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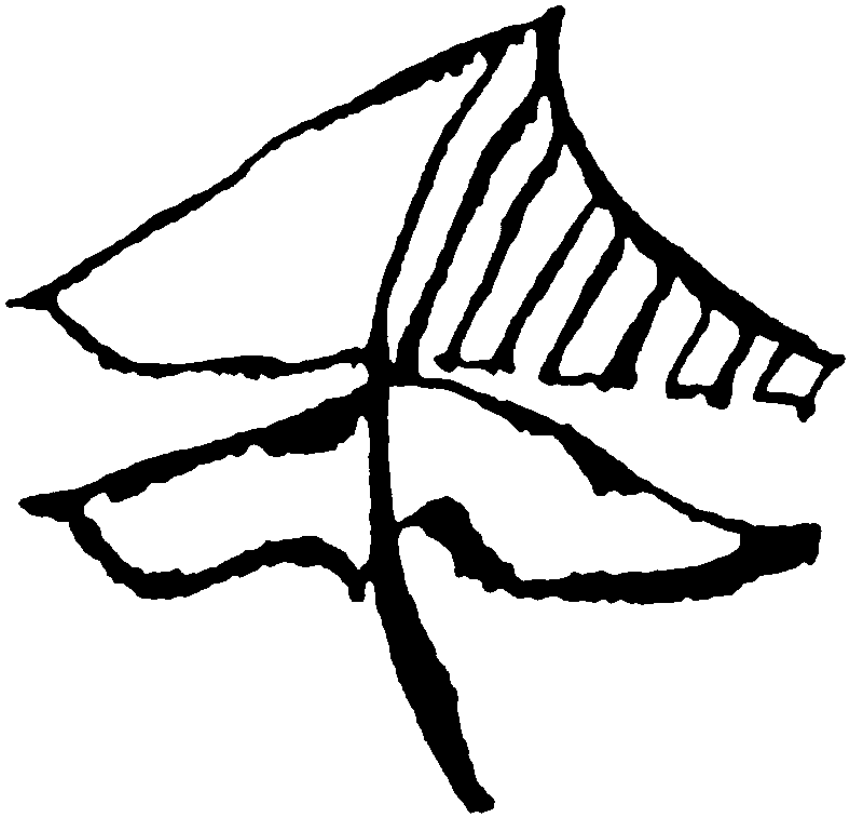

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CONTENTS

Dear Readers!

It has been the third year since *Intercathedra* - Scientific Bulletin of Plant - Economic Department of the European University Studies –has been published as a Scientific Quarterly.

This volume, 29/1, of the Quarterly is the result of scientific cooperation of departments from Poznań, Zwoleń, Warsaw, Kraków, Tarnów, Trnava, Zlin, Žilina, Košice, Zagreb, Brno, Prešov and other Polish and foreign scientific centres dealing with issues of economics, organisation, management and marketing, especially, but not only, in arboriculture. It contains articles ordered by the Editorial Board, which are based on the papers read at the International Scientific Conference „Problems of economics and business management of the wood industry enterprises in the perspective 12 years+ of the third millennium" - Economic Forum 2012" in Laski near Kępno which took place between 18th and 20th of September 2012.

The other part of the issue contains scientific articles sent to the Editorial Board in 2012 and occasionally in the first quarter of 2013 and approved for printing following reviewers' positive opinions and necessary amendments.

This year, 2013, the Scientific Conference has been suspended for the first time in 18 years. It was held annually in mid-September for 17 years – from 10 September 1996 to 20 September 2012. 15 Conferences took place at Laski Halls of Residence, Forest Research and Education Centre, Forest Experimental Department in Siemanice. In 1996 the first Conference took place at Zielonka Halls of Residence, Forest Experimental Department in Murowana Goślina. In 2004 the ninth meeting took place in Kępno.

The most important reason for suspending the Economic Forum Scientific Conference has been financial problems related to its organisation.

Although the Economic Forum Scientific Conference will not take place this year, the materials prepared for it may be published in *Intercathedra* journal provided they meet appropriate quality standards and have undergone a complete verification process by the Editorial Staff and received positive reviews.

This quarterly was published under the auspices of IATM - International Association For Technology Management. The members of this scientific network volunteered to write their reviews, prepare materials for publication and 17 scientific conferences. I would like to take this opportunity to thank them for their contribution and dedication.

Wojciech Lis

Irena Bekier[1]

STRATEGIES FOR RESOLVING INTERPERSONAL CONFLICTS

Abstract: The paper presents methods of coping with interpersonal conflicts and discusses their characteristics. Considering the relational nature of a conflict, different solutions are possible. However, the way of approaching a conflict may yield different results. Each strategy can be useful in certain conflict situations. The ability to choose a proper conflict solving strategy increases the chance for a constructive solution, and significantly affects the individual performance in professional and personal situations.

Key words: interpersonal conflict, behaviour, coping strategies, assertiveness, cooperativeness, conflict resolution style

INTRODUCTION

Conflicts are a regular part of our professional and personal life. They are caused by the diversity of human needs and personalities, as well as environment variability, external requirements and stress tolerance. People realize that conflicts are natural elements of interpersonal relations, and at the same time believe that they are negative and should be avoided. Conflicts alone are not bad, but they can destroy relationships when they are not solved properly, or left unsolved. Therefore, we should aim at learning constructive approaches to conflicts and resolving them to the advantage of both partners. Acquisition of conflict management skills becomes as important factor for job hunting, as the professional knowledge and skills. Good relations between people and fully resolved conflicts highly improve efficiency and effectiveness of professional performance, which is why employers value high level of social skills in their employees.

HUMAN BEHAVIORS IN CONFLICT SITUATIONS

The behaviour of an individual in a conflict situation is determined by two basic skills: assertiveness and cooperativeness. It is assumed that they are independent and that they may reach different level in every person. By combining assertiveness and cooperativeness, and depending on their intensity, five main ways of responding to conflict situations may be distinguished [1]. They are as follows:

1. Cooperation – individuals cooperate with their partners to achieve their own and their partner's aims, look for win-win solutions, the relations between the parties are improved and strengthened.

2. Competition – individuals treat the conflict as a game, are focused on the success and positive outcome for themselves, even at the expense of good relations with their partner, use pressure, blackmail, threats, employ power tactics.

3. Accommodation (yielding) – individuals give into their partner's needs, even at the expense of their own, they seek their partner's approval and quick resolution of the conflict, which they see as something destructive.

4. Avoidance – individuals withdraw, avoid conflict, believe it will phase out on its own, do not tolerate conflict-derived tension and seek peace.

5. Compromise – individuals are convinced that full agreement is impossible, and believe they must lose something to gain something else.

The following chart of people behaviour during conflicts forms a space where everyone can place themselves, depending on their responses to conflicts, and learn the level of their skills determining the way they cope with this situation [2].

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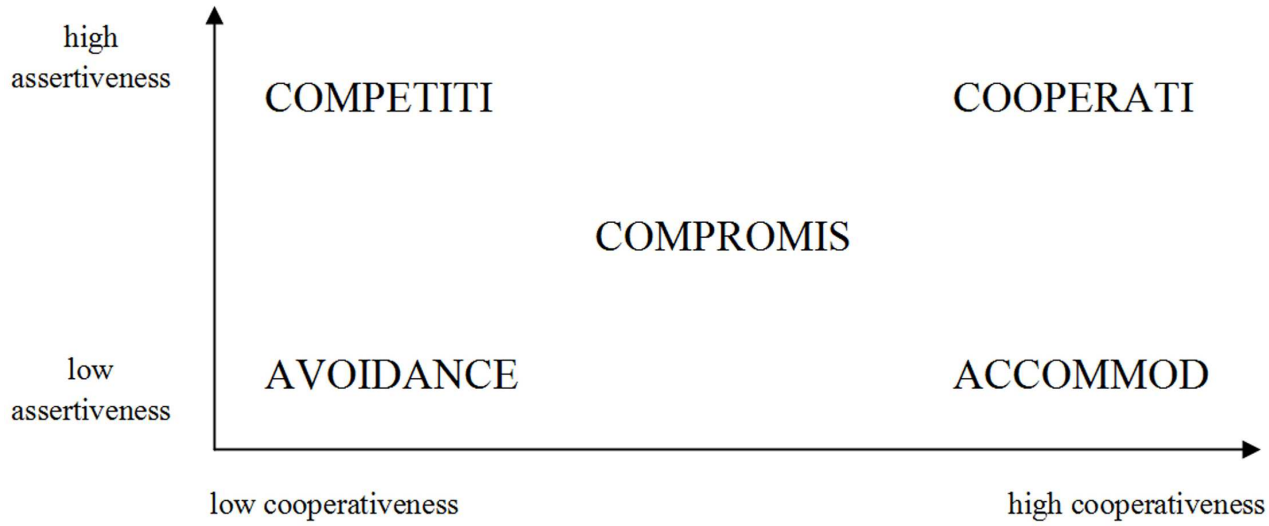

Figure 1. Chart of conflict behavior styles

An individually chosen method of solving a conflict may change if the persons involved display completely different behaviour. This indicates a relational nature of a conflict. The partners may follow one of the three styles of conflict resolution. The first is a complementary style when the partners use different, but mutually reinforcing behaviours. The second, known as symmetrical style, involves using the same tactics by both partners. The third style in which the partners, depending on the problem, shift from symmetrical or complementary pattern, is called a parallel style of conflict resolution. The use of a complementary style of the fight-fight type is common e.g. in mismatched marriages. This approach results in growing hostility and isolation, which are due to recrimination. The situation is similar to a symmetrical pattern, where the partners are hostile to each other and one insult leads to another, resulting in a spiral of escalation. The use of these two styles brings a variety of effects, which are shown in Table 1. Constructive symmetry is evident when two people communicate assertively, listen to each other, and work together to solve a problem [3].

Irrespective of the style of conflict resolution, every conflict is a struggle for a desired outcome. There are several types of strategies for conflict solving. Their choice depends on the situation and the type of relationship with a partner of a specific conflict.

The first option is the WIN – LOSE strategy. This method is chosen in either-or circumstances. Sometimes it is forced upon in situations where the resources are scarce and limited, e.g. when we can not raise salaries, as the company is in a weak financial condition. It should be applied when someone earnestly wants our defeat, or violates the law. In general, this strategy is considered, apart from a few cases, as destructive.

The second option of conflict resolution is the LOSE-LOSE strategy. It does not bring benefits to any of the partners. Despite negative consequences it is quite a common way of managing a conflict e.g. when we want to win with our partner.

Another strategy is a COMPROMISE. It is justified when the partners realize that there is not any possible solution, and this solution is better than none. The compromise is always a negative option, when the partners can cooperate with each other and look for better solutions.

Table 1. Complementary and symmetrical approach to a conflict

SITUATION	COMPLEMENTARY APPROACH	SYMMETRICAL APPROACH
A boss is irritated because an employee did not fulfill his duties.	The boss complains and shouts. The employee steps back and avoids the boss. (Destructive complementarity)	The boss complains and shouts. The employee reacts with anger and aggression. (Destructive symmetry)
A boss calls a senior employee "dude".	The employee says he feels offended and explains why. The boss apologizes. (Constructive complementarity)	The employee tries to make it clear that it was not nice. The boss understands the allusion and stops using irritating expressions. (Constructive symmetry)

The last method of conflict resolution the WIN-WIN strategy. This method allows for working out a solution satisfactory to both sides of the conflict. Their relationship is based on cooperation, without resorting to the compromise, and the primary goal is the realization of both partners' intentions [4]. However, this method works well when the partners follow the scheme developed by D. Weider-Hatfield. Here it is: a/ identify your needs, expectations and goals, b/ present them to the partner of the conflict, c/ listen to the needs of your partner, d/ identify all possible solutions, e/ evaluate them and choose the best solution, f/ implement the solutions , g/ evaluate the chosen solution after some time and consider its possible revision or re-implementation [5].

Table 2 presents the factors that should facilitate the choice of an effective approach to a conflict.

Table 2. The choice of conflict management strategy

LOSE-WIN (you lose)	when you discover your mistake, when the issue is important to your partner and irrelevant to you, when long-term costs of winning are not worth the short-time victory, when you want others to learn from their mistakes.
WIN-LOSE (you win)	when there is no time to work out common solutions, when the issue is irrelevant to your partner and important to you, when the partner does not want to look for a solution satisfactory for you.
COMPROMISE	when maintaining the relationship with your partner is not important to you, when the issue is important, and your partner does not use your approach.
WIN-WIN	when the goal is too important to settle with a compromise, when you want to maintain good relations with your partner, when your partner is eager to cooperate.

CONCLUSIONS

Conflict is an unavoidable element of interpersonal relationships, and that is why it is important to improve the skills of its effective management. There are different approaches to conflict resolution, and each of them may be justified in different circumstances. However, the

effectiveness of a specific approach depends not only on one partner of the interaction. The conflict partners can build the following relationships: win-win, win-lose, lose-lose or they can work out a compromise. An ideal situation is resolving a conflict with win-win solution, when both partners feel satisfied with the adopted solutions. This is not always possible, but learning the ways of dealing with a conflict allows us to increase the share of positive solutions both in our professional and private life.

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Wojciech Cichy[2]

AN INNOVATIVE PRODUCT CONCEPT ON THE BIOFUEL MARKET AND PROSPECTS FOR ITS IMPLEMENTATION

Abstract: The paper presents the current state of the law as regards the production of energy from renewable energy sources in Poland. In this light, development conditions of a relatively new industry, i.e. solid biofuel production, are presented. Organizational conditions (availability and supply of raw material) and legal regulations were the basis for the assessment of the chances of successful implementation of a new, innovative product. Bearing the above in mind, the idea of a new type of solid biofuel, which is to be produced by EcoPowerPlant Company, is described.

Key words: bioenergy, market in solid biofuels, foresight methods

INTRODUCTION

In the face of threats related to global warming and climate change, the European Parliament and the Council of Europe adopted a document [2], that aims at promoting an increased proportion of renewable energy sources in electricity production. The provisions of the above mentioned document stimulated a series of critical changes with regard to energy production in Poland and other EU member states. It turned out that in the conditions of Polish economy the fastest way to comply with international obligations in the area of electricity and heat production from renewable sources is to implement energy production technologies based on fuels derived from vegetable biomass (solid biofuels[3]),, which has been reflected in the guidelines for Energy Policy of Poland until 2030 [5].

As a result of these actions, EcoPowerPlant (EPP) company was founded in 2010 for the purpose of manufacturing modern biofuels (pellets). Already at the stage of designing the plant, it was decided that the thermal energy surplus would be used for electricity production. A separate activity of the company would be the promotion of a new, innovative biofuel.

The aim of this study was to verify if the premises adopted by the EPP's management, i.e. manufacturing of innovative solid biofuels using renewable energy sources, can ensure its business success within the bioenergy market.

The starting point for the study was a Foresight project developed between 2009 and 2011, which aimed at determining guidelines for priority scientific research with regard to fostering innovation and development of Polish wood sector companies until 2020[4] [3,6]. As a result of studies conducted in the Bioenergy area using the Delphi method, a few predominant research trends were identified, two of which deserve special attention:

- „Multidirectional and effective use of available woody biomass sources, including agrobiomass and wood coming from fast-growing tree plantations, will promote sustainable economic growth and protection of natural environment",
- „Development of modern woody biomass combustion technologies will allow to use increased amounts of lower quality wood and wood with little utility value" [3, 6].

