databases or bankruptcy proceedings,
- what is the paying ethics and relations of the potential customer with his suppliers.

On the ground of the gathered complex information about the customers they were classified into three credibility groups:

I. credibility group consist from solvent customers, who in credibility and bankrupt models are achieving excellent and very good financial situation and provided to the enterprise accurate and truthful information. These customers are expected to pay for the receivables with presumption about 80 - 100 %. For this group we can recommend to provide them business credit and as an ensuring instrument to utilize the standard conditions designed in the contract for work. Into this group from the carried out analysis belongs the companies C and E.

II. credibility group consist from average custome**rs**, who are inserted into vague grey zone, and there is a risk that they will have financial problems and they will not be able to pay their liabilities in accordance with the agreed conditions. These customers are expected to pay for the receivables with presumption about 60 - 80 %. We recommend to the enterprise for these customers with lower credibility to accept their order, but except ensuring instruments designed in the contract for work to utilize also other, for example bill of exchange, right of lien, bank guarantee, third person's liability, which decrease the risk of non-payment of the receivables to minimum. Into this group from the carried out analysis belongs the companies A, B and D.

III. credibility group consist from less solvent (substandard) customers, where is a high risk, that they will not be able to pay for the carried out works. Businesses making with the customers who achieved this credibility we do not recommend. To make an exception is possible in the case that the business will be ensured by constituting real estate or movable property of adequate character and value.

After classification the customers into credibility groups it is required to determine for the each credibility group the conditions for providing business credit.

4. SELECTION OF THE OPTIMAL PAYMENT TERMS

When determining the payment terms, the principal task is to state the time interval for invoicing and the term of expiration of the business credit.

Predominantly utilized term of expiration about 14 days, which we recommended to increase up to 30 days for increasing the competitiveness of the enterprise – the change on the one hand, provides to customers an adequate space to ensure financial resources, and on the other hand it can attract more customers.

On the ground of qualified estimation the enterprise can this way increase his revenues approx. about 5 %. This increasing the enterprise is able to carry out by existing capacities, therefore his fixed cost would not increased and would not changed the proportion of the variable costs on the revenues as well. However, extension of the payment time would increase the doubtful receivables approx. about 3 ‰ from the revenues. Losses from fixing capital in receivables would be quantified by estimation of the rate of evaluation about 5 % p. a. Through calculation we can find out, whether increasing the term of expiration up to 30 days would be under given conditions favorable for the enterprise. When calculating, we are considering the financial data of the enterprise from the year 2009:

Revenues: 2 641 243 EUR,

Costs: 2 480 889 EUR,

thereof fixed costs (FC) 1 364 489 EUR and variable costs (VC) 1 116 400 EUR.

- **Initial (beginning) state:**

➢ Profit = Revenues – Costs = 2 641 243– 2 480 889 = 160 354 EUR

➢ Average state of the receivables = $\frac{revenues\ x\ expiration\ term}{360} = \frac{2641243\ x\ 14}{360}$ = 102 715 EUR

➢ Costs per revenues = $\frac{costs}{revenues} = \frac{2480889}{2641243}$ = 0,9392

➢ Capital blocking = 102 715 x 0,9392 = 96 970 EUR

- **Increasing the term of expiration up to 30 days:**

➢ Revenues increased about 5 % = 2 641 243 x 1, 05 = 2 773 305 EUR

➢ Costs = $FC + increased\ revenues\frac{VC}{revenues}$ =1 364 489+1 172 220 = 2 536 709 EUR

➢ Costs per revenues = $\frac{2536709}{2773305}$ = 0, 9147

➢ Enterprise profit = 2 773 305 – 2 536 709 = 236 596 EUR

➢ Average state of the receivables = $\frac{2773305\ x\ 30}{360}$ = 231 109, - EUR

➢ Capital blocking = 231 109 x 0, 9147 = 211 395 EUR

- **Evaluation of the advantages of the 30 days expiration term**

➢ Profit change = 236 596 – 160 354= + 76 242 EUR

➢ Loss from capital blocked in the receivables about 5 % p. a. = - 5 721 EUR

➢ Doubtful receivables increase about 3 ‰ (2 773 305 x 0,003) = - 8 320 EUR

Expected profit increase = + 62 201 EUR

On the ground of the carried out calculations, and under given conditions, we can the extension of the expiration term from 14 to 30 day recommend.

Providing discount

Suitable tool, which motivates customers for paying the receivables in the agreed time, is the discount. Therefore we will find out whether it would be favorable for the enterprise to provide discount for his customers about 2 % in case of payment within 10 days at the increased 30 days term of expiration.

We can expect by a qualified estimation that the discount would be utilized in the 20 % of the revenues, and the doubtful receivables would decrease approx. about 1 ‰.

- **Calculation the advantages of the provided discount at 30 days term of expiration:**

Average time of payment for receivables	= 0, 20 x 10 days + 0, 80 x 30 days =	26 days
Average height of the receivables	= 2 773 305 x 26 / 360	= 200 294 EUR
Capital blocked in the receivables	= 200 294 x 0, 9147	= 183 209 EUR
Capital released	= 211 395 – 183 209	= 28 186 EUR

- **Impact on the profit under the condition „2/10 net 30“:**

released capital investing at 5 % profit (28 186 x 0,05)	= + 1 409 EUR
doubtful receivables decrease about 1 ‰ (2 773 305 x 0,001)	= + 2 773 EUR
revenues decrease caused by the discount (2 773 305 x 0,2 x 0,02)	= - 11 093 EUR

Profit change - 6 911 EUR

From the calculations under given conditions it is resulting that the discount would be disadvantageous for the enterprise, therefore it can not be recommended.

5. CONCLUSION

The analysis of state and system of the receivables management in the selected enterprise have shown that the company is not pay for the receivables management questions sufficient attention and as in the preventative stage as well in the monitoring stage. The greatest attention is paid in the stage of the recovery of receivables, what represents vain raise in their costs. Among the main lack offs found in the receivables management belongs:

- there are not determined exact procedures and rules for managing receivables,
- there is no credibility verification of the customers based on financial criteria,
- there are not considered the possibilities of utilization flexible and optimal varieties of payment conditions with a possible discount utilization,
- ensuring instruments are not utilized sufficiently,
- there is no determined a suitable motivated responsible person for receivables monitoring,
- the issue of weak communication of the economic department with the company management in the issues in question

On the ground of the listed findings and focusing the attention first of all on the preventative stage of the receivables management, there was designed a practical method for the customer credibility verification and for their classification into credibility groups, together with a suitable ensuring instruments specification. For the classification of the customers there were used credibility and bankrupt models, which are exploiting data predominantly from financial reports, but also other supplemental information. The designed method shows the advantages of the extension of the expiration term from 14 to 30 days, however it also shows that introducing discount with a cut rate 2 % for payment within 10 days would be disadvantageous.

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ECONOMIC ASPECTS OF NANOTECHNOLOGY APPLICATIONS IN THE WOOD COMMODITY

Abstract: Nanotechnology is expected to be a critical driver of global economic growth and development in this century. Using nanotechnology to produce nanomaterials with unique properties is expected to revolutionize technology and industry. The forest and wood products industry relies on a vast renewable resource base to manufacture a wide range of products that are indispensable in our modern society. By employing nanotechnology to revitalize the forest products industry, we can strengthen one of Polish core manufacturing sector. Poland has a great infrastructure for growing, harvesting and processing wood products, which provides a key employment base in almost every aspect. This infrastructure provides a fundamental strategic advantage that can be used for preserving the global economic competitiveness of this industry. Nanotechnology holds the promise of changing virtually all of the processes by which wood and paper products are now made, transforming the sector from a resource-based to a knowledge-based industry with much greater prospects for long-term stability.

Key words: nanotechnology, wood commodity, wood market, economy

1. INTRODUCTION

The specific features of nanometer-sized material have recently become the basis of the new direction of materials science. Nanotechnology, a science and technology generation, uses and applies materials which at least in one dimension lay in the range between 1 nm and 100 nm. Science dealing with the issues of the nano-scale (called nanoscience) is defined as the study of phenomenon, actions and impacts on the objects in the scale of atoms, particles and macroparticles. The main area of interest of nanoscience are these phenomena and actions that are tantamount to showing the features of the tested objects different from those observed on a larger scale. By controlling the size and the shape of the objects on a nanometric scale, nanotechnology focuses on creation, testing, analyzing as well as production and application of structures, devices and systems.

Moreover, thanks to the possibility of using nano-scale objects in most areas of human activity and daily life, nanotechnology, including engineering of wood materials, has become an area intensively studied and developed by scientists and even treated as a priority in the European Union in which Poland is a member. On the one hand, it is also worth noting that today it is a field of science where large funds are allocated, especially from the budgets of the countries with the greatest economic potential, but on the other hand, nanotechnology has also become a subject of lively discussion in the context of safety and risk of its application.

Therefore, it seems appropriate to highlight the potential applicability of nanotechnology in wood commodity, which may soon alter the structure of wood market, especially in terms of wood products, composites, furniture, etc. In the near

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future this attainable new quality in wood commodity may become an important economic criterion playing a significant role in the market offer for wood products.

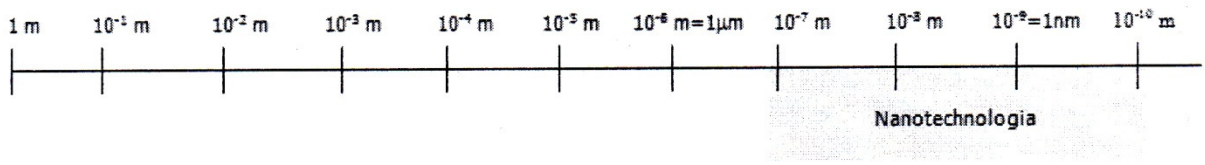
2. WOOD COMMODITY AND NANOSCIENCE

Nanotechnology is a relatively new concept. For the first time it has been used in 1974 by a Japanese scientist Norio Taniguchi to explain the possibility of materials engineering at the nanometer level. Earlier, in 1959, physicist Richard Feyman presented his visionary speech during the American Physical Society meeting: "*There is a plenty of room at the bottom"*. He explained the laws of physics or any other did not speak for the fact that manipulating single atoms was impossible. He also claimed the only limitation was the lack of sufficiently sophisticated equipment and devices: "(…).it has not been done because we are to big".

In the area of nanoscience and nanotechnology the following aspects played also an important role :

- the construction of scanning tunelling microscope STM by the Swiss team of IBM researchers under the leadership of Heinrich Rohrer and Gerd Binning (Nobel Prize in 1986);
- the discovery of new materials, such as fullerenes (Harold Kroto and a team of researchers from Rice University, Nobel Prize in 1996) and carbon nanotubes (Sumio Iijima, NEC-Japan, 1991), which have unique properties at the macro level.

Nanoparticles are objects in which one of their dimension does not exceed 100 nm. Nevertheless, this limit of 100 nm should be treated conventionally, because in fact, there are objects of larger sizes (up to about 250 nm), which fall within the category of nanoparticles, whereas the lower limit of nanoparticles' size is the dimension of individual atoms (about 0.2 nm). However, it should be noted that not every object that is small enough can be qualified to the category of nanoscience and nanotechnology. The necessary condition is to reveal by the nanometric object the nano-features that do not occur on a larger scale and further more, from the perspective of nanotechnology – its creation and application has to be possible [1,2,6].



Picture 1. The range of sizes of nanoparticles (nanotechnology in marked area)

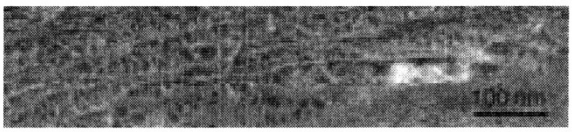
Source: www.nanotechforest.org [16].

In this context the wood can be called a natural nanocomposite. Its main component is the crystallite, built from a set of cellulose molecules arranged in parallel (called micelles), whereas structured micelles form so-called fibril, cellulose fiber. It is micellar structure which determines the chemical features of wood (surface area 240 ÷ 430 m2/cm3). In turn, the wood's mechanical properties are highly affected by the strong chemical bonds of cellulose atoms' chains and their one-way location.[3, 11] Nanoparticle of industrial wood is the cell (fiber) of wood. It should be noted that wood as a natural nanomaterial, on the one hand, can be considered as a model for the new artificial nanomaterial structures, and on the other, by the application of new nanotechnology (modification, change of some of physicochemical features, etc.) – as an interference issue.

From the perspective of materials science, the basis of wood application in the industry is a cellulose fiber and its physicochemical properties (properties of cellulosic fiber).

Cellulose fiber as nanoparticle has three unique properties [12]:

- very high mechanical strength,
- ability to bond strength easily with other chemical substances,
- the ability to process energy.



Picture 2. Cellulose nanofibrils withi a plant cell wall

Source: Image courtesy of Candace Haigler and Mark Grimson, North Carolina State University,Raleigh, NC [16].

The use of these properties, their intensification and its new applications have become an inspiration for a discussion of research programs for developing nanotechnology for engineering wood materials.

3. POSSIBLE APPLICATION OF NANOTECHNOLOGY IN THE WOOD INDUSTRY

It is obvious that research on the application of nanotechnology in the wood industry requires very large amounts of money and well-qualified research centers. Even the preliminary case studies were characterized by great optimism in terms of their economic viability. In this context, one of the first initiatives was the creation of international school "Nanotechnology for the Forest Products Industry - Vision and Technology Road Map" [16] in the USA (within the National Nanotechnology Initiati), where the concept of modernization and development of wood industry through the implementation of nanotechnology was elaborated. These observations are still up to date [17, 18]:

- lignocellulose as a nanomaterial should be the subject of detailed studies, including its interaction with other materials,
- for this purpose, new analytical methods, specific to nanoscience should be applied,
- lignocellulosic biopolymers with nanofibril structure can be successfully used in creating new multifunctional materials
- it seems possible to create "smart" materials based on paper or wood (also those with controlled self-organization),
- activity and chemical multifunctionality of nanolignocellulosoic particles' surface can be used to combine with other particles or molecules in order to form a composite or modification (e.g. auto-sterylization).

Such highlighted ideas allow for separation (for example USA) the main areas of nanotechnology application in the wood industry (see: "Nanotechnology for the Forest Products Industry - Vision and Technology Road Map") [16]:

1. Improving the appropriate strength of wood material (technical measures: improvement of bonding and adhesion of nano-scale, controlled hierarchy of structure, measurements of mechanical properties of the nano-scale).
2. Preparation and use of nanocellulose: (technical measures: application of methods of nanocatalysis and nanofractionation in order to receive nanocellulose).
3. Control of interaction between water and lignocellulose (technical measures: study on surface of alternating wettability [hydrophobic / hydrophilic] in the nanoscale).
4. Preparation of biomineral composites (technical measures: develop of nanocomposites with a surface of assumed chemical activity and creation of methods for testing physical properties of nano-scale composites).
5. Receiving a "smart" wood materiale (technical measures: application of piezoelectric and optical properties of cellulose, creation of hybrid bioinorganic devices; use of crystallographic structures).
6. Reducing energy consumption and costs of wood materials' production (technical measures: creation of low-temperature process of lignin removal by applying nanocatalysis, develop of anti-corrosion coatings as well as temperature, pressure and stress nanosensors that are able to work under difficult technological conditions, creation of methods for mixing wood fiber in nano-scale with chemical reagents).

Research program for the introduction of nanotechnology in the American wood industry has been included in a national road map of the nanotechnology development [16].

In this context, as report says, the area of potential nano- applications can be determined:

a) intelligent products with nanosensors for measuring forces, loads, moisture levels, temperature, et cetera,
b) as building blocks of products with substantially enhanced properties,
c) as coatings for improving surface qualities to make existing products more effective,
d) as basis for making lighter-weight products from less material and with fewer energy requirements.

4. ECONOMIC PROSPECTS FOR COOPERATION BETWEEN POLISH WOOD AND FORESTRY SECTOR AND NANOTECHNOLOGY.

Polish wood industry is an important and well-growing economic sector. The use of experiences and achievements of nanotechnology in the wood industry appears to be only a matter of time. This applies primarily to the production of wood-based materials and their refining.

In turn, nanomaterials have properties that differ them from small molecules or solids (bulk materials). Properties of nanomaterials are determined by elevated energy state of atoms forming the surface, which in their case, constitute a significant proportion of the whole body and the energy structure of electrons with relatively reduced density of states in the fundamental frequency resulting from a small number of atoms. In this context, wood cellulose micelles is a nanomaterial.

Table 1. Potential uses for nanotechnology applications in the wood commodity

NANOTECHNOLOGY could transform the wood products industry in virtually all aspects—ranging from production of raw materials, • to new applications for composite and paper products, • to new generations of functional nanoscale lignocellulosics.
PRIORITY ACTIVITIES
* receiving and using of nanocellulose, biomineral composites and "smart" wood materials,
* searching for new multiple wood-based composites and improving existing ones, by perfecting the relevant physicochemical properties of wood, and reducing energy consumption and production costs of wood materials
* using of nanotechnology to eliminate or at least to minimize environmental threats in the wood product's manufacture, use and destruction.

Source: own work based on www.nanotechforest.org [16]

The elimination of toxic ingredients (formaldehyde) and the flammability of wood products, as well as the elimination of toxic wood preservatives (e.g. antifungal) are the examples of research problems, whose solution is likely to achieve not only positive ecological effects, but also direct economic benefits.

In this case, the expected objective could be the desire to replace the chemical preparation by nanoparticles. An example of such attempts is the incorporation of silver or copper nanoparticles known to be bactericidal and fungicidal to the wood material. Characteristic structure of the wood material can be also treated as a model of a material with high proper strength.[1,6] Such technology using the pyrolysis of wood and the reaction of carbon skeleton with compound of silicone was used to obtain "cellular" nanoceramics SiC [15]. An innovative way of introducing nanotechnology to at least some specialized fields of wood industry could lead to the creation of new branches of this industry, and consequently not only to increase of the production in this area, but also to new job creation.

In a way, action taken in the area of nanotechnology in the future may have great importance for the Polish economy. The area called "research and development" should, according to the documents of the European Union, take the

nanotechnology into account in member counties' budgets and research programs. Previous Polish achievements in the field of nano are presented in publication, edited by A. Mazurkiewicz [5]. The potential of the Polish science is now mainly focused on nanomaterials and fundamental phenomena in nano-scale.

On the basis of paper prepared by the Ministry of Science and Higher Education "Nanosciences and Nanotechnologies - The national strategy for the Polish" (2006) it can be estimated that the Polish research centers are primarily specialising in the field of nanomaterials. This trend should encourage the inclusion of nanotechnology to the wood industry.

Table 2. The SWOT analysis conclusion for the development of nanotechnology in the wood industry.

SWOT CONCLUSION
A. Strengths: - large internal market and the country's rapid economic development in conjunction with the increasing number of innovative nanotechnology solutions, - growth of the number of research projects and their budgets.
B. Opportunities: - the possible involvement of material industry as an investor in the nanotechnology development
C. Weaknesses: - lack of links between education and industry area, - maladjustment of research and industry, - lack of wood industry development strategies in the area of nano.
D. Threats: - the risk of investment in areas where it will be difficult to gain a competitive advantage over traditional technologies

Source: own work based on Sokołowska A., Olszyna A., Frąckowiak I., Nanotechnologia w inżynierii materiałów drzewnych, in „Inżynieria materiałowa", no 5, 2008, p. 470-472 [18].