Taking into account the research guidelines in the area of bioenergy until 2020 [6], research priorities were selected, including the following:

- Research on multidirectional use of available woody biomass sources that promotes sustainable economic growth (Macro priority: Society and Environment) in the optimistic scenario;

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[3] *Solid biofuels – solid fuels derived from vegetable biomass*

[4] *"Foresight w drzewnictwie – scenariusze rozwoju badań naukowych w Polsce do roku 2020" – projekt POIG 01.01.01-30-022/08 ["Foresight in the wood sector - scientific research development scenarios in Poland until 2010" - a project in the framework of Innovative Economy Operational Programme 01.01.01-30-022/08]*

- Modern woody biomass combustion technologies for lower quality wood and wood with little utility value (Macro priority: Raw Materials Base) in the pessimistic scenario.

METHODS

The study used Foresight methods, the main tool being the SWOT analysis[5], that enables performing comprehensive assessment of both external an internal environments of the organization, and thus determining synergistic elements between organization's own potential and the one of its surroundings [1]. On this basis, company development scenarios were elaborated, using certain elements of PEST[6] analysis [4].

The study was conducted in the recently created company, EcoPowerPlant (EPP), located in the western part of the Polish region of Wielkopolska, in close vicinity of large forest areas, on land traditionally tied with agricultural vegetable production. During the research, the company was just finishing assembling its pellet production plant with the capacity of 8 Mg/h (approximately 50.000 Mg per year). What makes EPP stand out is its innovative concept of manufacturing biofuel from woody and agricultural biomass, using formulas that neutralize unfavorable agrobiomass properties. Lower quality raw material will be used for ORC[7] technology-based heat and electricity production in the cogeneration unit (CHP), which will allow additional production of approx. 1,8 MW of electricity and 8 MW of heat per hour. The generated electricity will be used for self-consumption by company's own equipment, which will allow reducing general energy production costs by 70%. The economic effectiveness of the manufacturing process will be enhanced by the possibility of applying support mechanisms provided for energy producers using renewable sources.

The biggest challenge for EPP will be to launch the manufacturing process, as well as promote and strengthen the position of its innovative biofuel on the market. It is assumed that the successful outcome of this task will ensure business success of the entire investment. The investment's location is of extreme importance for the successful outcome of the project: it will make it easier to employ new workers, make contacts with outsourcing companies and potential product end-users. An additional asset for the investment is the proximity of a big urban complex and country's border. The vicinity of a large wood processing plant will ensure raw material supply that covers approximately 40% of plant's demand. Short distance from large forest areas (wood processing plant) will allow to optimize raw material transportation costs and, as a consequence, reduce project's environmental impact.

The idea of a new product – BioFuelMix (BFM) – emerged as a result of the demand for biomass fuels. Once real-life needs of potential consumers were evaluated, a technological concept for a new type of fuel was created. The EPP company, encouraged by market demand, decided to launch the production of pellets made from wood particles and agricultural vegetable waste, which constitutes an innovation in terms of both product type and technology. Considering combined production of heat and power (CHP), as well as use of innovative technology (ORC), we can also talk about innovation of organizational nature.

RESULTS

As the gathered data shows (Table 1), favorable location of the company, availability of raw material, modern production equipment and experienced management personnel guarantee a success of the planned initiative. An innovative product, that fills a niche in the market and gains interest of its potential customers reaffirms this statement. Company's collaboration with a scientific research center constitutes an additional positive factor. The weakness of the project is the lack of its own raw materials.

[5] *SWOT – acronym for: Strengths, Weaknesses, Opportunities, Threats*
[6] *PEST – acronym for: Political, Economic, Social, Technological*
[7] *ORC – Organic Rankine Cycle*

One of company's opportunities (Table 2) was identified as continued importance of renewable energy sources on the market, which in combination with the boost in economic activity as regards solid biofuels and the economic well-being of energy sector enterprises guarantees project's successful outcome.

Table 1. EPP's strengths and weaknesses determined using SWOT analysis

Strengths	Weaknesses
· Company's location · raw materials base: · proximity of large forest areas (*Puszcza Notecka* and *Puszcza Drawska*) – wood processing plants · farming land in the region · good road and railway infrastructure · raw material supply · transportation of finished products · proximity of large urban complexes, industrial centers and country's border (potential consumers) · Cooperation agreement with a neighboring wood processing company – ensuring supply of cheap raw material in the quantity that covers 40% of company's demand. · Manufacturing a product that is wanted on the market, i.e. herbaceous biomass fuel granules (pellets) · Preliminary agreements with potential product end-users · New, modern manufacturing plant equipment purchased from renown producers · Experienced management personnel · Electricity production in a cogeneration unit: · prospects for obtaining "green" and "red" certificates · company's own electricity demand partially covered · An idea for an innovative product · Longstanding cooperation with a scientific research center	· No owned raw materials – the need of purchasing · business cycle fluctuations on the market of wood products and agricultural produce · depends on harvesting (the so called "agrobiomass") · Inexperienced production personnel · Necessity of promoting a new product, BFM biofuel, so far unknown on the market · Prospects for beneficial sales only for high quality products · Unstable legal regulations · possible elimination of the support system for energy produced from renewable sources · limitations while using certain biomass residues

Table 2. Company's opportunities and threats elaborated using SWOT analysis

Opportunities	Threats
· increasing awareness of environment-friendly approaches in the society · increasing importance of renewable energy production sector · boost in economic activity as regards solid biofuels and biomass in the country and abroad · economic well-being of energy sector enterprises – stable economic situation – increasing demand for solid biofuels · Legal limitations regarding the possibility of using higher quality roundwood for energy production · Constant, high supply of herbaceous biomass from agricultural by-products · A new product (solid biofuel) with enhanced technological properties, anticipated on the market	· Unstable legal framework with regard to energy production from renewable energy sources · possible elimination of financial support mechanisms · EU abandoning its environmental policy · Progressing economic crisis in the European Union member states · high inflation rate · Problems with raw material acquisition for biofuel manufacturing purposes · woody biomass · agrobiomass · Technical, technological and organizational problems related to manufacturing of the new product (BFM) · inexperienced personnel · non-alignment with the expectations of potential end-users · ineffective promotion of the new product

Radical legislative changes in the area of renewable energy sources can lead to a loss of interest of potential consumers in the new product and, as a consequence, threaten the entire investment. Threats arising from reduced biomass supply or problems of technical or organizational nature do not seem to be of considerable importance.

The scenarios presented in Table 3 were supposed to determine to what extent the implementation of a new product allows a successful business outcome for the company. Three development scenarios for EPP in relation to launching the manufacturing of a new biofuel were proposed: the optimistic scenario, possible to achieve in conditions of political and legal framework stability, stable situation on the raw materials market and constantly growing demand for solid biofuels; the pessimistic and most likely scenario, where constant strengthening of the new product's position on the market is anticipated.

Table 3. Possible development scenarios for EPP regarding the implementation of the new product

Outcome	Factors	Influence on business success
Optimistic scenario		
BioFuelMix will become a wanted product on the biofuels market. 100% of EPP's manufacturing capacities will be used.	Stability of political and legal framework	High
	Stable situation on the market of biomass raw materials	Medium
	Limitations regarding the possibility of using "forest" wood for energy production	Low
	Increasing demand for solid biofuels from agricultural by-products with enhanced characteristics	High
Pessimistic scenario		
High utility value of BFM and EPP's manufacturing potential will not gain interest of potential biofuel end-users.	Stability of political and legal framework	Medium / Low
	Stable situation on the market of biomass raw materials	Low
	Unlimited possibility of using wood raw material	High
Most likely scenario		
BFM will gain interest of energy specialists who use biomass fuels, however the demand for this product will increase at a much slower rate than expected.	Stability of political and legal framework	High
	Stable situation on the market of biomass raw materials	Medium
	Strong promotion of the new product	High
	Diversification of biomass-derived energy sources	High

SUMMARY

The assessment of EPP's activity, performed using selected foresight methods, allowed to identify factors determining the development prospects for the company. In each presented scenario, political and legal framework, as well as stable situation on the raw materials market, played an important role. It seems that the impact of these factors determines the development of the entire biomass-oriented bioenergy sector in Poland. The new product – BioFuelMix – which integrates the properties of both wood and agrobiomass, constitutes an attempt to avoid this problem.

Very good technical preparation of the manufacturing process, favorable location and experienced management personnel make the investment likely to succeed in terms of production.

A possible failure of the project could only come from external agents. Nothing indicates that in the coming years the European Union will abandon its environmental policy's main guidelines, a result of which is the use of renewable sources for energy production. Therefore, the only factor that could pose a significant threat to the investment is the situation on the biomass market. The location

of the manufacturing facility substantially reduces these threats. Everything seems to indicate that EcoPowerPlant's operation will be a success.

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Ján Dobrovič[8]

THE REFORMATION OF CUSTOMS AND TAX ADMINISTRATION IN SLOVAKIA – THE MODEL OF PLACE FOR COLLECTING TAXES, DUTIES AND CONTRIBUTIONS

Abstract: Within the framework of the research on the issue, we started form the existing functional organizational structures and tax administration systems not only in Slovakia, but also in Hungary, Poland, the Czech Republic, and Slovenia, whereas the fundamental assumption of the investigation was increased efficiency of the system as a whole. On the basis of a trend analysis we assume that the upcoming reform of the tax and customs administration will significantly contribute to an increased efficiency of the system and, eventually, to a positive perception of taxes as socially unpopular obligations.

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

INTRODUCTION

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

DEVELOPMENT OF THE ORGANISATIONAL STRUCTURES OF TAX SYSTEMS

Structuring by type of tax

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

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Structuring by functional groups

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

Structuring by individual types of taxpayers

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

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

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

a. Effort to increase the voluntary fulfilment of tax and health and social welfare insurance obligations, professionalism, partnership and correctness in the relations with the tax revenue administration clients;
b. Continual activities supporting the decreasing of tax arrears and tax evasion;

c. Building an organisation communicating with its employees and clients professionally, openly, intelligibly and timely;
d. Effort to use human resources more effectively, to be an employer offering a job perspective and the growth of the employees' professional level;
e. The utilisation of the information technology in the TRA with the objective to get closer to the taxpayer and to speed up the tax offices' work processes in the area of administration;
f. To constantly look for new opportunities for the improvement, increasing of the quality and making services more effective without major modifications of the legislation;
g. Education and training of workers in order to create a more versatile work potential;

Effort to implement an effective system for the measurement of the quantity and quality of work at all levels of the tax revenue administration, set for each critical factor of success and representing a measurable value.

As a starting point of the upcoming trends in Slovakia' tax revenue administration we take the Government's Programme Declaration[9] of 4.11.2002, which, in the part "Economic Policy", sets out the following objectives in the tax revenue administration: simplify the tax legislation, update the parts of the tax laws that allow ambiguous interpretation, simplify the sanction system in the area of tax revenue, decrease direct taxes, shift the tax burden from direct taxes to indirect taxes, reassess the application of property tax rates, unify income tax rates, analyse the possibility to introduce a flat tax, strengthen the tax revenues of municipalities, specify own tax revenues of higher territorial units, secure strict, direct, fair and effective collection of taxes, decrease tax rates, restrict tax evasion, and create a new system of horizontal financial balancing.

„Slovakia is the eighth most attractive European country from the perspective of tax systems. In the KPMG International's ranking, compiled on the basis of a survey of European company representatives' views on the attractiveness of domestic tax regimes, Cyprus was placed at the top, followed by Ireland and Switzerland. All three countries obtained high ranking positions thanks to a unified interpretation of the tax legislation, minimum changes in tax laws and relatively low tax rates."[10]

The survey[11] was carried out by KPMG International[12] and its results reflect the views of more than 400 tax specialists in multinational companies in Europe. The evaluation criteria included the attractiveness, administrative demands, consistency, long-term stability, extent of legislation, tax rates and relations with tax offices. At the European level, according to the survey results, the least attractive area is the extent of the tax legislation. The order of the countries is specified on the basis of "absolute attractiveness", which was calculated as a difference between the percentage of the respondents according to whom the key aspects of their domestic taxation systems were attractive, and the percentage of not satisfied respondents.

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

From the perspective of tax management levels within Slovakia, the current state can be defined as an officially two-level management, but by the transfer of some competences of the Financial Directorate of the Slovak Republic (FR SR) to the Tax Offices located in the central cities of the Higher Territorial Units (VUCs), it is, in fact, a three-level management, which justification is based on the need to manage 102 tax office centres, which is not possible to do from a single centre. Such organisation of the tax revenue administration is not optimal due to the following reasons:

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[9] *http://www-8.vlada.gov.sk/index.php?ID=918 – Programme Declaration of the Government 2002*
[10] *http://ekonomika.sme.sk/c/3685557/Slovensko-ma-osmy-najpritazlivejsi-danovy-system-v-Europe.html*
[11] *http://www.kpmg.com/SiteCollectionDocuments/2007CorporateandIndirectTaxRateSurvey.pdf*
[12] *KPMG is a global network of companies providing services in the field of auditing, taxes and consulting. Its member companies operate in 145 countries and employ more than 123,000 workers*

- The performance of the main processes is fragmented by the territorial principle, while each tax office (TO) centre (small, medium as well as large) runs all processes related to the administration and control of taxes and tax execution, so it is not possible to achieve the optimisation of the performance of such processes or of costs of their performance from the perspective of the tax revenue administration as a whole:[13]
- The system of the deployment of tax offices is little flexible, as it does not allow to adapt the deployment of the basic organisational units to the needs of taxpayers;
- In the current system of management, TOs represent an administrative level of management, while there has been a long-term need in their work to concentrate the performance of some processes (e.g. accounting, payroll) that are unnecessarily split between the FR SR and the TOs and increase administrative and communication demands;
- In the work of FR SRs' employees, there are problems that are characteristic for organisations that, along the line management, also apply other types of management (e.g. project, specialised-methodological, etc.). It is, for example, the case of the assignment of tasks by specialised managers of DR SR, which can collide in timing with tasks assigned by Slovak tax office line managers.

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

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

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

- Complexity of the organisational structure – duplicity of functions and powers at the central and regional levels;
- A costly administrative apparatus of the FR SR;
- Non-transparent project management, decreased possibility to control processes;
- The taxpayers' unwillingness to pay taxes;

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

The first phase has the name UNITAS I and part of it is a reform of the tax revenue and customs administration. For that phase it is proposed to examine the possibilities of process

[13] *RAŠNER, J., RAJNOHA, R.: Nástroje riadenia efektívnosti podnikových procesov (Tools for Managing the Efficiency of Enterprise Processes), Zvolen : TU in Zvolen, 2007.*

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

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

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

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

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

CONCLUSION

In the research of the issue, we started from the existing functional organisational structures and tax revenue administration systems not just in Slovakia, but also in Hungary, Poland, the Czech

Republic and Slovenia, while the basic assumption of the examination was an increase in the efficiency of the system as a whole, through a change in the organisational structure and its optimisation, as well as through the introduction of marketing principles in the area of orientation on the customer in order to achieve a positive image in the eyes of the public.