To be successfully used in consumer products and end uses, wood-based products and materials, including nanoscale materials, must be technically and economically viable as well as socially and environmentally acceptable [6].

5. CONCLUSION

The development of nanotechnology and nanomaterials in the world suggests that the vision of the introduction of nanomaterials into wood commodity and its viable application in the wood industry is not just an utopia. It is confirmed by American report "Nanotechnology American Forest Products Industry-Vision and Technology Roadmap", which says: "To sustainably meet the needs of present and future generations for wood-based materials and products by applying nanotechnology science and engineering to efficiently and effectively capture the entire range of values that wood-based lignocellulosic materials are capable of providing".

In this context, the future (possible transformation) and new directions of wood commodity development, they will have to face with the expansion of the nanophilosophy: "The distinctive feature of nanoscience is the increased understanding and technical control of nanoscale structure and functionality. This is not about new materials but about new processes, new forms, and new functionalities for old materials".

Although it can be sometimes believed that nanotechnology is only a fashion, and that – affects economy, but only in short-term - it would be a mistake to omit an investment in research and development for the wood industry in the field of "nano".

Undertaken studies on nanoscience, as well as the cooperation with industry - as a potential investor, would certainly contribute to good economic results. For example, Department of Materials Science and Engineering in Warsaw University of Technology has initiated and still continues the research project "Lignocellulosic ceramic nanocomposite" which focuses on the impact of different types of nanoparticles, including the wood cells. In turn, Research and Development Centre for Wood-Based Panels in Czarna Woda (Poland) and the Division of Composite Wood Products in Warsaw University of Life Sciences have already taken on the question of nano-wood industry.

Moreover, some articles appeared explaining the field of nanoscience and nanotechnology [4], the "Nanotechnology for the wood industry" program in the USA [10] as well as existing in industry preparation and technologies for perfecting the wood surface (hydrophobic process, abrasion resistance), in which nanoparticles are used [9].

Also at the Faculty of Wood Technology at the University of Life Sciences in Poznań started his own research in the field of nanotechnology [13]. Now, strategic initiatives are needed and use of funding that are interested in nanotechnology research as well.

American report [16] predicts place of nanotechnology in the wood industry:

- traditional manufacturing works from the top down—nanotechnology works from the bottom up, manipulating molecules to achieve precise and novel effects;
- nanotechnology is the most promising breakthrough towards production growth since the Internet—some say a second industrial revolution;
- to reach its goals, the forest products industry must align with the greater nanotechnology research community.

In the United States the question of nanotechnology in forestry and wood industry has already been discussed in detail in 2004. Therefore, the lack of interest in nanotechnology in the existing strategic documents for the wood industry may cause some concern [7,8]. Hopefully, the initiative carried out by the Institute of Wood Technology in Poznań since 2009 (in EU-grant "Foresight w drzewnictwie - scenariusze rozwoju badań naukowych w Polsce do 2020 roku").

In conclusion, the nanotechnology can contribute to the development of wood industry as a value added and in fact, those economic aspects should be highlighted. Primarily, it's about the development of the new wood industries, creation of new jobs, reduction of costs of wood production, energy saving by modifying the technology processes and implementation of new energy-efficient technology. Furthermore, through the production of nanocomposites using new wood,

nanotechnology can stimulate domestic demand and export of the wood products (e.g. furniture), the know-how and technology transfer and ecological effects known as a reduction of emissions of harmful substances used previously for the production and processing of wood-based products. Even against the possible risks in nanotechnology field, it seems to be a balance of positive that speaks in favor of innovation.

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FLOWS IN THE PROCESSING OF BEECH WOOD INTO SEMI-FINISHED ELEMENTS WERE DETERMINED

Abstrakt: Wood as a raw material is becoming scarce which makes it necessary to take action to improve economy and efficiency of wood processing. One of the major species of deciduous beech is a wide range of industrial applications. Taking into account the characteristics and qualities of raw beech decided to carry out research to identify indicators to optimize processing of the material in real conditions. Analysis of the processing timber beech into semi-finished elements of the furniture for the implementation of simple, curvilinear elements of the furniture may give base to the rationalization of technology in industrial applications

Key words: logistics, chain flows, technology, timber, semi-finished elements

INTRODUCTION

Beech wood is very valuable but scarce resource located widest use in the furniture industry. Manufacture of sawnwood and semi-finished elements were determined for furniture industry should be conducted in such a way as to ensure optimum performance and economic results. An important objective is to determine the link quality of wood working sawnwood and obtained performance of semi-finished elements for the production of skeleton furniture. To achieve the target agreed to establish the origin of processed beech raw material, together with the structure of dimensional-qualitative of wood working sawnwood and link technology indicators performance processing.

The initial raw material for the investigations of furniture semi-finished articles in production conditions was unedged beech sawn timber in three quality classes and quality and dimensional parameters complying with standard recommendations in accordance with the PN-72/D-96002 standard.

Depending on assortments dimensional-determined the sawnwood is subjected to due process, while maintaining the proper rules of optimization. After delivery and reception quality of the raw material followed by unloading in the warehouse where the sawnwood is stacking and then, depending on needs, is transported to the cutting room. Then unloads the sawnwood and transported by conveyor roller to workstations.

The main products comprised such furniture semi-finished articles as: joiner's elements – battens, curvilinear joiner's elements as well as elements intended for bending.

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The elements of the manufacturer's own production and those obtained from cooperating parties were divided into the following four length classes: short elements not exceeding the length of l=699 mm, medium length – l=700 to 1349 mm and long elements l=1350 to 2149 mm. The fourth group included special elements with the length exceeding 2150 mm and not longer than 2700 mm.

The main factor affecting the optimal utilization of beech wood raw material in the course of its processing into furniture semi-finished products is the choice of appropriate technology (Buchholz 1990, Hruzik 1993, 2006, Gotycz W., Hruzik G. J. 1995, 1996).

The main product is subjected to the tests, are furniture semi-finished elements - lath, the elements of joinery and curved elements for bending. It was found that in the event conversion into short semi-finished elements of across-along method, which follows the initial reduction in the long of the sawnwood into dimension elements, and its division by means of multi-circular saw. In the case of obtaining long elements it is recommended to use the along-across method, or to obtain a desired cross lath and shortening them to the required length with of the elimination of defects. Also apply a combination of methods combining the advantages of both methods. The fourth method is scribing, recommended for conversion of sawnwood into the curvilinear elements.

Sawnwood treatment process takes place in two logistic sequences. The raw material is processed in the system partly in the form of external orders and partly at the Department cutting-room of plant.

The technological process of production of semi-finished elements, further used for the production of chairs at the plants, depends on the type of elements that we want to acquire, ie elements of carpentry - lath, the elements of joinery and curved elements for bending and available machinery.

The differences occur at the stage of semi-finished elements, which in the case of typical dimensions are derived from the purchase, while the curved semi-finished elements or semi-finished elements different from the normative dimension which manufactured in cutting-room of the factory.

The first stage of the process is a sawnwood format for the length of the transverse circular saws. Then, in the case of semi-finished elements for joinery and rectilinear bending elements, sawnwood is split of lengths using a circular saw.

Analyzing the production process curved joinery semi-finished elements, sawnwood of formatted and transported to the positions where it is routed to the desired shape with shrinking allowance and allowance for machining. The last step is the obtaining of curved semi-finished elements is fretting at the band saw.

Obtained in the presented way joiner elements, bending and curvilinear, are put on pallets and depending on your relative humidity and the type of further treatment - a unit of bending or carpentry, transported on forklifts to the drying chamber. In the case of the use of semi-finished elements to joinery items they are subjected to drying and seasoning to a moisture content of 8 - 10%. However, of the use to bending of semi-finished elements usually have much excess moisture saturation point fiber - 30%.

In the next stage of the manufacturing process of both elements for bending and joinery are subjected to pre-treatment for different types of machines depending on the shape of a cross section that we want to achieve: in the case of rectangular elements are surfacers, planers, four-sides planers and moulders, while for the elements a circular or similar are lathes, profile montejuses and round rot machines.

Further of the manufacturing process elements of bent is hydrothermal treatment of bent ei plasticization and then bending manual and mechanical, and drying in the dryer, followed by the seasoning. Thus prepared elements of both curved and joinery shall be submitted to the department processing core, which is transmitted to them the final shape of the planer-type machines, copiers-planers, moulder machines, moulder-copier machines. Then the elements are subjected to grinding process, which also depends on the shape and cross section of elements - the selection of grinders. Polished items are transferred to the warehouse of finished components, where their quality is checked: the color, surface smoothness, shape compatible with the template, verified by the staff of Quality Control Department.

RESULTS AND THEIR ANALYSIS

On the basis of material flows for the period of the year, established a quality-quantitative structure of sawnwood purchased for the demanding of plant. It should be noted that some of the sawnwood goes to subcontractors who are executing orders on the basic elements used in the manufacture of furniture in the plant. See a significant share of quantity purchased sawnwood I and II quality classes versus III quality classes of sawnwood. Trend to use the sawnwood I and II quality classes, which is understandable due to the use of this raw material to produce unusual semi-finished elements, and therefore demanding better grades in order to obtain optimal treatment results.

It should be noted that the part of sawnwood goes to contractors who are executing orders on the basic elements used in the manufacture of furniture(Tab. 1).

See a significant share of quantity purchased sawnwood I and II quality classes versus III quality classes of sawnwood. Trend to use the sawnwood I and II quality classes, which is understandable due to the use of this raw material to produce unusual semi-finished elements, and therefore demanding better grades in order to obtain optimal treatment results.

You can propose to correct towards the use of sawnwood thickness of less than 55mm in the first and second classes quality, while at larger thicknesses increased use of part III quality class sawnwood. In the production of plant are used purchased and obtained semi-finished elements in the process of prefabrication beech sawnwood of various grades of quality.

Work covers the processing of wood working sawnwood into semi-finished elements with the analysis of performance factors to identify the most appropriate rules for optimization of technological process.

Table 1. The share of beech sawnwood specified thickness purchased for its own production and orders

Thickness of timber	The share of beech lumber in various grades [%]			
	I	II	III	together
25mm	3,80	3,69	1,52	9,01
28mm	5,18	4,58	1,41	11,17
32mm	6,03	9,37	3,97	19,36
38mm	8,56	13,29	6,76	28,61
45mm	6,08	6,50	1,66	14,24
50mm	4,57	6,65	1,49	12,70
55mm	0,10	0,00	0,00	0,10
60mm	1,18	1,93	1,17	4,29
65mm	0,08	0,10	0,16	0,34
70mm	0,00	0,08	0,09	0,17
together	35,59	46,18	18,23	100,00

Based on data obtained from the annual turnover of the material in cutting room summarizes the quantification of timber used to produce semi-finished elements.

Based on the methodological assumptions established performance of semi-finished elements obtained from individual quality classes of sawnwood in the annual processing and the value of the average yield of elements(Table 2, 3, 4).

Table 2. Performance limits of semi-finished elements obtained from the different qualities classes of beech sawnwood in the range of 25mm - 45 mm for different lengths

The range of intermediate length	Performance of intermediate obtained from the lumber grade Wp					
	I		II		III	
	max	min	max	min	max	min
Short	0,740	0,376	0,640	0,268	0,500	0,126
Medium	0,648	0,292	0,534	0,174	0,382	0,042
Long special	0,496	0,260	0,424	0,080	0,248	0,000

Table 3. Performance limits of semi-finished elements obtained from the different qualities classes of beech sawnwood in the range of 50mm - 100 mm for different lengths

The range of intermediate length	Performance of intermediate obtained from the lumber grade Wp [m^3/m^3]					
	I		II		III	
	max	min	max	min	max	min
Short	0,690	0,426	0,580	0,274	0,500	0,214
Medium	0,618	0,360	0,528	0,250	0,444	0,158
Long special	0,558	0,270	0,458	0,210	0,380	0,130

Table 4. Material efficiency of semi-finished products during processing of beech sawn timber of different quality taking into account its quantitative shares

Type of furniture elements [dimensions in mm]	Efficiency of obtained semi-finished products Wp [m^3/m^3]				The share of timber of different quality U_t [m^3/m^3]		
	I	II	III	medium	II	II	III
Short joiner's 25-45	0,64	0,50	0,13	0,38	0,25	0,33	0,42
Short for bending 25-45	0,55	0,44	-	0,49	0,42	0,58	0,00
Medium joiner's 25-45	0,65	0,52	0,04	0,46	0,41	0,35	0,24
Medium for bending 25-45	0,65	0,30	-	0,48	0,51	0,49	0,00
Medium for bending 50-100	0,56	0,25	-	0,41	0,51	0,49	0,00
Long joiner's 25-45	0,50	0,42	-	0,47	0,59	0,41	0,00
Special for bending 25-45	0,50	0,42	-	0,48	0,82	0,18	0,00
Special for bending 50-100	0,51	0,21	-	0,45	0,82	0,18	0,00
Short joiner's 50-100	0,55	0,40	-	0,46	0,40	0,60	0,00
Short for bending 50-100	0,58	0,50	0,19	0,42	0,33	0,33	0,34
Medium joiner's 50-100	0,62	0,53	0,44	0,53	0,34	0,31	0,35
Long for bending 50-100	0,56	0,39	-	0,49	0,60	0,40	0,00
Short curvilinear 25-45	0,64	0,50	0,27	0,45	0,29	0,34	0,37
Short curvilinear 50-100	0,58	0,50	0,24	0,44	0,32	0,33	0,35
Medium curvilinear 25-45	0,65	0,53	0,11	0,51	0,46	0,35	0,19
Medium curvilinear 50-100	0,62	0,47	0,16	0,47	0,42	0,38	0,20

On the basis of Table 1, it can be said that, in the case of processing of sawn timber of the first class into furniture semi-finished products, mean values in the entire thickness and length interval ranging from 0.50 to 0.65 m^3/m^3 can be adopted. Beech sawn timber of the second quality class allows obtaining mean efficiency in the entire thickness and length interval ranging from 0.21 to 0.53 m^3/m^3. Beech sawn timber of the third quality class is utilised only to manufacture short- and medium-length elements. For this raw material, the semi-finished product efficiency interval ranges from 0.04 to 0.44 m^3/m^3.

Decided also a significant impact type of items produced in sawn room.

The processing of the raw material of different quality comparable to the values obtained for the elements of joinery and curved.

Higher demand for the raw material was found for bending semi-finished elements, derived from the third quality class sawnwood. For elements of joinery average length and thickness in the range of 25mm - 45mm does not seem reasonable use of third quality class of sawnwood.

CONCLUSIONS

On the basis of the performed investigations and the applied analysis of secondary processing of beech sawn timber into furniture semi-finished products in the FAMEG Factory of Bentwood Furniture in Radomsko, the following general conclusions can be drawn

1. Based on purchasing records found that purchased beech material originates in the vast extent of land south-east of Poland, with a fairly large share of the purchase of the land area of Starogard Szczeciński and a negligible share of supplies from the vicinity of the northern Poland.
2. On the basis of semi-finished product yields determined in production conditions, it was possible to collate mean material efficiencies of semi-finished products from sawn timber of different quality classes. The highest efficiencies were found in the processing of the first class quality sawn timber ranging from 0.50% to 0.65%. Raw material of the second quality class yielded efficiencies ranging from 0.21% to 0.53%, whereas that of the third quality class – from 0.04% to 0.44%.
3. Based on the established performance materials, determining the optimal use of raw beech quality grade, for the manufacture of certain group of semi-finished elements were determined, demonstrated the impact of the length of manufactured items. This shows a lack of reasoning apply in the processing of third grade quality sawnwood.
4. The optimization results obtained allow to conclude that in the production process of semi-finished furniture elements - both joinery, to bending and curved, it is reasonable to use better quality grades of sawnwood. Pay attention to the use of second sawnwood grade.

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***Marek Wieruszewski, Viktor Gotych, Ginter J. Hruzik*[92]**

LOGISTICS IN OWN AND COOPERATIVE PROCESSING BEECH WOOD

Abstrakt: Beech wood is the mast important species used in wood industry. Take into account the usability of the beech wood was realized the research in order to specify of conversion factory in ZMG FAMEG factory conditions. The analysis of timber conversion effectiveness of bent furniture elements has been taken consideration.

INTRODUCTION

Securing semi-finished products intended for the needs of furniture industry should proceed optimally from the point of view of effectiveness and economy. Manufacturers of semi-finished articles should aim at the most rational processing of the raw material into sawn timber and destined elements employing effective methods of processing and utilisation of raw material (Gotycz W., Hruzik G. J. 1995, 1996).

The aim of the study is to determine the link quality classes beech sawnwood and efficiency obtained of semi-finished elements in own or cooperative production. To achieve this objective it was decided to determine the origin of raw beech, together with the structure of qualitative-dimensional processing sawnwood. The studies illustrate the difference between the elements derived from the purchase or a manufactured at the plant and determine the optimum conditions of processing of beech sawnwood to the semi-finished elements were determined.

The initial raw material for the investigations of furniture semi-finished articles in production conditions was unedged beech sawn timber in three quality classes and quality and dimensional parameters complying with standard recommendations in accordance with the PN-72/D-96002 standard.

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Depending on assortments dimensional-determined the sawnwood is subjected to due process, while maintaining the proper rules of optimization. After delivery and reception quality of the raw material followed by unloading in the warehouse where the sawnwood is stacking and then, depending on needs, is transported to the cutting room. Then unloads the sawnwood and transported by conveyor roller to workstations.

The main products comprised such furniture semi-finished articles as: joiner's elements – battens, curvilinear joiner's elements as well as elements intended for bending.

The elements of the manufacturer's own production and those obtained from cooperating parties were divided into the following four length classes: short elements not exceeding the length of l=699 mm, medium length – l=700 to 1349 mm and long elements l=1350 to 2149 mm. The fourth group included special elements with the length exceeding 2150 mm and not longer than 2700 mm.

The main factor affecting the optimal utilisation of beech wood raw material in the course of its processing into furniture semi-finished products is the choice of appropriate technology (Buchholz 1990, Hruzik 1993, 2006)

The main product is subjected to the tests, are furniture semi-finished elements - lath, the elements of joinery and curved elements for bending. It was found that in the event conversion into short semi-finished elements of across-along method, which follows the initial reduction in the long of the sawnwood into dimension elements, and its division by means of multi-circular saw. In the case of obtaining long elements it is recommended to use the along-across method, or to obtain a desired cross lath and shortening them to the required length with of the elimination of defects. Also apply a combination of methods combining the advantages of both methods. The fourth method is scribing, recommended for conversion of sawnwood into the curvilinear elements.

Sawnwood treatment process takes place in two logistic sequences. The raw material is processed in the system partly in the form of external orders and partly at the Department cutting-room of plant.

The technological process of production of semi-finished elements, further used for the production of chairs at the plants, depends on the type of elements that we want to acquire, ie elements of carpentry - lath, the elements of joinery and curved elements for bending and available machinery.