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

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

- More efficient administration of the state's receivables with the possibility of their mutual compensation and a stronger position in receiverships;
- Optimisation of the number of employees by the elimination of the performance of duplicate activities and by the reduction of management positions;
- Decreased costs of the running of a united organisation.

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Pavol Gejdoš[14]

CHANGES OF CERTIFICATION OF QUALITY MANAGEMENT SYSTEMS IN WOODS ENTERPRISES IN SLOVAKIA

Abstract: The article deals with the certification of Quality management systems in enterprises of wood-processing industry in Slovak Republic. It describes the changing attitudes, reasons and causes of woodworking companies for the changes in the certification process of Quality management systems according to ISO 9000.

Key words: woods enterprises, quality management system, certification of quality management system

INTRODUCTION

The term quality is still more and more used in professional practice and also in everyday life because it is becoming the criterion according to which the companies might survive or become or extinct. Area of quality is one of the substantive components in the company because without quality goods and services, which firms offer or should offer, company cannot exist. Only expressive increasing of quality can guarantee the efficiency of production and competitiveness of the company. One way to increase the quality and performance of each organizations is the implementation of ISO 9000.[6]

1. FUNDAMENTAL CHARACTERISTICS OF WOOD – PROCESSING INDUSTRY IN SLOVAK REPUBLIC

The wood – processing industry currently has no position in Slovak market similar to production of cars, is not involved in environmental debate like power engineering, lacks advertising campaign similar to that carried out for chemical products nevertheless, wood and furniture industry in Slovakia is more than necessary.

The wood – processing industry is one of the most dynamically developing industrial sectors in the EU which representation is approximately 10% of total EU manufacturing industry. It provides us with a wide range of materials and products based on renewable raw material - wood. Due to its rapid adaptability to market requirements and significantly low capital investment it supports the development of small and medium enterprises and creates employment opportunities. Its advantage is relatively small dependence on imported raw material inputs. The development of wood - processing industry felt a negative impact of the global economic crisis. The biggest change in Slovakia, see the volume of the timber trade, which in the first quarter of 2009 compared with first quarter of 2008 declined by 46%. Price of wood in world markets fell by 15 to 20%, in Slovakia the average price fell by about 24%. Stabilization and gradual increase in prices began in 2010.

The economic situation in wood – processing industry in Slovakia.

Positives:

- export performance highlights the competitiveness of enterprises production on foreign markets,
- development and production of value added tax - a growing trend in these indicators, positive developments in timber industry, where you can observe the growth of manufacturing products with high added value

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- nvestment development has a positive, upward trend, despite the increasing level of investment, the investment in machine-technology equipment is still low,
- improvement in the economic situation in wood and furniture industry - since 2002 there is a positive development of all economic indicators. [1]

Negatives:

- high credit debt companies - credit debt equity ranges of around 100%,
- the amount of overdue maturity - a negative situation is mainly in wood and furniture industry, where the pointer shows an upward trend,
- adverse developments in pulp and paper industry - since 2002 there is a decline in investment activity, production, profits, value added [1]

2. QUALITY MANAGEMENT BASED ON ISO 9000

The organizations today appreciate quality management mainly due to the implementation and preservation of quality management system by ISO 9000. This is inadequate because the real quality management in organization must be oriented on quality products for customers. [2] Quality management system may assist organizations in enhancing customer satisfaction. Customers require products with characteristics that satisfy their needs and meet expectations. These needs and expectations are expressed in product specification and collectively referred to as customer requirements. The quality management system approach encourages organizations to analyse customer requirements, define the processes that contribute to the achievement of product which is acceptable for the customer and keep these processes under control. [5]

The adoption of a quality management system should be a strategic decision of an organization. The design and implementation of organization's quality management system influenced by:

- Its organizational environment, changes in that environment and the risks associated with that environment,
- Its varying needs,
- Its particular objectives,
- The products it provides,
- The processes it employs,
- Its size and organizational structure.

ISO 9000 specifies requirements for a quality management system where an organization:

- Needs to demonstrate its ability to consistently provide product that meets customer and applicable statutory and regulatory requirements,
- Aims to enhance customer satisfaction through the effective application of the system including processes for continual improvement of the system and assurance of conformity to customer and applicable statutory and regulatory requirement. [4]

3. CHANGES AND TRENDS OF CERTIFICATION OF QUALITY MANAGEMENT SYSTEM BASED ON ISO 9000 IN WOOD – PROCESSING INDUSTRY IN SLOVAKIA

In the following charts you can see the changes and trends in the implementation and certification of quality management systems (QMS) in wood – processing industry in Slovakia.

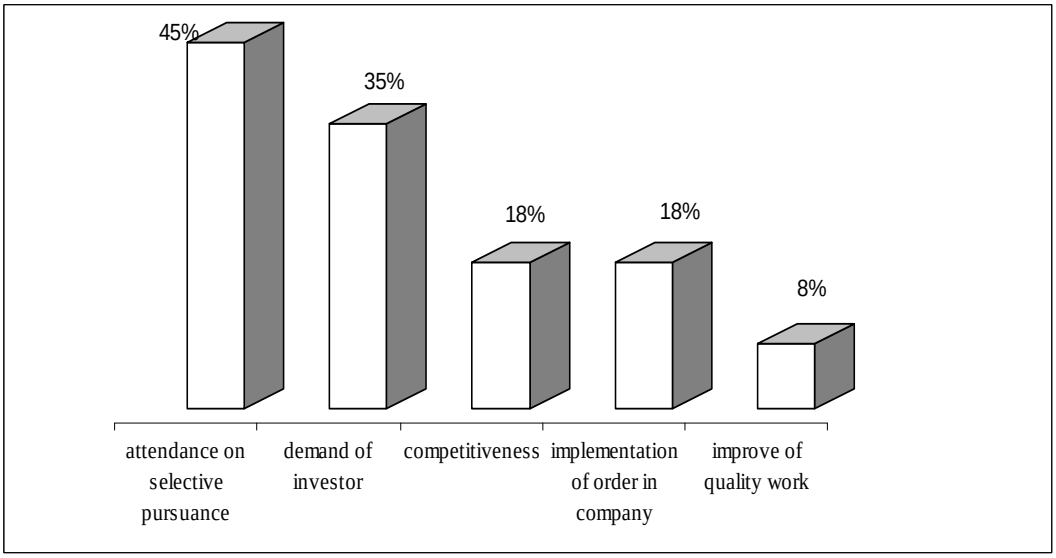

Figure 1. The most important reasons of implementation and certification QMS in wood processing enterprises in 2009 [3]

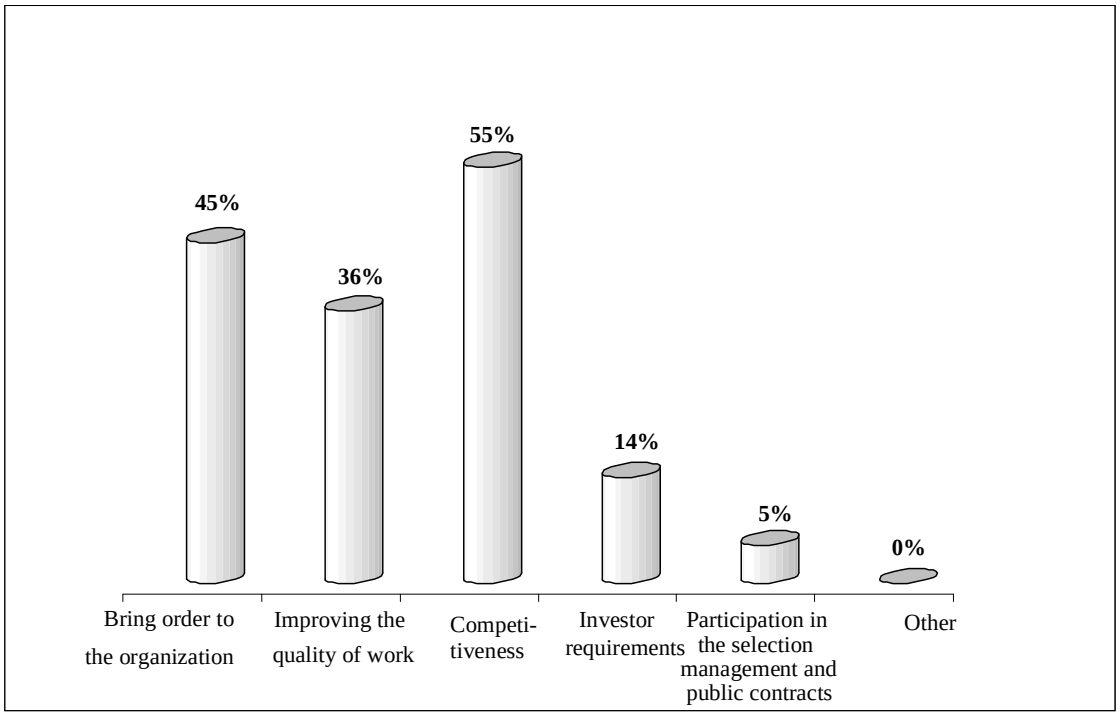

Figure 2. The most important reasons of implementation certification QMS in wood processing enterprises in 2011 [1]

As you can see over two years there has been quite a fundamental shift in approach and in the perception of building and certification of quality management systems in enterprises of wood – processing industry. Companies acknowledge the need for building a quality management system because it gives them competitive advantage and improves the quality of their products etc.

The next factor which was monitored and compared deals with the benefit of certification of quality management system. This situation is illustrated in figures 3 and 4.]

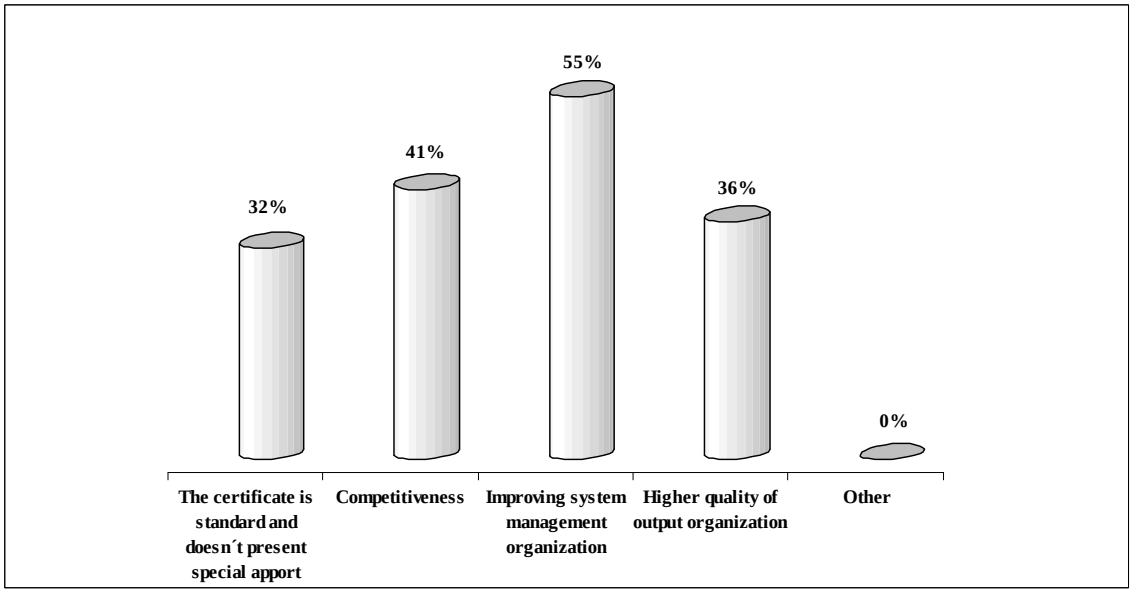

Figure3. The benefit of certification of quality management system in wood processing enterprises in 2009 [3]

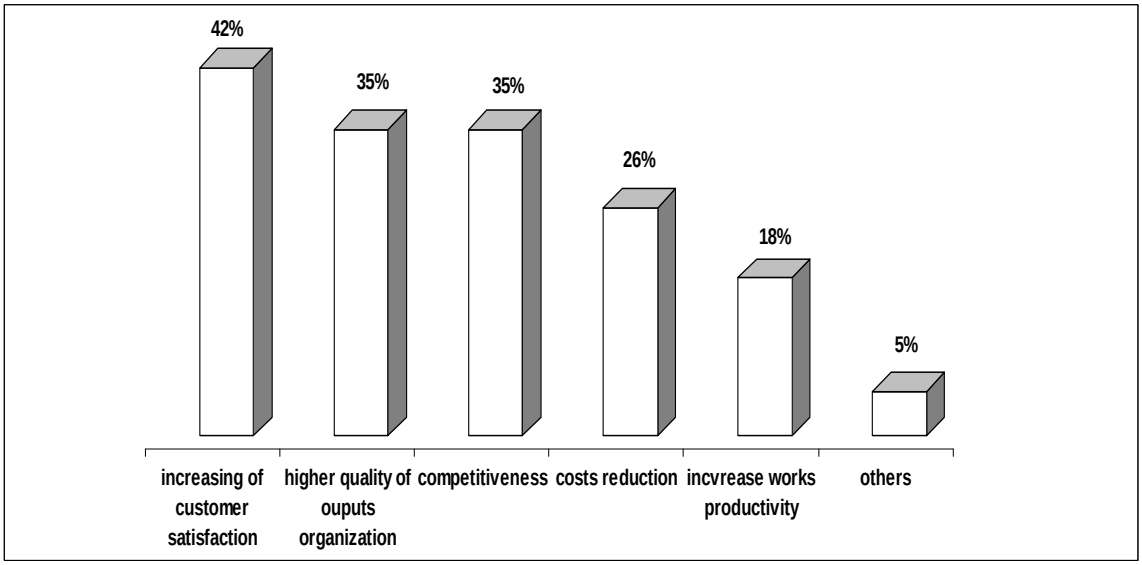

Figure 4. The benefit of certification of quality management system in wood processing enterprises in 2011 [1]

As you can see from the graphs over two years quite significant changes have occurred in the perception of the importance of building and certification of quality management systems. Among the benefits that we can see there are for example cost reduction, productivity improvements and others. This is due to the influence of global world crisis that also hit the industry and national economy.

CONCLUSION

Wood processing enterprises are at present exposed to strong competitiveness but they have many new chances, too. If they strengthen their productivity they can become successful companies. All know-how, proposals, solutions, continual development of employees and other factor can be effectively applied in management of all types of companies but we must find appropriate strategy. Success of each company is conditioned by individual abilities of its employees.

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Leszek Kozioł, Zenon Muszyński, Jacek Muszyński[15]

SELECTED DETERMINANTS AND CAUSES OF ARDUOUSNESS OF WORK IN TIMBER INDUSTRY

Abstract: The article relates to arduousness of work and draws particular attention to the problem of accidents at work in timber industry companies in the years 2005-2011. A concise description is presented of the issue of work arduousness caused by noise, mechanical vibration and timber dust, as they are important factors affecting employees' health. The final part of the paper shows conclusions which may contribute to raising the standards of working conditions in timber industry companies.

Key words: timber industry, occupational accident, arduousness, noise, timber dust

INTRODUCTION

According to European Statistics on Accidents at Work, annually in the EU there are about 8900 fatal accidents at work, which means that such accident occurs every two hours. Whereas every five seconds a less severe occupational accident is recorded. It should be noticed that men, who are more often engaged in the more arduous and dangerous tasks, are approximately three times more likely to be exposed to risk of accident. In comparison with accident rate in all industries, accident rate in timber industry is relatively high (about 10% of accidents in all industries)[16]. It is estimated that in EU annually there are 650 000 accidents on the way to and from work with 3400 casualties.

Labour Force Survey research shows that 5% of those who recover from occupational injuries are not able to return to their previous workplace. Occupational accidents entail not only health impairment, but also great social costs as they cause about 150m days of absence from work (or even up to 210m days as other estimations show)[17].

1. ACCIDENT RATE IN TIMBER INDUSTRY

Work in timber industry is accounted an arduous one as well as particularly dangerous. Employees are very often exposed to various factors which may constitute severe health or even life hazard. Identification of those hazards, their subsequent monitoring as well as reduction, if their complete elimination is impossible, is essential to protect employees from potential dangers.

According to current Labour Code regulations[18], the employer is responsible for occupational health and safety in the working place. The employer is among others obliged to protect life and health of the employees by ensuring safe and hygienic working conditions by means of proper work organization and exploiting achievements of science and technology.

Furthermore, the employer is obliged to provide the employees with information on life and health hazards associated with particular workplace activities. In case of imminent danger to life or health, the employer is obliged to order cessation of works and recession to a safe place.

Although the employers are very often convinced of their proper performance of the work task, many accidents happen during work (tables 1-3). In timber industry, in the years 2005-2011 annually the average of 2357 injured employees were recorded.

There were on average 8 fatal accidents, 47 severe and 2300,8 minor accidents (table 1).

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[15] *Małopolska School of Economics in Tarnow, Agricultural University of Cracow*
[16] *http://www. bhp. abc.com.pl*
[17] *Ibidem*
[18] *Kodeks Pracy of 28.06.1974, art. 207*

In total number of those who suffered during work, there were 87,4% men, 12,5% women and 0,3% adolescents (table 2).

Table 1. Persons injured in occupational accidents in timber industry except for furniture production

Specification		Total		In occupational accidents		
	years	In absolute number	In %	fatal	severe	minor
Wood manufacture except for furniture production	2005	2285	2,7	9	59	2217
	2006	2609	2,7	12	67	2530
	2007	2710	2,7	3	45	2662
	2008	2697	2,6	7	53	2637
	2009	1901	2,2	8	34	1859
	2010	2141	2,3	10	45	2086
	2011	2155	2,2	10	30	2115

Source: GUS 2009, 2011 [19]

Table 2. Injured in accidents at work by gender

Specification		Total		
	years	women	men	adolescents
Wood manufacture except for furniture production	2005	209	2069	7
	2006	248	2352	9
	2007	349	2356	5
	2008	396	2295	6
	2009	263	1633	5
	2010	263	1874	4
	2011	295	1855	5

Source*: GUS 2009, 2011* [20]

Among more serious consequences of occupational accidents (except for effects of fatal accidents and accidents causing severe injuries) is absence from work. In the analyzed period of time, average annual number of days of incapacity for work in timber industry (excluding furniture production) amounts to as much as 108 300 days. This means an average of 46 days per one injured person (table 3).

Table 3. Number of days of incapacity for work caused by accidents at work

Specification		Number of days of incapacity for work	
	years	in absolute number	per one person injured
Wood manufacture except for furniture production	2005	108561	47,7
	2006	127712	49,2
	2007	123097	45,5
	2008	132473	49,2
	2009	89142	47,1
	2010	87051	40,8
	2011	90528	42,2

Source: GUS 2009, 2011 [21]

[19] *Główny Urząd Statystyczny 2009, 2012*
[20] *Ibidem*

2. NOISE AND MECHANICAL VIBRATION

According to EU statistics 30% of workers in Europe, that is 60m people, for over a quarter of their working time is exposed to danger of high levels of noise.

In many timber industry companies, especially in small and medium ones, admissible norms of noise and vibrations are significantly exceeded. It may lead to higher accident rate as well as chronic and very often incurable occupational diseases.

While eliminating or limiting occupational risks during, among others, mechanical woodworking, in workplaces where admissible noise and vibration norms are exceeded, the time of employees exposure to these factors should also be reduced, which ensures safer and less stressful working conditions[22].

Harmful and arduous influence of noise depends not only on its volume, but also on its spectrum as well as whether it is continuous or pulsating. Degree of harmfulness is also dependant on the time of one's exposure to the noise.

It should be remembered that noise causes untimely tiredness, general psychical fatigue, worsened perceptiveness and labor efficiency. Furthermore noise hinders concentration which may lead to making wrong decisions and thus cause accidents.

Noise which exceeds 80 dB not only causes difficult to cure hearing damages, but also detrimentally affects neural and circulatory system.

Brief, unexpected and pulsating noise of more than 90 dB is especially harmful. Percussive noise, which is characterized by high level of sound pressure, causes permanent damage to hearing, usually classified as occupational deafness[23].

The level and scope of detrimental influence of vibration on human body depends above all on its frequency and amplitude, as well as on its transmission to particular organs of the worker, for example while using percussive tools. Consequences of detrimental vibration influence on human body are very complex and have diverse characteristics. It may cause of hypertensive disease, sight disorders and balance disturbance. In many cases, workers suffer from a so called vibration disease syndrome with symptoms of pathologies in osteoarticular, nervous as well as digestive system. Furthermore, workers may suffer from psychosomatic disorders.

3. TIMBER DUST

Employees are exposed to timber dust basically during mechanical and further processing of wood raw material. Among the most arduous work tasks are those which involve grinding, form tracing, cutting and planing as well as when using circular, band and mill saws.

Longtime inhalation of timber dust, especially of hard wood (beech, oak), may cause glandial cancer of mucosal nose membrane and nasal sinuses. There were also other ailments recorded, such as: respiratory system, mucosal membrane and skin diseases as well as allergic pulmonary alveolus inflammation, bronchial syndrome, bronchial hyperresponsiveness, chronic rhinitis, allergic conjunctivitis and skin inflammation[24].

Threat of exposure to timber dust among employees involved in mechanical processing of wood raw material as well as its further processing depends most of all on effectiveness of machines which intercept the dust and then effectively remove it by pneumatic devices to safe storage.

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[21] *Ibidem*

[22] *Muszyński Z., Muszyński J.;2000. Wybrane zagadnienia z zarządzania w przedsiębiorstwie a problem bezpieczeństwa pracy w aspekcie nowych regulacji prawnych. . [w]: Intercathedra Annual Scientific Biulletin of Plant, Economic Department of the European Wood Technology University Studies Poznań, nr 17, s. 91-96.*

[23] *Muszyński Z., Muszyński J.; 2003. Hałas i drgania mechaniczne w małych i średnich przedsiębiorstwach przemysłu drzewnego. [w]: Intercathedra Annual Scientific Biulletin of Plant, Economic Department of the European Wood Technology University Studies Poznań, nr 19, s.99*

[24] *Dutkiwicz J., Prażmy Z. 2008. Biologiczne czynniki zagrożenia zawodowego w przemyśle drzewnym. [w]: Zdr. Publ. 118(2), s. 138-139.*

Timber industry companies management should take into account occupational safety and ergonomic guidelines.

CONCLUSIONS

1. Arduous and dangerous working conditions as well as potential accident causes should be eliminated or at least considerably limited in all wood industry companies.
2. The employer is obliged to ensure appropriate working conditions, whereas the employee should firmly obey all the rules and regulations of safe handling of machines and devices.
3. Because of high risk of occurrence of occupational hazards in timber industry companies, permanent monitoring of working conditions is indispensable.
4. The employer is obliged to isolate loud workplaces with sound-absorbing shields and equip the employees with means of individual protection from noise and mechanical vibration.
5. Timber dust produced during mechanical wood processing should be entirely removed in a stream of air through an adequate system.
6. Introduction of eco-management system in timber industry should contribute to a more effective, reliable and ergonomic production.

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Peter Malega, Andrej Ješka, Michal Bartók[25]

STRATEGIC PLANNING – FIRST STEP TO EFFECTIVE MANAGEMENT

Abstract: This article is focused on the strategic planning, which is one of the most important processes in company management. The article is divided into three main sections. First section is oriented on the main requirements of the strategic planning. The second section deals with strategic plan construction and its three main stages, i.e. assessment stage, objective stage and evaluation stage. The last section concerns control and monitoring of the strategic plan.

Key words: strategy, strategic planning, long-term planning process, assessment stage, objective stage, evaluation stage

INTRODUCTION

Strategic management was established in developed countries in the area of large enterprises as the reaction to new, unknown and surprising changes in business environment. [1, 10] But the processes of strategic management don't mean quick and easy success. We can understand these processes more as guidelines and recommendations, through which we obtain various solutions, about which we have to further creatively speculate.

Strategic management is currently understood as a process which main attributes are the continuity, compactness and internal harmony. Strategic management gives emphasis on the linkage of strategy and the procedure for strategy implementation. The special status has the evaluation and control, which through a feedback initiates changes in strategy implementation and in case of major changes in the environment also in strategy formulation. [3, 6]

Planning can be defined as the determination of the main goals (objectives), formulation, evaluation and selection of appropriate policies, strategies and tactics, but also other activities that will enable achievement of defined objectives. [4, 5]

STRATEGIC PLANNING

Long-term strategic planning is the process through which are formulated long-term, i.e. strategic objectives of the organization. It is the basis of strategic management. It is based on a thorough analysis and subsequent determination of the plan implementation. [2]

The basic steps of strategic planning process are in Fig. 1 [8, 9]:

1. performance evaluation in relation to defined objectives and identified differences,
2. assessment of the differences considering external conditions,
3. assessment of the differences considering internal assumptions,
4. identification of future goals considering arising due to variations,
5. wide action plans that lead to achieving objectives,
6. identification of resources unthinkable for functional areas to implement plans,
7. necessity aggregation of functional areas to necessity of SBU,
8. allocation of resources to each SBU,
9. reallocation of resources to functional areas,
10. distribution of resources within the functional areas,
11. monitoring of resources utilization with functional areas,
12. monitoring of resources utilization by each SBU.

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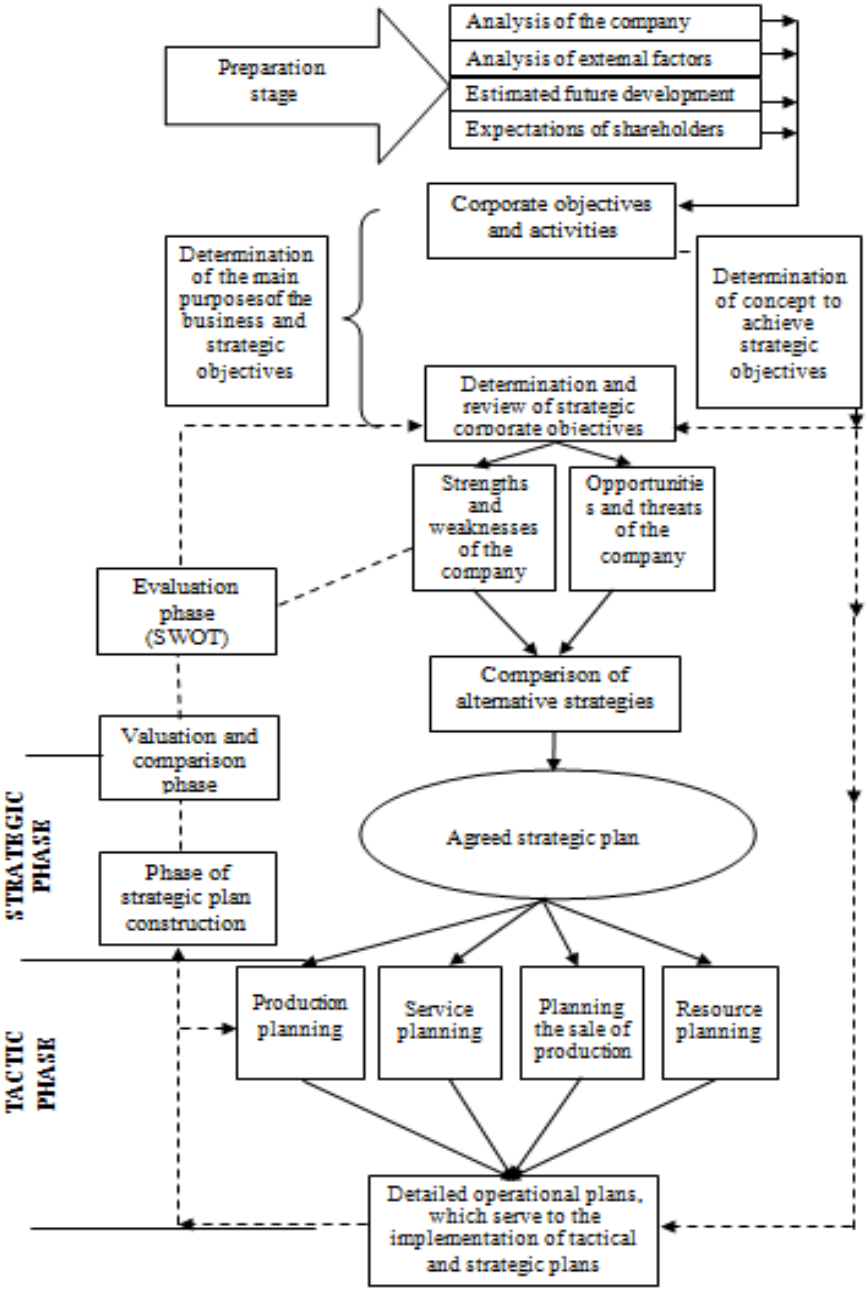

Figure 1. Planning levels and phases [8]

Long-term planning process consists of several stages, resulting in the construction of a strategic plan. The phases of long-term strategic planning are:

1. assessment stage
2. objective stage
3. evaluation stage
4. strategic plan.

In the long-term planning is very important the intuition of the planning team, that have to use statistical and mathematical methods that are mainly based on past data, which is often inaccurate and therefore hinder the planning team from proper and in time predicting of major future changes.