The differences occur at the stage of semi-finished elements, which in the case of typical dimensions are derived from the purchase, while the curved semi-finished elements or semi-finished elements different from the normative dimension which manufactured in cutting-room of the factory.

The first stage of the process is a sawnwood format for the length of the transverse circular saws. Then, in the case of semi-finished elements for joinery and rectilinear bending elements, sawnwood is split of lengths using a circular saw.

Analysing the production process curved joinery semi-finished elements, sawnwood of formatted and transported to the positions where it is routed to the desired shape with shrinking allowance and allowance for machining. The last step is the obtaining of curved semi-finished elements is fretting at the band saw.

Obtained in the presented way joiner elements, bending and curvilinear, are put on pallets and depending on your relative humidity and the type of further treatment - a unit of bending or carpentry, transported on forklifts to the drying chamber. In the case of the use of semi-finished elements to joinery items they are subjected to drying and seasoning to a moisture content of 8 - 10%. However, of the use to bending of semi-finished elements usually have much excess moisture saturation point fiber - 30%.

In the next stage of the manufacturing process of both elements for bending and joinery are subjected to pre-treatment for different types of machines depending on the shape of a cross section that we want to achieve: in the case of rectangular elements are surfaces, planers, four-sides planers and moulders, while for the elements a circular or similar are lathes, profile montejuses and round rot machines.

Further of the manufacturing process elements of bent is hydrothermal treatment of bent ei plasticization and then bending manual and mechanical, and drying in the dryer, followed by the seasoning. Thus prepared elements of both curved and joinery shall be submitted to the department processing core, which is transmitted to them the final shape of the planer-type machines, copiers-planers, moulder machines, moulder-copier machines. Then the elements are subjected to grinding process, which also depends on the shape and cross section of elements - the selection of grinders. Polished items are transferred to the warehouse of finished components, where their quality is checked: the color, surface smoothness, shape compatible with the template, verified by the staff of Quality Control Department.

RESULTS AND ANALYSIS

On the basis of material flows for the period of the year, established a quality-quantitative structure of sawnwood purchased for the demanding of plant (Tab. 1). It should be noted that some of the sawnwood goes to subcontractors who are executing orders on the basic elements used in the manufacture of furniture in the plant. See a significant share of quantity purchased sawnwood I and II quality classes versus III quality classes of sawnwood. Trend to use the sawnwood I and II quality classes, which is understandable due to the use of this raw material to produce unusual semi-finished elements, and therefore demanding better grades in order to obtain optimal treatment results.

You can propose to correct towards the use of sawnwood thickness of less than 55mm in the first and second classes quality, while at larger thicknesses increased use of part III quality class sawnwood. In the production of plant are used purchased and obtained semi-finished elements in the process of prefabrication beech sawnwood of various grades of quality. On the basis of documentation of material purchased and manufactured elements of furniture, found to share quantitative-dimensions of elements due to the thickness of the sources for obtaining semi-finished elements, as shown in the figure 1.

Table 1. The share of beech sawnwood specified thickness purchased for its own production and orders

Thickness of timber	The share of beech lumber in various grades [%]			
	I	II	III	together
25mm	3,80	3,69	1,52	9,01
28mm	5,18	4,58	1,41	11,17
32mm	6,03	9,37	3,97	19,36
38mm	8,56	13,29	6,76	28,61
45mm	6,08	6,50	1,66	14,24
50mm	4,57	6,65	1,49	12,70
55mm	0,10	0,00	0,00	0,10
60mm	1,18	1,93	1,17	4,29
65mm	0,08	0,10	0,16	0,34
70mm	0,00	0,08	0,09	0,17
together	35,59	46,18	18,23	100,00

The total proportions of the purchased semi-finished products and those obtained in the cutting shop were similar, although significant quantitative differences were observed for different thicknesses. Thin elements were manufactured on the spot, whereas in the case of 38 mm and 45 mm thicknesses, purchased elements constituted very high proportions.

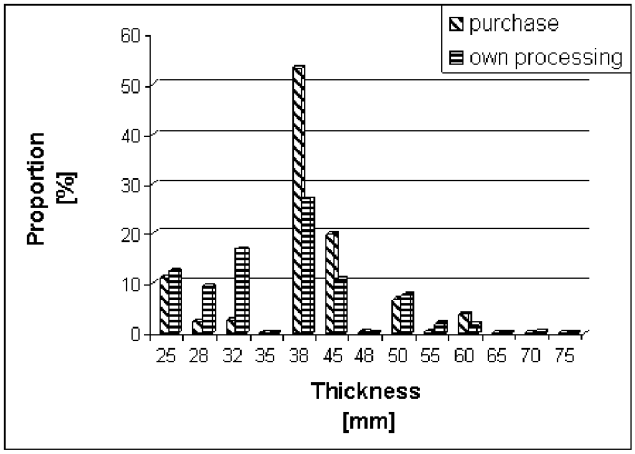

Figure 1. Proportion of purchased and own production regarding thickness

The proportions of the semi-finished articles derived from individual sources taking into account their length shown in figure 2 indicate that purchased elements constitute a clear majority when we compare purchased and own elements in the group of long and special semi-finished products.

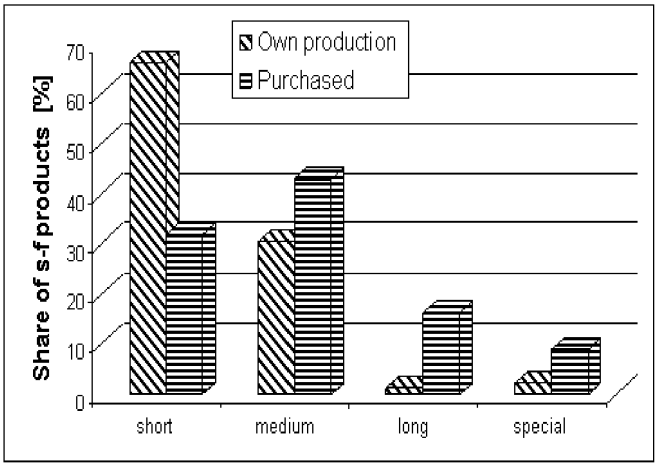

Figure2. Proportion of beech semi-finished products purchased and from the plant's own production of different lengths

CONCLUSIONS

On the basis of the performed investigations and the applied analysis of secondary processing of beech sawn timber into furniture semi-finished products in the Furniture Factory, the following general conclusions can be drawn:

1. Based on purchasing records found that purchased beech material originates in the vast extent of land south-east of Poland, with a fairly large share of the purchase of the land area of Starogard Szczeciński and a negligible share of supplies from the vicinity of the northern Poland.
2. Analysis of furniture semi-finished elements, resulting from the reprocessing of its own in cutting-room and parts procurement, provides a comparable quantitative relationship assortments from both sources, with far higher purchase

ratio of furniture elements with a thickness of 38mm - 45mm and 53.2% - 19.8% and obtained in cutting-room with a thickness 32mm - 28mm and 16,8% - 9.3%.
3. The analysis of the thicknessing structure most cooperative elements had acquired thickness in the range of 25mm-50mm, with the decisive participation of the dimension of 38mm - 32mm and 30.8% - 19.1%.
4. Short- and medium-length semi-finished articles dominate the general element structure. Elements for bending and joiner's elements are, in their majority, short.

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Marek Wieruszewski, Katarzyna Mydlarz[93]

MANAGEMENT OF THE SUPPLY CHAIN IN AN ENTERPRISE MANUFACTURING PREFABRICATED WOODEN HOUSES

Abstrakt: The new capital system shaping Polish economical reality has made entrepreneurs aware of the necessity to custom-orientate their activities. Due to strong competition, recognition of customers' preferences is essential for the success of all enterprises. On the other hand, the awareness that, for increasing numbers of customers, not only product quality and price but, equally or even more importantly, servicing standards are beginning to gain in importance causes that manufactures are beginning to pay more and more attention to issues associated with logistics. Such problems are particularly important for companies producing prefabricated wooden houses as the undertaking of house construction is a multi-stage process and requires a long-term contact with the client which does not end with the moment of house purchase but continues long after moving in. This article aims at presenting the flow of raw materials, materials, semi-finished products and finished articles in an enterprise manufacturing prefabricated wooden houses and at indicating problems that may occur at individual phases of the process.

Key words: logistics, supply chain, technology, prefabricated wooden houses

INTRODUCTION

From the point of view of customers, what has distinguished various products in recent years, was actions connected with logistics which are undertaken by competing enterprises. For a potential customer, apart from physical characters of a product, the way and standard of service are equally important and, together, they form, what has come to be known as an article's "added value". It is true that the trait also comprises marketing activities, e.g. advertising or the brand of a given product, but they are factors whose main objective is to win customers (Rutkowski 2002).

In order to maintain continuity of economic processes in an enterprise, which effectively create the image of a company, it is essential to pay special attention to the flow efficiency of supply streams. Wooden houses constitute a unique type of product because the contact of the manufacturer with the customer does not end with the production of the house. If it had been the case, logistic measures, although important from the point of view of winning customers and securing their positive opinions about the product, would not have been so important as in the case when the produced house has to be put up in a specific place, its proper functioning assured and, in extreme situations, complaints satisfied even if the problem cannot be attributed toy any hidden defects.

Since, in the case of prefabricated wooden constructions, we have to do not only with production but. in addition. many different services need to be provided, therefore, it is very important to harmonise individual stages of processing and sales.