STRATEGIC PLAN CONSTRUCTION

The strategic plan is a product of strategic planning and management. The process of creating the strategic plan is shown in Tab. 1 – Tab. 3 [7, 9]:

Table 1. Assessment stage

ASSESSMENT STAGE	
Inputs	Activities
Impact evaluation of the external conditions	Economic, political, sociable a technical factors and their impact: ➢ competition analysis, ➢ resource analysis.
Estimated future development	Evaluation of major economic trends (purchasing power, inflation, taxes): ➢ political stability and economic policy, ➢ development of technologies, ➢ competitive behaviour.
Analysis of the organization strengths and weaknesses	Evaluating of the strengths and weaknesses, limits and constraints of the organization: ➢ possibility of manufacturing facilities, ➢ analysis of profiles bottlenecks, ➢ options, performance and quality of labour, ➢ analysis of performance and productivity, ➢ income, value added, ➢ research and development, ➢ financial analysis.
Analysis of the expectations of owners and other interested stakeholders	➢ Owners: dividend policy, EVA, MVA, ROE ➢ Employees: job stability, wage requirements, insurance, education ➢ Customers: quality requirements, price, economic life, design, technology of payments, service ➢ Public: environmental protection, pollution and waste management, economic stabilization and sustainable development of regions

Table 2. Objective stage

OBJECTIVE STAGE	
Determination of long-term strategic objectives	This phase plays a key role in the whole planning process. It decides about the techniques of achieving the long-term objectives. It starts with setting long-term goals and continues with setting tactical and short-term operational objectives through which then perform long-term goals. Long-term goals, their measurability and evaluation should be determined in the following areas: ➢ position of company on the market, ➢ overall performance and productivity, ➢ innovation and new technologies and practices utilization, ➢ profitability, ➢ managerial and employee motivation and performance, ➢ public interest.

Table 3. Evaluation stage

EVALUATION STAGE	
SWOT analysis	At this stage of the planning process company is reviewed using SWOT analysis, first internal and then also external.
Evaluation of alternative strategies	The planning team determined the scope of strategic objectives and provides long-term alternative strategies that are considered when the company develops its strategic plan. The specific objectives of strategies are designed in detail at operational level.

Clearly defined, measurable and motivating comprehensive strategic plan becomes one of the main documents of the company through which the company is managed, monitored and evaluated.

Advantages of strategic planning [9]:

- long term view on activities of the company,
- system approach,
- target orientation and interdependence and coherence of objectives,
- development of appropriate strategies and processes to achieve planned objectives,
- company evaluation in terms of its strengths and weaknesses,
- elimination of inefficiencies,
- continuous improvement,
- control function and a motivational factor.

Disadvantages of strategic planning [9]:

- possible static, formal and non-motivating approach,
- excessive process bureaucracy,
- complexity and time-consuming,
- lack of flexibility and inefficient formal control,
- excessive subjectivity of the long-term goals.

CONTROL AND MONITORING OF THE STRATEGIC PLAN

In monitoring and control of the plan are very useful the feedbacks techniques, which are provided by adequate information system. At present, we can distinguish two main techniques used in strategic planning [12]:

- traditional (formal) technique,
- modern (informal) technique.

The traditional planning system was used until 1970, when its weaknesses uncovered mainly external shocks (e.g. increases in oil prices, collapse of financial markets). The main disadvantage of this system was the lack of flexibility, which prevented a timely response to changes in external conditions.

Modern planning system has a good flexibility and adaptability in relation to unpredictable changes.

Currently, prefers a balanced combination of both approaches to planning so that the advantages and disadvantages of both techniques are balanced and as a whole bring higher added value of the whole planning process. In the whole planning process there are useful computer-generated models, which allow quickly created automated outputs. Using them is then very effective and comprehensive modeling of the future incurred situation.

Most useful are those analysis based on the level of sales, selling price, profitability, total costs, etc. The optimization models that use linear programming techniques, probabilistic models and other available techniques are even more developed [9].

CONCLUSION

When companies have a clear idea about the objectives which they want to achieve and know how to achieve these objectives, i.e. clear strategy, then they can effectively implement it, systematically check and adjust if appropriate. [11]

Strategic planning has also in today's turbulent environment created a set of actions through which the company can respond flexibly to changes in the environment and help companies gain the competitive advantage.

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This article was created by implementation of the grant project VEGA no. 1/0102/11 Experimental methods and modelling techniques in-house manufacturing and non-manufacturing processes.

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CSR CONCEPT AND THE VALUE CRISIS

Abstract: The main aim of this paper is to point out the role of both company and society values in the context of the world economic crisis. Nowadays, we are facing the crisis which roots in a lack of moral values, respectively, communities, companies and individuals lose their faith, that these values are still valid and applicable during globalization in market economy. We are focusing on CSR and its role in current crisis.

Keywords: moral crisis, company values, CSR

INTRODUCTION

„In addition to the current financial, economic and environmental crises worldwide, we are facing a crisis of values, ideas and vision. There is a need to find stronger common moral ground among those who participate in the globalized marketplace and in civic and public spaces." (Global agenda..., 2012) We think that the current crisis is an opportunity for global society to connect values, ethics and morals with economic acting of the companies, governments and individuals.

According to Schwab (2008, p. 109) the state power has declined and the influence of corporations on environment, communities, the lives of citizens is increasing. And that's why communities, citizens look at corporations and demand help, the answers and the leadership and on the other hand, they also criticise the corporations for wrong doing.

People are looking for leaders, who have strong values, rules and this economic crisis is an opportunity to establish a new model of the global society life with respect to natural resources, human life and sustainable development of the entire planet.

The companies are engaged in society life and they have to take responsibility for their actions. As Schwab mentioned (2008, p. 110) The World Economic Forum has worked and developed a framework to help corporates to engage in society. The first was stakeholder[27] concept; this concept became a part of the Davos Declaration, which describes the fundamental principles of a corporation's social and environmental responsibility.

There are five core concepts, which can be applied in the company – corporate governance, corporate philanthropy, corporate social responsibility, corporate entrepreneurship and global corporate citizenship (Schwab, 2008, p. 110).

„The Global Agenda Council on Values identified social technologies as providing opportunities to build more truly human and social enterprises, driving greater transparency in values and serving as potential enablers for companies and the people within them to make better decisions. The goal is to create concepts for products, services, and tools that translate values such as transparency, fairness, inclusiveness, and empowerment into tangible, personal experiences, and to develop practical solutions and tools that allow companies and their people to live up to their ideals in their day-to-day decision-making and behaviors" (Values in decisions making, 2012).

Our global society should rethink and redesign the links between companies and goverments, communities and other stakeholders. „Beyond conventional concepts of corporate social responsibility, the discourse has shifted to more fundamental questions of principle and values, prompting us to rethink the very purpose of the enterprise" (Values in decision making, 2012).

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[27] *A corporate stakeholder is a party that can affect or be affected by the actions of the business as a whole (Stakeholder, 2012) (e.g. public, customers, employees, competitors, communities….). The group of the corporate stakeholder varies following the type of the corporation.*

We will be focusing on CSR concept as one of the possible solution for current value crisis.

CSR CONCEPT

In the pursuit of the creation of moral values within the business environment it is possible to explain this process by the example of the confrontation between the two most general moral principles – egoism and altruism, which are based on principles of individualism and collectivism.

"Egoism is the life principle when human's activities following only their own interests, ignoring the interests of other people. Egoism, as a moral quality, was in the history of moral consciousness generally evaluated negatively" (Agafonová, 2006, p. 6).

"Altruism is a moral principle based on the suppression of one's own egoism (selfishness), selfless sacrifice for the benefit of another, the willingness to sacrifice one's own interests for the interests of others" (Agafonová, 2006, p. 6).

The above-mentioned moral principles are not strictly bound and characteristic only for man understood as mankind, but these principles are also characteristic for business. If the companies were to be oriented only in one direction, either egoistic (achieving maximum profits regardless of the ways and consequences, which companies caused in society by their activities) or altruistic (the company would absolutely deny the basic role of business and would carry out only benefits for society, irrespective of their own benefit) such system would become unsustainable. Therefore, it is necessary to constantly seek a compromise between these two principles. The possible "compromise area" is shown in figure 1.

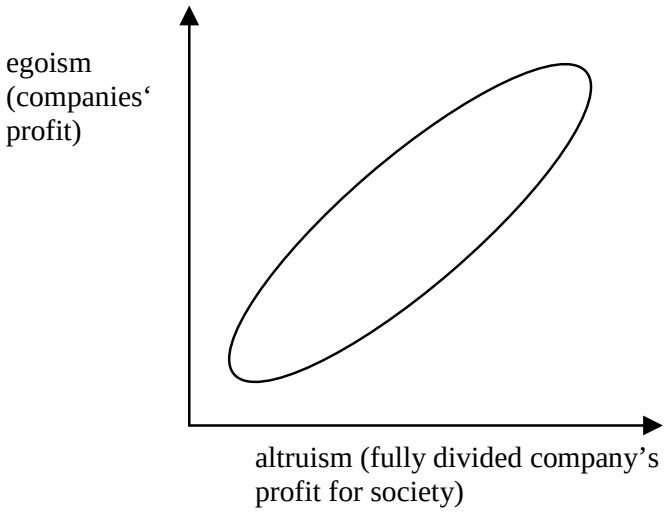

Figure 1. The compromise area between altruism and egoism

To find the right level of companies' behavior as a responsible citizen of the society within which the company executes its business is a very difficult task and we probably can't determine the exact level of company's involvement in this process. Essential idea is, that companies have to realize that their only objective can't be only their own profit and their sole duty and obligation is not just paying taxes and fees. As we mentioned above, the state fails to ensure basic social needs and therefore also the involvement of business sector in this process as one of the citizens of society is also important.

Corporate social responsibility is in professional circles, but also among the general public, better known under the abbreviated term "CSR". CSR can be defined as an initiative that is based on voluntary integrating social and environmental concerns into everyday business operations and interactions with corporate stakeholders. Being socially responsible means not only fulfilling legal expectations, but also going beyond compliance and investing "more" into human capital, the environment and the relations with stakeholders. The experience with investment in

environmentally responsible technologies and business practice suggests that going beyond legal compliance can contribute to company's competitiveness. Going beyond basic legal obligations in the social area, e.g. training, working conditions, management-employee relations, can also have a direct impact on productivity. It opens a way of managing change and of reconciling social development with improved competitiveness (European Commission, Green Paper, 2001, p. 6).

The goal of CSR is to embrace responsibility for the company's actions and encourage a positive impact through its activities for the environment, consumers, employees, communities, stakeholders and all other members of the public sphere who may also be considered as stakeholders.

CSR and the application of the principles of change (and in some way and denies), his own view on the role of firm-level "profit only" (only gain) to a broader perspective in the context of today often discussed – the "3 P" – "people, planet, profit". It is in this context, that it is possible to find parallels with the concept of sustainable development and CSR, which also stands on three pillars called "Triple-bottom-line" (triple base company income or even triple). It offers a view of the society functioning in its economic, social and environmental aspects

CONCLUSION

"People often assume that ethics and economy do not go together and that the market is a place where ethical ideas are weaker than egoism, profit, contention, damage of environment, etc.

An ethical code as "a means for implementation of morality" in the commercial sphere may be styled as a code of professional responsibility, which may dispense with difficult issues of what kind of behaviour can be considered ethical "(Drličková, Kaputa, 2006, p. 12).

We can assume that corporations can't take the whole responsibility for the global problems and the current crisis. They also can't solve the global problems. The new model of cooperation among corporations and the rest of the society is needed, it means the cooperation among stakeholders such as governments, transnational corporations, communities etc. This new model could be based on the strong and valid values.

The corporations can solve and help to solve the social problems which are in the vicinity or which are compatible with their objectives. The possible way of restoring the faith in the value among people is to act correctly with the employees and their families and local communities, the corporations can also use their products as tools to manifest such values as "transparency, fairness, inclusiveness, and empowerment". As we mentioned before, the power and influence of the corporations is raising, if their behavior is correct and based on the strong corporate core values we can expect the positive change in the whole world.

The CSR concept should help corporations find balance between their business objectives (e.g. profit) and the global societal goals (e.g. sustainable development). The first step in this process is to realize the responsibility for the next generations.

As an example of the "responsible acting on the market" we can give the wood processing corporations which spend part of their profit on environmental protection, which consists of reducing emissions, recycling materials and the use of certified wood raw material sources. They implement awareness in those communities that are nearest to them and focus on solving those problems that are professional in their field of competence.

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Martina Merková, Josef Drábek[28]

POSSIBILITIES OF RISK ANALYSIS IN THE INVESTMENT DECISION-MAKING OF THE ENTERPRISE

Abstract: The aim of this paper is to identify critical factors that affect the expected profit and cash flow in the implementation of investment projects, also achieve the objectives of investment by applying the most advanced models used to quantify the risks of investing. In the study there has been performed the sensitivity analysis of investment and the Monte Carlo simulation, an evaluation of the results of analyzes and syntheses that have been used to support the investment decision-making of the enterprise has been carried out.

Key words: investment, enterprise investment, investment activity, risk of investment, sensibility analysis

INTRODUCTION

The allocation of available financial resources to fixed assets, recovery of the property or investments in modernization of production technologies are possible ways when a company can ensure its prosperity, growth of value and development. In order to ensure adequate use of these investments it is necessary to analyze, evaluate their economic benefits and also analyze the risk that is inherently associated with investing. It is not possible to develop business activity without taking risk. To find a suitable and acceptable balance between undergoing risk and a potential profit is difficult. Although the perception of risk and understanding of risk improved recently, identification of risk factors and the newest procedures of risk quantification are not themselves able to prevent bad decision making and subsequent loss.

The aim of the article is to analyze the risk of selected investment and to highlight the factors that are significant risk carriers of investing in wood production. The article suggestests investment project accompanied by sensitivity analysis and also Monte Carlo simulation. On the basis of the analysis the reached evaluations and formulated conclusions are presented.

RISK ANALYSIS OF INVESTMENT PROJECTS

A risk analysis of the investment project is an initial realization of the reasons that could cause its failure. Risk analysis helps entrepreneurs to plan a project in order to increase the probability of success.

Through risk analysis the company detects, which risk factors are important in terms of the project and on the other hand, what means and measures can reduce the project risk and how much of risk is still acceptable for the business.

The base of risk analysis is a systematic process of working with risk and uncertainty, which requires deeper knowledge of tools and methods of risk decision-making, which leads to a significant increase in the quality of planning and evaluation of business projects (Fotr, 1992).

The content of project risks analysis can be briefly divided into some general points which are characterized in Figure 1.

Among the tools and resources that can be used to identify risk factors there are for example check lists, discussions and interviews, audits, results of financial controlling and financial analysis, but also the various analyses of internal and external business environment, be it a SWOT analysis,

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STEEP analysis, mind maps, brainstorming method, etc. In the identification of risk factors there should be involved the widest possible range of interested managers. It should be emphasized that the identification of project risk factors is the most important and time-consuming phase of risk analysis. It requires experience, a systematic approach and ability to predict possible future situations.

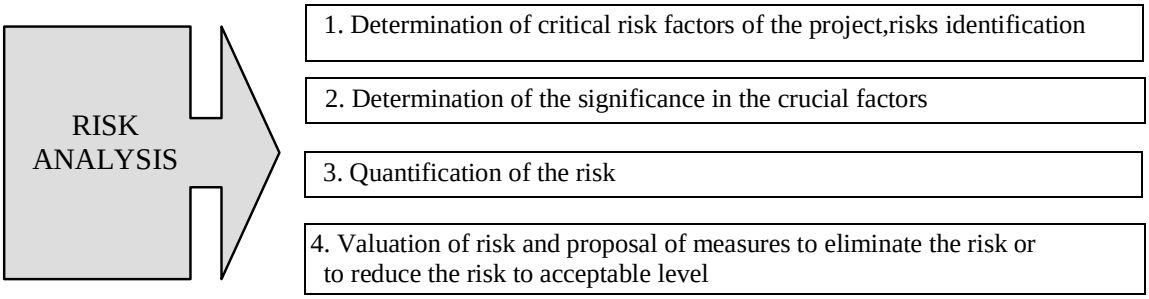

Figure 1. Risk analysis

Source: author's own study

Order to determine the significance of risks is possible to use sensitivity analysis - where risk factors are able to quantify, or expert evaluation which assesses the factors which are not able to quantify and they are evaluated verbally.

Sensitivity analysis of investment is an important part of the investment decision-making on investment projects. Its function is (Scholleová, 2009):

- To stop in time the realization of the investment, which although is profitable within the means, its risk does not meet the goals of the company. The expected deviation of its return may in fact be so large that the probability of the possible investment loss is not at risk level acceptable by the owners.
- To mark critical values, which monitoring and control will be necessary during the investment realization, they have a significant impact on the investment value and probability of change is high.

The basic equation for sensitivity analysis (Drábek, Polách 2008) is:

$$P = Q \times p - \left[\left(v_1 + v_2 + ... + v_n \right) \times Q + f_1 + f_2 ... + f_n + \frac{I}{T} \right] \qquad (1)$$

Where:

P – Profit from the investment project per year

Q – Quantity of the production in natural units (pcs, kg, m, …) per year

p – price per unit

v1, v2,..vn – variable costs per unit

f1, f2,...fn – fixed costs per whole production

I – Investment

T – Time of the lifecycle (years)

The fundamentals of sensitivity analysis in investment decision-making are the detection of sensitivity of the chosen criteria for possible changes in risk factor values that affect the criterion. This means the goal is to determine how some changes of factors such as the production volume, production capacity, sales price and other affect the criteria – for example the profit.

The basic form of sensitivity analysis is the one-factor analysis, which determines the effects of selected changes in individual risk factors for the chosen criterion, i.e. while all other factors are stable at their projected (planned, the most probable) values. The variation of individual risk factors

may have pessimistic or optimistic character and deviations from planned (the most probable) values of a certain size, for example ± 10%.

Risk factors with changes written above cause only minor changes to the selected criteria, we considered as not important - it means that the sensitivity of the criteria for changes in this risk factor is small. Conversely, factors which considerable changes will cause massive changes in the selected criteria are certainly significant. The criterion is therefore very sensitive to changes in these factors (Hnilica, Fotr 2009).

The Monte Carlo simulation belongs to a class of simulation models that are used for complex problems, which cannot use other methods and models of risk measurement. Monte Carlo simulation is based on the principle of roulette, where the computer simulates different values of each factor and their combinations in the determined level of probability. The Monte Carlo method is helpful in creating a vision of how individual factors can progress (Fotr, 2011).

The base of Monte Carlo simulation is to generate a large number of scenarios (each of the scenarios is one discrete arrangement) and the values calculation of financial criteria for each scenario. The result of Monte Carlo simulation is a graph of the probability distribution of the selected criteria.

The Monte Carlo simulation allows the simple and rapid implementation of a large number of possible situations created as combinations of possible values of input variables, for example: sales volume, price, cost, etc., to calculate the possible values of a profit. The Monte Carlo simulation requires the determination of probability distributions for all input random variables (risk factors). Information concerning the distribution (type and parameters of distribution functions) is entered into a computer simulation model and by using a random numbers generator we obtain discrete values for each distribution, which combinations provide calculation result, for example the profit, cash flow, net present value (Varcholová, Dubovická 2008).

Generating of scenarios (many times repeated random experiments on the input data sample) is carried out until they are provided stable results of the density in probability distribution. The results become more stable because the statistics data (that describe it) change less with increasing number of simulated calculations. Number of trials will vary depending on the using distribution functions.

1. VERIFICATION OF THE RISK ANALYSIS IN THE ENTERPRISE WOOD, LTD.

1.1. Evaluation of the economic efficiency of the investment project

The company Wood, Ltd. decided for the modernization of the production technology to obtain the machining center and the application software for the construction and production management.

The selected technology and application software fully meets the requirements of the company. The proposed technology will allow the production of innovative all-wood products; software support will enable customers to implement their creativity - unique production. The new advanced technology of wood processing with application software will increase the capacity of the company production.

From the available input data (Tab. 1-3), we calculated the net present value, internal rate of return, profitability index and discounted payback period. All calculated values of these criteria testify in conformity to the investment's suitability. Results are presented in Tab. 4.

Table 1. Financial sources for the investment project (€)

Equity	Dept	Total:
306 360 €	900 000 €	1 206 360 €

Table 2. Terms of the loan for the investment project

Amount of the dept	Annual payment	Interest rate	Payback period
900 000 €	150 000 €	5.75 % p.a.	6 years

Table 3. Operating costs (€)

Cost item / Years	**1**	**2**	**3**	**4**	**5**	**6**
Material costs	666 434	773 020	905 464	1 002 390	1 002 390	1 002 390
Personal costs	403 704	484 598	592 877	691 794	709 155	690 732
Lease	23 900	24 962	26 090	27 252	28 480	29 775
Administration, Services	54 106	56 562	59 085	61 774	64 529	67 450
Energy	54 903	57 392	59 981	62 670	65 492	68 446
Repairs and maintenance	49 127	51 318	53 641	56 065	58 587	61 210
Transport	32 995	34 455	36 015	37 642	39 335	41 094
Insurance	5 045	5 278	5 510	5 743	6 008	6 274
Promotion	83 744	92 047	96 196	116 345	105 357	109 772
Other costs	40 862	42 687	44 613	46 604	48 729	50 919
Operating costs 1	1 414 820	1 622 320	1 879 473	2 108 279	2 128 062	2 128 062
Amortization	188 774	187 612	185 919	184 326	143 730	142 435
Interests	63 750	52 125	40 500	28 875	17 250	8 625
Operating costs 2	1 667 344	1 862 057	2 105 892	2 321 418	2 289 042	2 279 122

Table 4. Evaluation of the investment project by Cash flow (€)

Indicator /Years		1	2	3	4	5	6
	Total income	1 676 700	1 957 460	2 258 200	2 558 940	2 678 000	2 678 000
-	Expenses	1 414 820	1 622 320	1 879 473	2 108 279	2 128 062	2 128 062
-	Amortization	188 774	187 612	185 919	184 326	143 730	142 435
-	Interests	63 750	52 125	40 500	28 875	17 250	8 625
=	Profit before taxes	9 356	95 403	152 308	237 460	388 958	398 878
-	Taxes 19 %	1 777.64	18 126.57	28 938.52	45 117.40	73 902.02	75 786.82
=	Net profit	7 578.36	77 276.43	123 369.48	192 342.60	315 055.98	323 091.18
-	Funds 10 %	757.84	7 727.64	12 366.95	19 234.26	31 505.60	32 309.12
=	Disposable profit	6 820.52	69 548.79	111 032.53	173 108.34	283 550.38	290 782.06
+	Amortization	188 774	187 612	185 919	184 326	143 730	142 435
=	Cash flow	195 594.52	257 160.79	296 951.53	357 434.34	427 280.38	433 21706
-	Dept payment	200 000	200 000	200 000	200 000	150 000	150 000
=	Net Cash flow	-4 405.48	57 160.79	96 951.53	157 434.34	277 280.38	283 217.06
	Discount 10 %	0.90909	0.82645	0.75131	0.8301	0.62092	0.56447
	PVCF per year	177 813.20	212 529.58	223 104.08	244 132.46	265 307.50	244 539.74
	Present Value of Cash Flow - PVCF in total					1 367 426.56 €	
	Net Present Value - NPV					161 066.56 €	
	Profitability index - PI					1.13	
	Internal Rate of Return - IRR					13.87 %	
	Discounted Payback Period - DPP					5.34 years	

As follows from the economic analysis of the project by cash flow indicators, project is feasible, effective, some values can be considered borderline. Project at the discount rate has leeway to risk. The project should be implemented in practice.

1.2. Sensibility analysis

The sensitivity analysis clearly identifies which factors most affect the profit in presented period. The planned profit was in amount of 398 878 € in the 6th year of life cycle. To evaluate the factors in longer term, there primarily is the impact of the selling price, the volume of production, changes in cost price of inputs as well as changes in labor costs per unit of output. Results of the sensibility analysis for the planned investment project are shown in Tab. 5.

Table 5. Project risk factor quantification (project sensibility analysis)

Risk factor	Item	Unit	Estimated value (€)	Estimated value (€/pcs)	Deviation ± 10 %	Profit after change (€)	Absolute change (€)	Relative change (%)
Q	Production volume	pcs	885	885	797	323 378	75 500	18.93%
c	Price	€/pcs	3 025.99	3 025.99	2 723.39	131 078	267 800	67.14%
v_1	Material expenses	€/pcs	1 002 390.00	1 132.64	1 245.91	298 639	100 239	25.13%
v_2	Personal expenses	€/pcs	690 732.00	780.49	858.54	329 805	69 073	17.32%
v_3	Promotion	€/pcs	109 772.00	124.04	136.44	387 901	10 977	2.75%
v_4	Administration, services	€/pcs	67 450.00	76.21	83.84	392 133	6 745	1.69%
v_5	Other variable expenses (35%)	€/pcs	17 821.65	20.14	22.15	398 878	0	0.00%
v_6	Transport (30%)	€/pcs	12 328.20	13.93	15.32	397 096	1 782	0.45%
v_7	Energy (15%)	€/pcs	10 266.90	11.60	12.76	397 645	1 233	0.31%
v_8	Repairs and maintenance (20%)	€/pcs	12 242.00	13.83	15.22	397 851	1 027	0.26%
f_1	Lease (€)	€	29 775.00	29 775.00	32 753	395 900	2 978	0.75%
f_2	Insurance	€	6 274.00	6 274.00	6 901	397 026	1 852	0.46%
f_3	Other fix expenses (65%)	€	33 097.35	33 097.35	36 407	395 568	3 310	0.83%
f_4	Transport (70%)	€	28 765.80	28 765.80	31 642	396 001	2 877	0.72%
f_5	Energy (85%)	€	58 179.10	58 179.10	63 997	393 060	5 818	1.46%
f_6	Repairs and maintenance (80%)	€	48 968.00	48 968.00	53 865	393 981	4 897	1.23%
f_7	Amortisation	€	142 435.00	142 435.00	156 679	384 634	14 244	3.57%
f_8	Interests	€	8 625.00	8 625.00	9 488	398 015	863	0.22%
P	Profit	€		398 878				

The results of the sensitivity analysis of the project by changing the project values ± 10% shows that the dominant risk factors are the selling price (reduced profit by 67.14%), the volume of production (reduced profit by 18.93%), material costs (reduced profitability of 25.13%) and labor costs (earnings decrease of 17.32%). The few significant effects can be considered other factors such as depreciation, advertising, services, energy, repairs and maintenance, other costs, transportation. Costs for rent, insurance and interests have very little effect to the profit.

Monte Carlo Simulation

Step 1 - Installing Crystal Ball

The application of Monte Carlo simulation in the analysis of the investment project we supported by the system Crystal Ball, which was connected with the model developed in MS Excel program.

Step 2 - Preparation of input data

Project description: The Slovak wood company with production of small all-wood constructions for recreational use, decides whether to accept the investment plan related toI increasing of the production volume and diversification of offered products. In case of the investment realization, which is modernizing of production technology, another added value is more efficient use of raw material. In addition, the implementation of the project will create new jobs for the region with high unemployment.

Determination of key risk factors: Key risk factors were selected by using the expert method with owners. We chose the probability distribution for individual risk factors. Key risk factors that affect the profit of the company (or the investment project) are:

1st price – it is the average selling price for a unit of the production (piece), triangular distribution, the most probability value, min., max.

2nd volume of production – it is the number of sold units, BetaPERT distribution and the most probability value of 10%, 90%.

3rd material costs – it presents the key raw input costs, Beta distribution was set the mode is the most probability value.

Other risk factors have no major impact. The statistical dependency between the selected key factors was considered.

Definitions of investment options: We have proposed alternatives for the project presented in Figure 2.

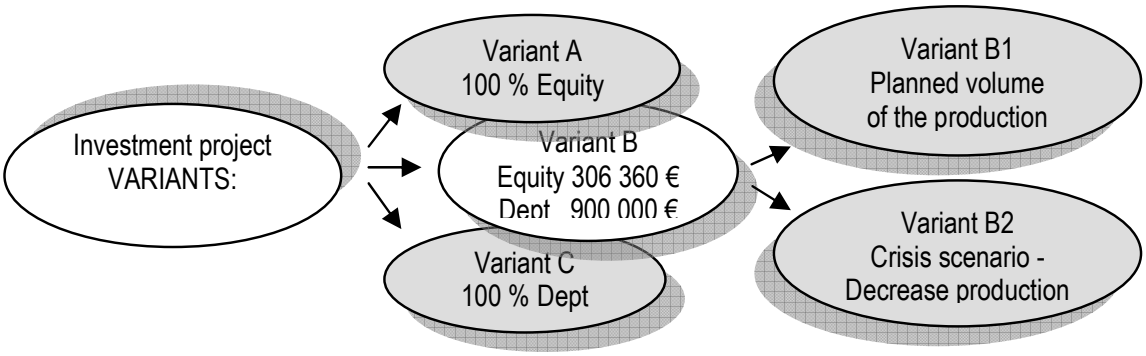

Figure 2. Investment alternatives and scenarios for the investment project

Source: authors

Determination of evaluation criteria and simulation parameters: We defined two types of variables:

1st variables which make the object in the simulation, are known as Forecasts in the Crystal Ball system. These are the output variables in respect of which the simulation is carried out. We defined indicators in our case: Net Present Value (NPV), Internal Rate of Return (IRR) and Profitability Index (PI) of the investment project. We selected the number of simulations as 50 000.

2nd risk factors for the project are the input variables and their uncertainty is respected in the shape of a probability distribution. These variables are labeled as Assumptions in the Crystal Ball system. In the case of two factors – the production volume and the price – these are not statistically dependent on each other and therefore may be generated independently during the simulation. The next pair of factors – the price and material costs – shows a statistical dependence and we have considered it in the simulation.

Estimated project life cycle is six years; the total number of risk factors is 13. We determined the number of simulation steps as 50 000 due to stable results.

Step 3 - Results of the simulation

Evaluation of the analysis: The values confirm that the present investment project is significantly profitable in variants A, B1 and C. The criteria values for the investment project for the various alternatives are shown in Tab. 6.

Table 6. The criteria for the different variants of the investment project

Variants	NPV (€)	IRR (%)	PI	DPP (years)
Variant A	264 481.60	16.64	1.22	4.94
Variant B1	161 066.56	13.87	1.13	5.34
Variant B2	-550 503.00	-4.90	0.54	10.10
Variant C	125 863.92	13.08	1.10	5.48

Results of Monte Carlo simulation for option B1 are shown in the graph of the probability distribution of the output variable Profitability Index (Figure 3). Results for other output variables - Net Present Value and Internal Rate of Return as well as their statistical characteristics are presented in Tab.7. Type of the probability distribution for NPV and IR we chose a Weibull distribution, for IRR it was Beta distribution.