SUPPLY CHAIN IN AN ENTERPRISE MANUFACTURING PREFABRICATED WOODEN HOUSES

The phrase 'supply chain' refers to a flow of goods and services from its primary source through all intermediate phases down to a finished product. Although the 'chain' concept is based on the flow of material streams, nevertheless, it also takes into account information and decision-making processes which are used in flow management. Information is

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gathered, classified and then utilised in decision-making, hence, its huge role and influence on the way of transfer of goods between individual links of the supply chain (*Skowronek, Saryusz-Wolski* 2008).

In enterprises manufacturing prefabricated wooden houses, the flow of material streams is very elaborate. It covers not only raw materials and semi-finished products manufactured for house construction but also finished products which, due to their specificity, do not make the process easier. Apart from efficiently operating material flow, the proper circulation of documents and flow of money are also important issues connected with the right operation of the entire supply chain. That is why, from the point of view of the enterprise, especially, organisation of both the production process and product sales, logistics actions are essential as their aim is to integrate all links of the complex chain into one, logic and effectively operating entity (Klepacki 2008).

Adoption of this kind of approach, on the one hand, poses a serious challenge to manufacturers of wooden houses but, on the other, ensures increased competitiveness. Thanks to the cooperation between individual links of the chain, it is possible to achieve synergy which leads to the increase in the company potentials and exerts a huge impact on its image from the point of view of potential customers. Therefore, taking into consideration all participants of the process in such enterprise, it is possible to select both kinds and directions of flows of individual streams.

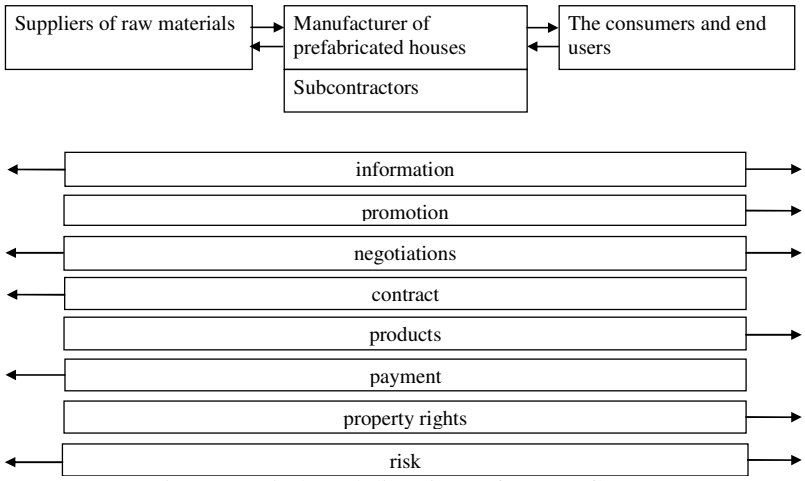

Figure 1. Kinds and directions of stream flows.

Source: Prepared on the basis (Michnowicz 2008, Witkowski 2009)

As evident from Figure 1, the flow of streams in an enterprise manufacturing prefabricated wooden houses is complicated and the degree of its complexity depends, to a large extent, on the quantity of stages preceding the transfer of the house as well as on the adopted production technology. That is why, in order to ascertain the flow fluidity of all streams – material, money as well as information - between individual stages of the production cycle and to monitor possible problems, it is essential to get acquainted with the process of the company operation from the moment of purchasing the raw materials (input) to the moment of the technical acceptance of the house on the construction site.

The manufacturer of prefabricated houses remains in continuous contact with external systems which include streams of supplies and streams of sales as well as with internal systems comprising processes of flow, manipulation, storage as well as stocks. In order to maintain proper functioning of logistic processes, it is necessary to take into consideration both of these systems and determine ways of their mutual cooperation (*Skowronek, Saryusz-Wolski* 2008).

Bearing in mind the specificity of the enterprise, a number of major actions must be taken into account when producing a finished product such as a house. These include: preparation of the timber material for gluing, process of production of glued elements and the prefabrication process of skeleton houses. In this case, the finished article is understood as a product prepared for transport and later on assembly on the construction site and does not constitute, as in majority of cases, a product which a customer can use at once.

Taking into consideration, in the first place, the system of internal flows, an effective control of successive production processes is necessary to guarantee an efficiently functioning enterprise at all stages of production. The production technology of prefabricated skeleton houses from glued wood, can be divided into three basic stages (excluding customer service, project preparation and material lists):

I. Preparation of wood raw material.

II. Production of glued semi-finished products (according to needs).

III. Production of modules of prefabricated skeleton wooden houses and their assembly on the construction site.

The decision process of continuous flows begins with manipulation of round timber. The division of long logs into logs and segregation of logs according to their diameters guarantee appropriate timber assortment for sawing. After generating requirements for sawn materials, round wood is subjected to basic processing. Log debarking is recommended as it reduces dulling of tools during later stages of processing. One-time sawing usually performed on frame sawing machines yields principal sawn timber as well as unedged timber as initial material for solid construction elements as well as glued construction elements. After classification, the material is shortened and then sorted and stacked. The stored sawn timber can be sent to drying chambers to be dried to the moisture content of about 10% and then to edge saws. On the basis of appropriate production plans, sawn timber is cut into battens of 98 mm net width or, if the material is wide (more than 150 mm) and of good quality, selected for solid construction elements. Material 60 mm wide is used for production of glued elements. Optionally, if the cut sawn timber is wet, battens are subjected to the drying process. The process of

preparation of the initial material of appropriate mass and quality plays a key role in ensuring production continuity of prefabricated houses. Appropriate coordination of materials makes it possible to avoid stoppages during the consecutive stages of the production process and, consequently, eliminates concentrations at cooperation contacts.

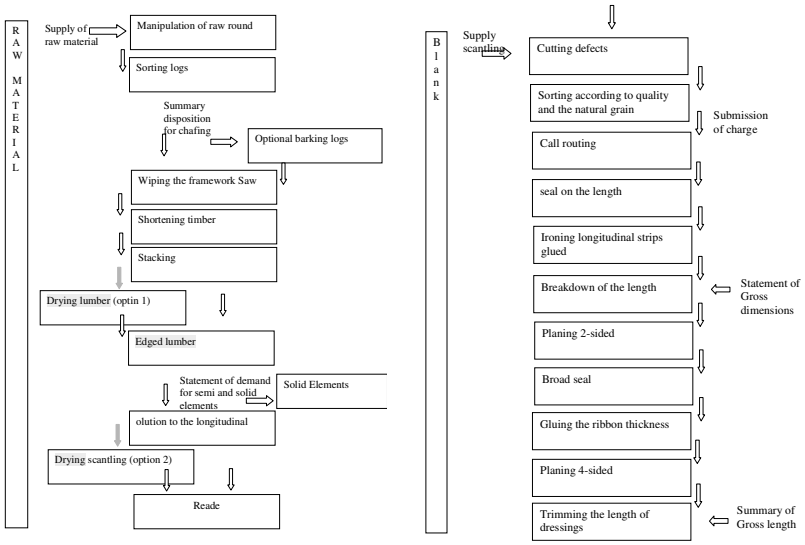

Figure 2a. Supply chain in an enterprise manufacturing prefabricated wooden houses
Source: Own elaboration

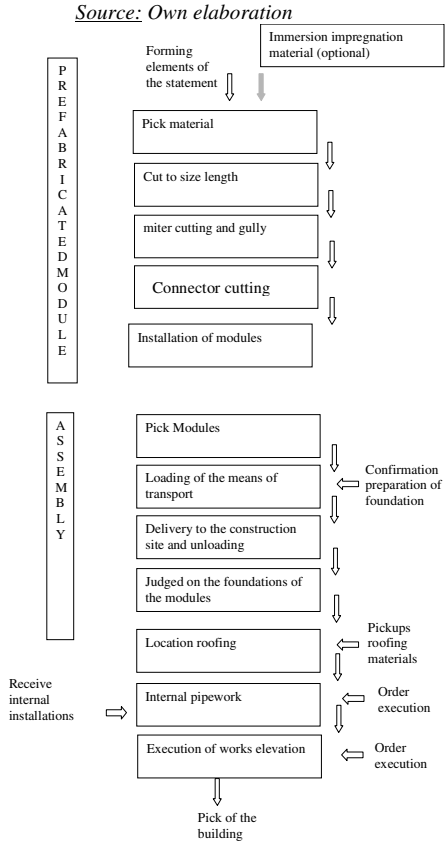

Figure 2b. Supply chain in an enterprise manufacturing prefabricated wooden house
Source: Own elaboration

The next stage comprises production of glued semi-finished products. The process begins with defect elimination from batten surfaces by division into purpose-oriented elements for gluing. Coniferous semi-finished elements are sent to appropriate stations in selected batches in accordance with distribution of annual rings and quality. Next, splines are milled in heads of semi-finished products and, simultaneously, glue is applied. A support device positions individual elements on the assembly line and the semi-finished 'ribbon' is divided into constant lengths and sent to the press. Appropriate semi-finished articles are prepared in the technological chain on the basis of the list of requirements for glued construction elements. The process includes: two-side planing of battens connected length-wise and setting up glued ribbons into batches and loading them into press where they are pressed into specific series of appropriate thickness dimensions. Once the process is finished, four-side planing into net dimension is carried out and glued elements are cut into the required

length sections. The preparation of appropriate dimensional groups of semi-finished products is of paramount importance for the suitable coordination of module assembly. This process has a direct influence on the timing of the consecutive, final stage, namely, assembly of the building.