Table 7. Statistical characteristics of selected indicators – Variant B1

Statistic / Indicators	Profitability Index (IR)		Internal Rate of Return (IRR)		Net Present Value (€)	
	Fit: Weibull	Forecast values	Fit: Beta	Forecast values	Fit: Weibull	Forecast values
Mean	1.040	1.042	13.73%	13.73%	154 822	154 839
Median	1.045	1.044	13.86%	13.87%	155 258	155 311
Mode	1.050	-	13.82%	-	156 163	-
Standard Deviation	0.510	0.500	4.15%	4.15%	4 362.19	4 307.70
Variance	0.2607	0.2509	17.22%	17.22%	19 028 713	18 556 319
Skewness	-0.9153	-0.5868	-0.1105	-0.1105	-0.5588	-0.5319
Kurtosis	4.44	3.76	2.96%	2.96%	3.38	3.57
Coeff. of Variability	0.490	0.479	0.302%	0.302%	0.0281	0.0278
Minimum	0.160	0.570	-160.77%	2.03%	123 992	125 350
Maximum	+ unlimited	1.215	107.76%	40.57%	+ unlimited	167 976
Mean Std. Error	-	0.000	-	0.08%	-	19

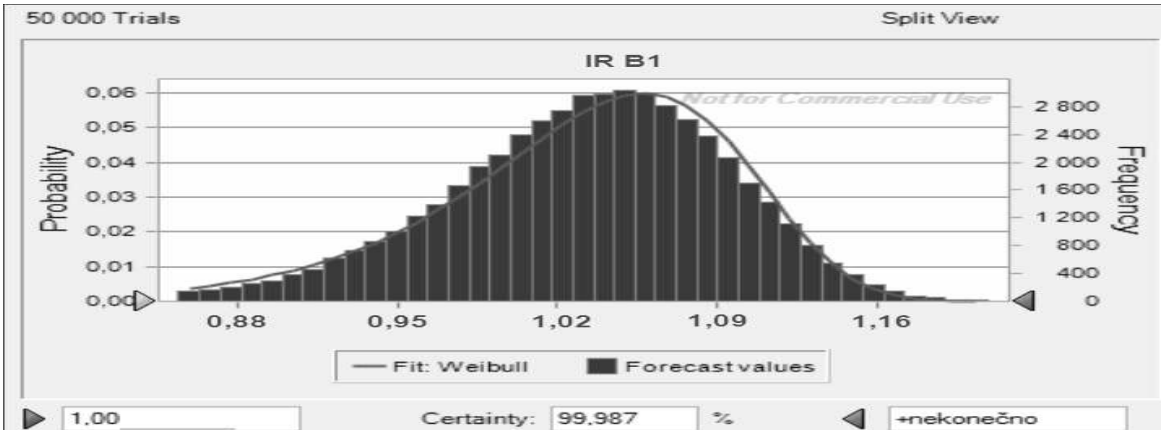

Figure 3. Probability distribution of the variable Profitability Index – Variant B1

Source: authors

The statistical characteristics of the NPV of the project in variant B1 show that the indicator Mean of NPV is 154 839 €, which is about 6 227 less than the estimated value of 161 066.56 € and the Median is 155 311 €. The risk characteristics of the project i.e. Standard Deviation is worth 24 910 €, Variance has a value of 18556 319 € and the Coefficient of Variability, which represents the quotient of standard deviation and the mean, is 0.1953. Skewness is negative, which means that the NPV probability distribution is not symmetrical (symmetrical is when the skewness is zero), but is skewed to the left, i.e. towards lower values. The minimum simulated value of NPV is from the Median distant than the maximum simulated NPV.

The continued influence on the wood production has the world economic crisis that that has been affecting Slovakia since 2008. The crisis was reflected in an increase in prices of input raw materials, rise in energy prices and fall in the demand for long-term products.

Evaluation of variants suggests that the growth of production could not be associated with growth of the project profitability because of the decline in selling prices and also increase in the cost of procurement of input materials and energy costs.

On the basis of the risk analysis of the project by Monte Carlo simulation the project is recommended for implementation. Using Monte Carlo method Option B1 of the project has been tested for which the probability of achieving positive results of net present value, internal rate of return and profitability index consistently is 99.9%. The identified risk is acceptable for Wood Ltd. Company.

CONCLUSION

Aim of the presented study was to identify factors that critically affect the expected profit from the investment project. The conclusions of the sensitivity analysis shows that assuming the implementation of the investment the economic result (profit) of the project was most strongly influenced by the selling price of the products and then change of the production volume, material costs and labor costs. Dynamic methods of economic evaluation of the project prove the project is profitable and there is sufficient maneuver space for the risk.

The risk which relates to the realization of the investment project is acceptable to the company and it is possible to recommend the implementation of the investment project.

The presented risk we recommend reducing through diversification. Diversification gives the possibility of increased width and depth of product range. Implementation of the project ensures the company Wood, Ltd. additional space for the investment development. New machining center will allow the company to produce also other construction-joinery products that will improve the competitiveness of the company and ensure its stability.

The appropriate form of risk reduction we recommend to increase the volume of the production provided the increased export of manufactured products to the EU markets or markets of Russia and Ukraine.

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PINEWOOD QUALITY POTENTIAL

Abstract: The scope of the article was to determine quality ratios based on the selected large-size and laboratory samples of coniferous pinewood obtained from the central part of Poland (Wieruszowski District), in order to evaluate the usefulness of those elements for wooden constructions. Physical and mechanical parameters have been determined which facilitated defining quality and endurance ratios of semi-finished products.

Keywords: pinewood, quality, strength tests, components

INTRODUCTION

Wood used mainly for construction and finishing elements is characterized with high endurance, small dead load, as well as the simplicity of processing. It is used as the material forbearers and parts of timber roof trusses also exploited in unfavorable weather conditions. (Krzysik 1978, Kokociński 2004). Companies specializing in timber construction develop through the implementation of new technologies what facilitates development and continuously overcoming the limitations concerning wood usage. In order to obtain materials of required technical parameters, complex endurance tests in accordance with the adequate norms are necessary. (Krzosek 2009, Wieruszewski et al. 2009).

PURPOSE AND SCOPE OF WORK

The aim of the paper was to establish quality efficiency ratio when processing large-size pinewood. The research was carried out in order to determine quality potential for the production of construction lumber through determining its physical and mechanical features. Under analysis also came the issue of usefulness of sawn materials obtained for production purposes and used as construction elements by building industry.

METHODOLOGY

Raw material for the research came from forest district Przedborów, sub-district Sokolniki, and it constituted of 8 logs which underwent cross-cutting, bucking and planking. As the result of those processes 32 solid flat-sawn and radial–sawn beams were obtained. Pine stand was 112 years old. Percentage share of tree classes looks as follows:

- Class A – 3%,
- Class B – 19%,
- Class C – 78% .

Material delivered to the sawmill where it was processed was not homogenous quality-wise. Quality presentation of the coniferous material delivered in 2011 shows that 85% of that material represented WCO class, and 12 % belonged to WBO class.

The tests of coefficient of elasticity were carried out in accordance with recommendations laid out in norm PN-EN 384: Construction wood. Marking characteristic mechanical features and density. Determining elasticity ratio at static bending. Measurements were done using endurance machine type: DM 2214 using instrumentation suitable for endurance testing. While determining coefficient of elasticity during bending the obtained data was used for calculating real values for samples of moisture content of 12%, in accordance with norms PN-EN 1912;2010.

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From large size samples, for further testings on endurance machine Zwick/Roell Z050, laboratory samples were obtained. Subsequently they underwent research of their mechanical features in accordance with PN-77/D-04103 norm „Wood. Determining endurance for static bending." and norm PN-63/D-04117 „Physical and mechanical features of wood and the results became the basis for the evaluation of quality of raw material from each sample as the indicator of material potential for usage in construction.

Laboratory samples underwent testing in order to determine main physical parameters of wood such as its density. Another physical parameter of wood, considered to be one of the most significant is its density which closely relates to the other qualities of that material. Density testing was done in accordance with norm PN-77/D-4101 „Wood. Determining density" and PN-EN 384 „Construction wood. Determining characteristic mechanical parameters and density".

RESULTS

Wood sawing density is among the most important physical parameters and it is also a factor having an impact on wood mechanical endurance. In the results (Fig 1) on pinewood density accounting for an average for the material under the research were presented.

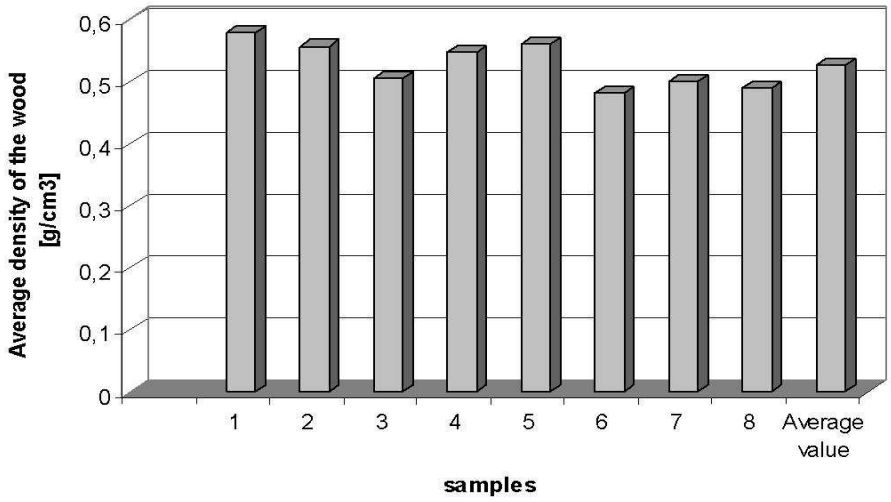

Figure1. Average wood density for individual samples

Above pinewood density depending on the type of log was presented. It may also be noticed that density ranges between 481 and 578 kg/m3. Testing of coefficient of elasticity was carried out on 32 large-size samples out of which 16 were flat- sawn and the remaining 16 radial-sawn. The arithmetic mean of that testing on coefficient of elasticity at absolute moisture content of 12% for both flat-sawn and radial-sawn raw material formed the basis for endurance classification in accordance with norm: PN-EN 338 „Construction wood. Endurance classes." Endurance class was determined and the adopted criterion was the result of average coefficient of elasticity and 5% quantile of elasticity module. Stress grading results were presented in table 2.

Therefore, solid pinewood large-size samples may be qualified as endurance class: C14/C20. Solid pinewood large-size samples show low mechanical values required for individual quality classes. Defects present in wood such as knots contribute to it to a large extend. Hence more and more often glulam is used as the material deprived of defects due to which coefficient of elasticity significantly increases.

Mechanical features which were tested on endurance machine Zwick/Roell Z050 were carried out on 64 laboratory pinewood samples representing quality of the material and the potential of obtained elements free from defects.

Table 2. Presentation of endurance classes for the results of coefficient of elasticity according to norm: PN-EN 338

(Wieruszewski et al. 2012)

strength class	Designations solid pinewood large-size samples							
	1	2	3	4	5	6	7	8
C14	Meets	Meets	Meets	Meets	Meets	Meets	Meets	5%
C16	Meets	Meets	Meets	Meets	Meets	5%	5%	5%
C18	Meets	Meets	Meets	5%	5%	5%	5%	5%
C20	Meets	Meets	5%	5%	5%	5%	5%	5%
C22	5%	5%	5%	5%	5%	5%	5%	
C24	5%	5%	5%	5%	5%	5%		
C27	5%	5%	5%	5%	5%	-		
C30	5%	5%	5%	5%	5%	-		
C35	5%	5%	5%	-	-	-	-	
C40	5%	5%	-	-	-	-	-	-
C45	-	-	-	-	-	-	-	-
C50	-	-	-	-	-	-	-	-

Meets requirements – given batch meets standard criteria
5% - 5% quantile of coefficient of elasticity meets norm requirements

Table 3. Assigning endurance class based on the results of coefficient of elasticity in accordance with the norm: PN-EN 338

Strength class	Designations solid pinewood laboratory samples							
	1	2	3	4	5	6	7	8
C14	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets
C16	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets
C18	Meets	Meets	Meets	Meets	Meets	Meets	Meets	5%
C20	Meets	Meets	Meets	Meets	Meets	5%	5%	5%
C22	Meets	Meets	Meets	5%	5%	5%	5%	5%
C24	Meets	5%	5%	5%	5%	5%	5%	5%
C27	5%	5%	5%	5%	5%	5%	5%	5%
C30	5%	5%	5%	5%	5%	5%	5%	5%
C35	5%	5%	5%	5%	5%	5%	5%	5%
C40	5%	5%	5%	5%	5%	5%		-
C45	5%	5%	5%	-	-	-		-
C50	5%	-	-	-	-	-	-	-

Meets requirements – given batch meets standard criteria
5% - 5% quantile of coefficient of elasticity meets norm requirements

To determine the quality of the material under the research it was decided to interpret such value as coefficient of elasticity. Average values which were calculated during the tests on mechanical parameters using endurance machine formed the basis for the evaluation and classification according to norm: PN-EN 338. Criterion which was adopted for the classification was the result of average coefficient of elasticity and its 5% quantile. Stress grading results were shown in table 3.

Out of all results of coefficient of elasticity for pinewood it may be concluded that the material from which the large-size and laboratory samples were cut out is not homogenous what can be observed looking at various technical parameters.

Solid pinewood laboratory samples show optimum mechanical parameters required for individual quality classes. Interpreting table 2 and 3 allows us to state that laboratory samples meet

higher requirements than large-size samples. Hence pine samples free from defects may be classified as C18/C24 in respect to their endurance.

CONCLUSIONS

Based on the research the following conclusions have been reached:

- The bigger the distance from the core on the cross section of the material from which the sample was taken the higher wood density. The density ranged from 481 to 578 kg/m3 at moisture level of 8%.
- The differences observed in coefficient of elasticity of various samples free from defects and solid samples are the results of potential assumptions of eliminating defects from the material through cutting and gluing in order to obtain large-size elements.
- According to the norm: PN-EN 338 solid large-size samples may be classified as C14/C18 (in reference to their endurance) and laboratory samples may be classified as C18/C24, hence there is visibly significant quality potential in processed pinewood.
- Knowledge of physical and mechanical parameters specified in the article for the material under the research allows for an adequate control system, which to a large extend, helps to forecast and clearly define quality and endurance parameters of semi-finished products.

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COMPARISON OF CALCULATION METHODS FOR THE PRODUCTION OF WOOD PELLETS IN TERMS OF SELECTED SLOVAK COMPANY

Abstract: Wood pellets are a high comfortable homogeneous fuel, which is wonderfully well-kept and it regulates the heat. Heating using wood pellets is a real alternative to normal (fossil) fuels and comfort is close to heating with natural gas. The main aim of the paper is to present the possibilities of calculation method in wood processing industry in Slovakia specializing in the production of wood pellets.