Prefabrication of skeleton houses includes, depending on requirements, immersion impregnation of the material as well as its assembling in accordance with material lists. It is necessary to cut elements to length and to cut bevels and keys. Semi-finished products prepared in this way are then sent to special tables where skeleton walls, so called modules, are assembled. The finished walls are completed in accordance with the design project and taken to the construction site using the factory's own or hired transport. The house assembly is carried out by the manufacturer using, for this purpose, a hydraulic crane jib which is useful during loading and unloading of elements as well as assembling of the house. The process is performed by the company's own assembling teams carrying out all planned operations beginning with the positioning of the construction elements on the earlier-prepared foundation and finishing with the closed building. This stage is closely connected with the earlier-generated orders and commissions for the realisation of a house in skeleton construction.

Proper synchronisation of all production stages of the house as well as realisation of installation and finishing works on the construction site all exert impact on the prompt completion of the project execution and final technical acceptance of the house. Frequently, one inappropriately finished element may result in dramatic delays or even stoppage of the assembly process. This becomes even more troublesome when the mistakes are made by the manufacturer and part of the tasks are commissioned out to outside companies. This situation can have serious consequences, also financial. That is why, properly coordinated internal and external systems are so important for efficient operation of the supply chain and, consequently, for achieving high degree of satisfaction of the customer from the purchased final product. From this point of view, the choice of proper cooperating companies is very important as it guarantees efficient flow of all streams in the chain and punctual realisation of orders. These are all extremely important issues from the point of view of challenges faced by the manufacturer and responsibilities for customers.

Efficiently functioning system of internal flows exerts a decisive influence on all processes associated with raw material processing, manufacture and distribution of finished products and these, in turn, have a direct impact on good cooperation with outside companies. Proper flows inside the company interact with the system of outsourced tasks frequently based on cooperation orders.

RECAPITULATION

Development of technology as well as innovative solutions in production of prefabricated wooden houses affected increased interest in these products. In addition, a new approach to issues associated with customer services emerged. In free-market economy, quality is a frequently repeated phrase but it refers not only to the product. The quality aspect frequently constitutes one of the basic criteria of the overall assessment of a company operation and its attitude to its customers. It is one of determinants of the way a given enterprise functions, exerts impact on its organisational structure and managing processes. Through appropriate management of the supply chain, it creates the company's image.

Problems concerning standards of customers' services are important and understood in companies all over the world. Advantages resulting from their introduction and maintenance affect, primarily, sales but, to a considerable extent, they also exert impact on the overall assessment of enterprises. They are treated as standard in the European Union and are also slowly becoming standard in Poland.

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***Viktor Gotych, Ginter J. Hruzik, Marek Wieruszewski*[94]**

COMPARISON OF EFFICIENCY OF PRODUCTION OF OAK AND ASH VENEER FURNITURE

Summary: The paper presents selected results of experimental studies related to the establishment of production efficiency of oak and ash natural veneer. On the basis of throughput experimental oak and ash veneer logs of various diameters, found the material balance derived products, performance indicators and efficiency of production of veneer.

Key words: effectiveness, veneer, oak, ash, volume of products, market prices of products

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INTRODUCTION

The main purpose of the veneer is wrapping the upper layers of wood-based panels used in the furniture industry. Veneer is also used for wrapping joinery items to enhance their aesthetic qualities. Aesthetic value of furniture products to a large extent depend on the type used in the manufacture of veneers. The most prized furniture is produced using natural wood veneers. Aesthetic value of the furniture in the largely depend on the quality of the veneers are used to produce them. Veneers with excellent natural aesthetic, an interesting figure, without treatment, and anatomical defects are coveted by furniture manufacturers [3]. Important also is the efficiency of production of veneer. Reasonable solutions should be sought in the rational processing of wood raw material, which directs the material to achieve maximum performance and efficiency of production and produce high quality veneer [1, 2].

With a wide variety of designs hardwood veneers native species can be distinguished oak (Quercus robur L.) and ash (Fraxinus excelsior L.). They are mostly species of hardwood used for the production of natural veneers. It was decided to carry out research on the example of two main species of hardwood: oak and ash. The study was performed in the Department of Barlinek SA, produces natural veneer.

CONDUCTED RESEARCH AND ANALYSIS

The aim of the study is to determine the influence of a dimensional structure of the material in the process of milling to the material balance. The study sought to determine the value of the resulting veneer and the efficiency of its production. The studies used two dominant species in Polish forests of hardwood: oak and ash. Experimentally converted three groups diametral veneer logs: 40-45 cm, 46-49 cm, >50 cm.

The scope of investigation included the following topics:

- quality and dimensional characteristics of veneer lumber;
- experimental treatment of the representative logs intended for the manufacture of veneer;
- analysis of qualitative and quantitative structure produced veneer;
- establish indicators of material performance;
- determine the effectiveness of the production of veneer.

Veneer production efficiency ratio, obtained by processing raw round, is expressed in natural units or in percentages. Is defined as the sum of the value of veneer and various kinds of waste (waste timber and fuel chips) obtained from the raw material cost allocated to the purchase of logs used to produce them. This rule describes the following:

$$E_{po} = \frac{V_{ob} \cdot c_{ob} + V_{tp} \cdot c_{tp} + V_z \cdot c_z}{V_w \cdot c_w} \cdot 100$$

Epo – veneer production efficiency ratio [%];
Vob – thickness of the veneer produced [m2];
cob – unit price of veneers [zł/m2];
Vtp – thickness of timber waste [m3];
ctp – unit price of timber waste [zł/m3];
Vz – thickness of fuel wood chips [m3];
cz – unit price of fuel wood chips [zł/m3];
Vw – thickness of the logs [m3];
cw – unit price of the logs [zł/m3]

Table 1. Summary of the shares acquired assortments processing and manufacturing efficiency oak and ash veneer

Type of product / waste	Oak		Ash	
	The share of products and waste (%)	Production efficiency (%)	The share of products and waste (%)	Production efficiency (%)
Veneer	95,91	216,38	96,95	340,20
- I grade	15,96	36,01	12,32	43,23
- II grade	34,44	77,69	31,48	110,48
- III grade	36,94	83,34	51,91	182,16
- IV grade	8,57	19,34	1,24	4,33
Industrial Waste				
- waste timber	3,86	8,70	2,67	9,36
- sawdust	fuel		fuel	
- veneer scraps	fuel		fuel	
- chips of semi-finished elements	0,23	0,52	0,38	1,34
SUM	100,00	225,60	100,00	350,90

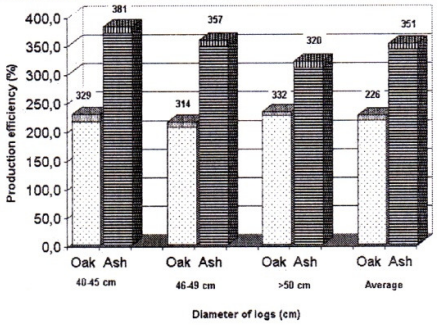

Figure 1. Effectiveness of the treatment of oak and ash veneer-logs with different diameters

In processing the experimental veneer production efficiency expressed as a percentage determined by comparing the value to the value produced veneer lumber, from which it was produced.

Indicators of efficiency production oak and ash veneer, and the accompanying production of waste are presented in Table 1 and Figure 1.

Obtained by analyzing the production performance indicators oak and ash veneer can be concluded that the greatest efficiency ratio obtained in the production of ash veneer. Clearly visible is the decrease efficiency production in ash veneer with increasing diameter logs used for processing.

SUMMING UP

The study can be concluded that higher production efficiency is achieved in the production of ash veneer 350,90% than the oak veneer, which is 225,60%. In a similar quantitative performance such a large difference in efficiency may be due to the fact that the purchase price of raw oak, destined for the veneer, which is much higher than the price of raw ash, while the price of oak veneers and ash is not very diverse.

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Leszek Wanat, Tomasz Potkański[95]

EFFECTIVE LEADERSHIP AS ONE OF THE PILLARS OF DEVELOPMENT OF KNOWLEDGE - BASED ECONOMY

Abstract: Modern economy increasingly depends on effective knowledge management – i.e. acquiring, generating, distributing and applying of knowledge in modern societies and organizations. In such circumstances more and more visible becomes a crisis of real leadership, or even, quite often, lack of leadership. We often observe how formal leaders of different kind, so important until recently, are rapidly losing their position – they continue to be "rulers" but are no longer "leaders". The main objective of the "leadership" becomes building relations among members of the organization rather than competing for power. Such reinterpretation of modern management paradigm becomes a necessary pillar of development of modern knowledge-based economy.

Key words: leadership, knowledge-based economy, human capital, management

1. INTRODUCTION

Changes in world economy occurring in front of our eyes are often called technological revolution. It especially concerns information technologies. Modern times are often called "a knowledge society" (P.F. Drucker) [4], "a systemic consciousness era" (D. Tapscott) [17] or "an era of personal sovereignty" (Ch. Handy) [6] or even „a network society", while in Poland we often refer to it as an information society [1].

Enterprises and organizations are changing, as well as economic systems and even governments – and the engine that facilitates all these changes is a rapid expansion of technologies of exchanging information and knowledge. One may say that all organizations worldwide have a chance to once again define their position in this new world of knowledge-based economy. Means of production identified by a classical economy: land, labor and capital – seem today secondary. They can be acquired by using knowledge, and the latter is becoming a means to achieve economic and social objectives. Knowledge becomes thus a most precious resource and most fundamental factor of growth in a knowledge-based society.

The so called human capital which by using *know-how* - becomes a foundation for economic development. From such point of view an increase of value added can be obtained not necessarily through production processes, but rather through applying intellectual processes. If so, why not to treat seriously a hypothesis that "an effective development of knowledge potential would determine future prospects for country's development and wealth".

2. KNOWLEDGE AS A POINT OF DEPARTURE

Talking about contemporary knowledge-based economy, one should ask, what earlier was the basis for economy, if not knowledge [14]? A proposed model is based on generating a knowledge which is practical and on exchanging this knowledge for material or social profits. A term that was functioning previously – "new economy" – was not clear and was usually directly connected with information technologies. Today it is easy to recognize that fast-growing economy to a larger extent depends on effective management of knowledge – i.e. acquiring, generating, distributing and applying of knowledge in modern societies and organizations [13].

Fast technological changes facilitate development of better form of learning by individuals, organizations and societies – so that they are able to cope with constant development. Organizations and societies faced with various problems are trying to adjust themselves to these changes. Quite often they lack sufficient flexibility to successfully cope with dynamic developments which endangers their stability. Those who is acting "as always" is achieving results „as always". If we want

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to, successfully cope with new problems and achieve new objectives, we shall support changes in approach, by opening for diversity and innovations.

3. FROM MANAGEMENT TO LEADERSHIP

One of the most important skills, necessary in the changing world, become leadership skills. By leadership we usually understand an ability to conduct activities/tasks or influence others so that they act or think in accordance with the vision of the "leader". With respect to organizations and societies the notion of leadership is often confronted with the notion of management. The latter is usually defined as achieving something by making others to act, while leadership is rather about convincing others that they want to act like the leader suggest, with a stress on words "convincing others that they want to act" rather that they "had to act" like the leader suggests [3]. Management is usually associated with increase in productiveness, with more stable environment and more effective and flexible processes. Leadership seems more necessary at the time of crisis or transformation, or in a situation of social changes – and as a consequence effective leadership is a catalyzer for development. But why should we consider it useless at the time of more stable development?

Table 1. A Comparison of Management and Leadership Competencies

Management Produces Order & Consistency	Leadership Produces Change & Movement
• Planning and Budgeting • Establishing agendas • Setting timetables • Allocating resources	• Establishing Direction • Creating a vision • Clarifying the big picture • Setting strategies
• Organizing and Staffing • Provide structure • Making job placements • Establishing rules and procedures	• Aligning People • Communicating goals • Seeking commitment • Building teams and coalitions
• Controlling and Problem Solving • Developing incentives • Generating creative solutions • Taking corrective action	• Motivating and Inspiring • Inspiring and energize • Empowering subordinates • Satisfying unmet needs

Source: P. Northouse, Leadership theory and practice. Thousand Oaks, CA: Sage Publications, 2007, p. 10. [12]

Using the common definition from *Merriam-Webster's Dictionary*, we may understand the term „leadership" as „showing the direction", especially by being ahead of others, and by mobilizing them to follow the leader" [11]. It seems that the real leadership requires that a leader is ahead of others, and motivates others by means of what he/she does and says. To put it more broadly – leadership could be seen as an ability to engage others in the process that leads to achieving a defined objective in the frame of a wider system or environment.

Therefore it seems that behind an effective leadership there must be an ability of formulating a vision, convincing others to cooperate towards achieving it, and by giving example to others by personal engagement in the process [5].

Modern societies and organizations in fact seem to be dependent on effective leadership. Inability to act in a stable environment, with economies exposed to recurrent global and regional crises and shocks - make our world indeed more dependent on effective leadership. Some may say that it has always been like that. That an effective leader has always been necessary for a success of its organization. To some extend they are right, but intensity of changes in the socio-economic and natural environment is much higher now.

There are also some theories that propose a contrary view, negating the need for existence of leadership. Among them there is a theory of substitutes for leadership [9], authors of which claim that role of leader can be neutralized or even replaced competencies of an employee (by skills and attitudes, by their experience, by need to act independently from direct control), by type of tasks exercised (simple ones based on routine, or ambitious ones, which give satisfaction once completed), or by features of an organization (formalization, lack of flexibility due to strict procedures, etc.). Other research suggest that such approach is not grounded. If a formal leadership in a group gets submerged/weakened, there will always emerge new people who enter into position of informal leaders. The result is that the organization is getting back to where it was before. It has a leader but an informal one/ones, and attempt at regaining power by formal leader always lead to conflicts [10]. This is the most common scenario of weakening or abandoning leadership in groups.

4. NEW PARADIGM OF LEADERSHIP

Demand for leaders in different groups, systems or organizations that are influenced by constant changes varies however. There are many situations which require a string leadership, but a group fees that he/she might be a threat for their individual/group positions or interests. This is perhaps a source of opinions that leadership is not necessary at all. In such situations the leader has to convince the group to accept his vision, though trying not to be different from the group members. According to Aaron Wildavsky, the author of the cultural theory of leadership [19], it happens like that mostly in egalitarian cultures.

It seems that conclusions which emerge from such type of theories, jointly suggest a need for modification of a concept of leadership in modern times, about a need to educate new leaders whose tasks and acts will be different than those of traditional leaders.

This is indeed necessary, as the traditional approach to leadership is based on the assumption of human beings being helpless, lacking own vision and unable to cope with forces leading to changes – emerging problems and destitution of common people, for which only few great leaders has an answer [16].

Experience show that this model of thinking does not reflect reality any more, there are other requirements towards the leaders. This is not only about individual leadership skill, but also about the group or social dimension of this process. Leadership becomes a challenge to groups and local communities, to state apparatus and non-governmental organizations, to economic enterprises (including transnational corporations), to international organizations and to entire nations. "Era of systemic consciousness" (networked intelligence) is the era of hope. It does not imply networking of technologies, but it implies networking of people through technology. This is not era of intelligent machines, but individuals who through networks can combine their personal intelligence, knowledge and creativity – in order to overcome obstacles for resolving emerging problems and fostering social development. This is an era of great expectations and unbelievable opportunities".[18]

5. WHY IS THE VISION NEEDED?

We shall point to one more notion at this stage. This is a notion of vision. This concept seems to be shared by both the theories of leaders as creators and agents of change in organizational culture, as well as for the theories of transformational and of charismatic leadership, or leadership in a learning society. Sometimes it happens that the vision is indeed created by a leader (a charismatic leader), or sometimes the vision is only nourished by a leader (learning organization), or a leader is co-creating the vision (transformation leadership theory, Schein's theory). Despite obvious differences all referred theories are in agreement that the vision is necessary. But then – what should it be like? According to Schein [15], it shall first of all give the organization an opportunity to survive on the market, shall become a basis for creating strong organizational culture, shall allow the organization to show itself as different from others on the market.

According to Senge [16], the vision should be a „source of the objective" – both individual and common for the organization. The vision shall formulate a direction for the organization, an objective for its efforts and learning exercises.

However, according to House'a [8] the vision shall not be contradictory to basic assumptions and values of the society, as otherwise it would endanger the stability of the society. This is also consistent with the opinions of Burns [2], that the leadership requires a strong moral element.

To summarize the above, it seems that organization without a vision would not have chances to survive in the contemporary world. Modern leadership needs and requires a vision, which would be known and internalized by the society or personnel of the organization. A process of sharing, promoting or rather marketing a vision to new groups is an important element of the modern concept of effective leadership, regardless of different theoretical approaches.

6. CONCLUSIONS

Modern leadership in economy creates constantly growing challenges for individuals. An old concept of an authoritarian, all-knowing leader, gradually steps back giving a space for a concept of a careful constructor of culture. Modern leader supports the process of organizational learning, prepares the organization for surviving in an non-equilibrium environment. Although a leader may possess sometimes a charismatic personality, but he carefully hides his/her charisma, or the latter is expressed in building excellent relations with the personnel of the organization, in communication skills, in promotion of the vision to others to make it a common framework for making decisions on organizational approaches to make this vision a reality.

Who should then be a modern leader? He obviously shall have high technical competencies, a practical experience obviously help - but all these is not sufficient. If this woud be a case, then leadership as a classical technical skill would be part of the curriculum of professional occupations. According to Max DePree [10] modern leadership become something like an art. Constructive leadership is a set of activities that are undertaken by a leader as a result of his/her careful analysis and thinking. Such a leader learns by experience and pays a lot of attention to his/her supporters. He/she tries to identify challenges and needs well ahead, and reacts to them, often by-passing official positions and hierarchies. The leader treats the surrounding reality as substance that can be shaped, as Senge [16] says, and not a source of limitations. The leader should thing of the organization as of a system composed of interrelated elements.

We often observe how formal leaders of different kind, so important until recently, are rapidly losing their position – they continue to be "rulers" but are no longer "leaders". The main objective of the "leadership" becomes building relations among members of the organization rather than competing for power. Such reinterpretation of modern management paradigm becomes a necessary pillar of development of modern knowledge-based economy.

What then can be observed? We see that formal leaders of different kind, so important until recently, are rapidly losing their position – they continue to be "rulers" but are no longer "leaders". The main objective of the "leadership" becomes building relations among members of the organization rather than competing for power. In the latter case it is easy to lose control over the organization, since leader often manages team of people of high qualifications, whose skills and value for organization is often almost comparable to his value, and who – more and more often – work in different distant places, not in the headquarter of the organization. In such conditions leaders gradually lose tools for motivating their key personnel, and have to increasingly rely on their soft internal motivations. Demand for leadership in such circumstances increases even more, since the latter have to develop motivation of key personnel – so that they could lead themselves (be self-motivated). Such function is consistent with the concept of super-leader – as a person who leads others so that they lead themselves. [10] Approaching this issues from a historical perspective – as Robert L. Heilbroner points out [7] - all great economists – founders of this discipline – "were not people publicly significant, they did not have military armies at their command, and according they were not sending people for death, they did not rule the empires. Few of them became known, none of them become a national hero (…) none became of public enemy no. 1. Nevertheless what they did made a

bigger impact on the history than acts of many recognized leaders, known for their great achievements. They have exerted bigger influence than the armies that were crossing borders, they had more opportunities to do good and evil things then laws passed by kings and parliaments. What did they do? They were shaping the minds of people and were changing the way people see the world around".

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