Key words: cost, calculation, absorption costing, wood pellets

INTRODUCTION

Every business needs to have very precise information about the structure of the costs of products offered and their reasons, if it wants to be competitive. Precise and complete information about the cost structure gives the company management a possibility to effectively manage and optimize processes and products. Costing and budgeting are among the most important tools in the value management of each company. Relatively wide range of tasks which relate to the calculation (deciding the amount and range of performances, pricing, and valuation of assets created by own activities, compilation of plans and budgets,), requires the creation of a complex system of individual types of calculations and relations between them, which form the so-called costing system of company.

Calculation is the way of determining the total costs of making and selling a product or providing a service. The calculation is possible to express as an activity. Its target is to find actual, alternatively planned (calculated) costs and the rest of pricing elements accrued to the calculating unit. Result of these activities is calculation. The calculating scheme has a certain integrated structure and it indicates the highness of costs and other pricing elements of the calculation. The term - calculation of the costs to outputs is understood in two ways [1]:

- as an activity determining the costs to outputs,
- as a result of this activity (concrete calculation of the costs to the calculating unit).

Costing represents the activity, which is calculated and in a certain structure reflects the cost of the products and services respectively in the performance of each company [5]. Its objective is to identify the actual or planned costs and other price components per calculation unit. The calculation according to the cost structure expressed in a calculation formula is classified according to the cost and price calculation [2].

The cost calculation represents highness of invested costs by valuation of their economic efficiency in individual sections of the company. The price of the final product will be determinate by their summary with the profit margin.

The price calculation endows the costs like they perform by selling prices of the products. It shows the costs from the aspect of the effectiveness of investing. This is so-called retrospective style of designation of the calculation.

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The allocation of costs is a process of assigning cost object calculation which is very closely connected with that, what is the amount and structure of overhead costs, i.e. the costs which cannot be directly expressed in the calculation unit. There are basic methods of costing for that. The calculation method is the method of determining, or finding cost incurred for the chosen subject matter of calculation. The wood processing industry enterprises are most frequently using costing calculation based on the method of dividing calculation and absorption costing calculation.

1. WOOD PELLETS

Few decades ago, the question of how to replace traditional heating ways emerged in the Western Europe. This is when the idea of a "liquid wood" – pellets came into life. The key issue to solve was how the wood provides for as comfortable heating as gas or oil. The solution is easy, however little weird at first: wood needs to be fluidised. "Liquid wood" called pellets was developed 20 years ago in Austria and Sweden [9].

Forest and sawmill residues, agricultural crop residues, and energy crops can be densified into pellets. Pellets are cylindrical, 6 to 8 mm in diameter and 10 to 12 mm long. Melin reports that in North America, more than 1.2 million t of fuel pellets are produced annually [4]. Most of the U.S. pellets are bagged and marketed for domestic pellet stoves. In Canada, pellets produced from sawdust and wood shavings are exported to European countries – Sweden and Denmark. Slovakia is starting to discover the benefits of pellet production, and this type of fuel does not have a dominant position in the market. The current consumption of wood pellets has not been good enough for domestic production.

Wood pellets are a group of clean renewable sources of energy for heating. It is the fuel of plant origin phyto fuel. Wood pellets have a cylindrical shape with a diameter of 4-20 mm and length 10 to 50 mm. There are two groups of pellets:

- Wood pellets are a fuel made of 100% natural domestic material. Main raw materials for pellet production are filings and shavings, i.e. a waste of wood processing industry. Pellet production is free of any chemical and synthetic additives. Lignin acts as a binder contained in the wood itself, which at high temperatures due to the influence of friction reaches the plastic state. Recently, wood pellets have been produced from the targeted fast-grown trees.
- Alternative pellets are made of straw (wheat, rye, soybeans, barley, peas, rapeseed) and agricultural waste (organic waste from industrial cleaning and drying of agricultural crops). The required strength and durability of alternative pellets obtained by the addition of waste rapeseed or sunflower seeds (2 to 3% of total) for straw and other agricultural waste for pelletising. This waste of oil reduces the energy consumption in production, prolongs life and improves the quality of pelletiser alternative pellets.

Wooden pellets make a perspective fuel of the present and future. They have a high heating capacity (more than 18 MJ/kg), burning process is clean and the produced heat can be very effectively used to heat hot and service water. Perfect burning makes a minimum ash content, not containing any harmful substances, which can be used as a fertiliser due to its nutrient content. The main reasons for heating with wood pellets are [7]:

- ✓ higher energy efficiency
- ✓ high heating capacity (up to 19 GJ/t)
- ✓ low ash content (to 1%)
- ✓ low water content (to 8%)
- ✓ low storing capacities demands (approx. 650 kg/m3)
- ✓ fully automatic operation and regulation
- ✓ low production of emissions from burning

- ✓ affordable price per a produced heat unit
- ✓ fully-fledged compensation for other fuels
- ✓ not dangerous in case of accidental burner overflow
- ✓ renewable energy source for heating

Wooden pellets are made by pressing the input material in forming presses. Starting material such as sawdust bark, which when burning debris creates a high ash content. Then clean and dry sawdust under high pressure extruded through small round holes with stainless steel, and was heated to 100 ° C. Cellulose, which is located in the wood due to temperature softens and becomes sticky. This allows compressed sawdust pellets into shape without adding any chemicals or synthetic additives.

Prices for heating using pellets can be compared with other forms of heating. Figure 1 presents basic information about the average annual cost of heating a house with an annual consumption of 100 GJ of heat, which is 27.8 MWh by the association of legal persons Biomasa [8].

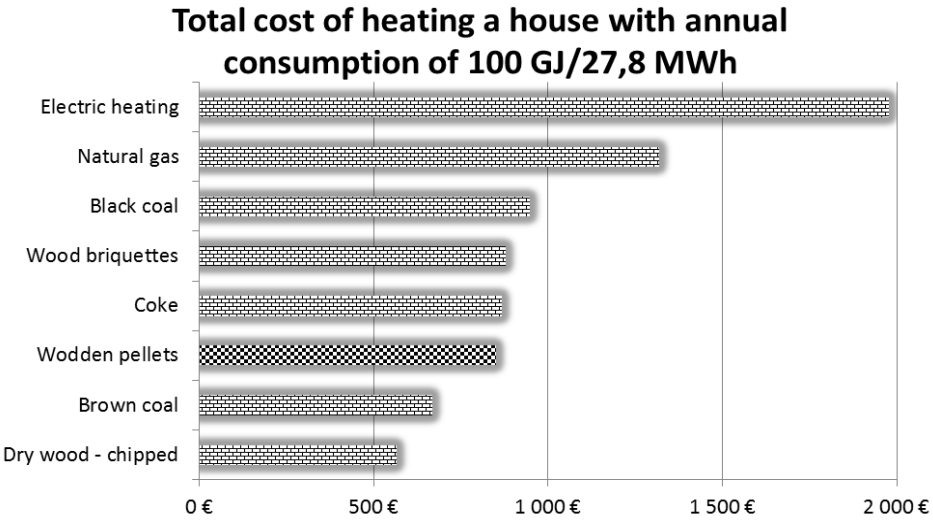

Figure 1. Average annual cost of heating a house with consumption of 100 GJ/27.8 MWh [6]

2. SUITABLE CALCULATION METHODS FOR DETERMINING THE PRICE OF WOOD PELLETS

Absorption costing is also referred to as the full cost method (in many specific methodical variations – for example dividing costing, join product costing, absorbing costing or standard cost method). Accumulates only product costs, direct and indirect, to measure product cost. The gross margin (under absorption costing) is sales revenue minus all product costs, including applied fixed manufacturing overhead. Absorption costing averages all product costs across units produced. When there are large amounts of committed or fixed costs, making more units reduces the average cost per unit, which may be a visible number. Also, placing some units in inventory defers all the costs of those units from being recognized as expense, which could increase currently reported income.

The absorption costing methods (also Full Costing) is an inventory valuation that includes all manufacturing costs [3]:

- direct materials - those materials that become an integral part of finish output and can be conveniently traced into it.

- direct labour - those factory labour costs that can be easily traced to individual units of product by norm of hours.

- both variable and fixed manufacturing overhead in the costs of a unit of product. These costs are transformed to the product by margin of manufacturing overhead by the suitable cost allocation base.

In practice, there is possible to find and use most basically two types of cost allocation bases [1]:

- Natural allocation base (quantitative): unit quantities of the processed material (given in kg m3, m2) units of time (in hours of work the employee, machine hours, standard hours). This type of allocation base excludes the impact of price inflation effects, but their problem is more difficult to detect evidence of previous periods, or performing specific economic and technical analyzes.
- Monetary allocation base: the value of direct materials, direct wages and production costs are determined in monetary terms. Their detection is relatively simple and accurate accounting records of the documents, but their problems are caused by frequent changes in exposure time inflationary effects.

Dividing calculation is used in cases where the costs for a certain period of time or for a certain amount of production are covered by one uniform type of performance. There are in particular the productions of pellets, briquettes, while the methodology can be applied also in specific cases, the processing of the logs by cutting on uniform type of timber in the timber industry. This method of calculation allocate to the costs to performance on the basis of ratio relation of the joint expense (with the possibility of their quantification in the type-cost groups) to the quantity of calculation units.

Costing methods which result from a specific cost group and do not regard all cost items belong among non-absorbent costing methods. This calculation can be specified as incomplete (variable) costs calculation. The variable costing method (also: Direct Costing or Marginal costing) is an inventory valuation that includes only the variable manufacturing costs:

- direct materials (those materials that become an integral part of finish output and can be conveniently traced into it
- direct labour - those factory labour costs that can be easily traced to individual units of product by norm of hours.
- only variable manufacturing overhead in the costs of a unit of product. This cost are transformed to the product by variable margin of manufacturing overhead

An important value is determining the level of contribution margin, as a difference between the price of product and variable cost or gross margin, as a difference between the price of product and direct cost.

The cost of pelleting includes fixed (capital) and operating costs. The purchase cost of different equipment was collected from the manufacturers and published literature sources. According to important world experts state that biomass pellets can be economically produced with a production cost of $51/t, assuming a raw materials cost of $10/t and drying biomass from 40% to 10% moisture using dry shavings as fuel [3]. In the production of wood pellets costs are several times higher. Raw material and personnel costs are the major cost factors in the cost of pellet production followed by dryer and pellet mill costs. An increase in raw material cost substantially increases pellet production cost. Scale of the plant, burner fuel options, and the fuel cost had a significant influence on pellet production cost.

3. CASE STUDY

ROYAL PELLETS Company Ltd. was founded in 2010, after taking firm commitment Italian Design, Ltd. Head of the company itself as well as the production line is located in Trenčín. The

company, which main business is processing logs to lumber decided for by-products (sawdust, bark and shavings) utilized in the production of wood pellets, which then wants to be marketed as a stand alone product newly established subsidiary. The Company provides for pellet production line fully automated modern Italian production. Monthly pellet production capacity is around 500 tons. Manufactured pellets meet high standards Austrian standard Ö - M7135 and German norm DIN plus. ROYAL PELLETS company uses for its product only material from Slovakia.

The problem of costing is that the company does not use its own calculations and prices of its products determined by the price of competing manufacturers. At the basis of the information from financial accounting we are creating generated gross budget of cost for one year, for the calculation. Limiting cost groups are: cost of materials (sawdust, wood shavings at the price 11.4 € for space meter- s.m.), labour cost for 6 employees including statutory contributions amounting to 35.2%, fee for the rental of premises, land and machinery, energy costs, including electricity and gas, amortization of fixed assets and other cost (financial cost, telecommunication etc.)

Projected budget costs in each period of one year, presented in Table 1. Company plans to produce in the period 2 160 tons of wood pellets, and the idea sale price includes a profit of 10% return on cost. Calculation unit is high capacity bag (big bag) weighing 1 ton of wood pellets with a length of 2-5 cm with a diameter of 6 mm.

Table 1. Budget cost for wood pellets production

Cost item	monetary base
- cost of materials (sawdust, wood shavings) 14.650 s.m. (11.4 € / s.m.)	167 000 EUR
- labour costs (including charges) for 6 employees	56 400 EUR
- rental (production + storage. space) + energy(technology + service)	72 800 EUR
- amortization (line technology, cars, press, packing machine)	24 600 EUR
- other costs (fuel, insurance, interest, telecom. services, accounting)	22 800 EUR
Total	343 600 EUR

The aim of the case study is to compare the two most common methods of calculation methodology. This is specifically a dividing calculation methodology and absorption costing with methodology of sharing by the used of monetary allocation bases.

Dividing costing:

Material costs	(167 000 EUR / 2 160 t)	77.31 EUR/t
Labour cost	(56 400 EUR / 2 160 t)	26.11EUR/t
Overhead costs	(120 200 EUR / 2 160 t)	55.65 EUR/t
Total own costs		159.07 EUR/t
Profit (10% return on cost)		15.91 EUR/t
Price without value added tax		174.98 EUR/t
Value added tax (20%)		35.00 EUR/t
Selling price with value added tax		209.98 EUR/t

Absorption costing

The schedule for the selection of monetary base is determined by the percentage of overhead surcharges as follows:

$$\text{Percentage margin of overhead cost} = \frac{\text{Total overhead costs} \times 100}{\text{Value allocation base (material /labour cost/)}} \ (\%) \ (1)$$

Alternative 1: allocation base material cost
Percentage margin of overhead cost = (120 200 x 100) / 167 000 = 71.98 %

Alternative 2: allocation base labour cost
Percentage margin of overhead cost = (120 200 x 100) / 56 400 = 213.12 %

		Alternative 1		Alternative 2
Material costs	(167 000 EUR / 2 160 t)	77.31 EUR/t		77.31 EUR/t
Labour cost	(56 400 EUR / 2 160 t)	26.11EUR/t		26.11EUR/t
Overhead costs	(71,98 %)	55.65 EUR/t	(213,12%)	55.65 EUR/t
Total own costs			159.07 EUR/t	
Profit (10% return on cost)			15.91 EUR/t	
Price without value added tax			174.98 EUR/t	
Value added tax (20%)			35.00 EUR/t	
Selling price with value added tax			209.98 EUR/t	

The results of the calculations we can conclude that the determination of selling prices in the production of wood pellets as a homogeneous production, selection of calculation method and schedule basis is important, but the decisive factor is the structure and value of individual cost items. Selling price calculated in all cases at 209, 98 EUR / tone of wood pellets with value added tax.

Without the application of cost sharing for fixed and variable, it is impossible to apply a system of calculation of variable costs in calculating the contribution margin. Therefore, based on the disposition of the case study data, we apply the principle of incomplete cost calculation with the calculation of gross margin (as a difference between the price of product and direct cost).

Price witout value added tax	174.98 EUR/t
Direct cost (material cost, labor cost)	103.42 EUR/t
Gross margin	71.56 EUR/t

Gross margin is important information for decision making. This value informs how much the product contributes to covering of overhead costs and generate profits. Meaning, however, shall in particular for heterogeneous productions.

FINALIZATION

Slovakia is starting to discover the benefits of pellet production, and this type of fuel does not have a dominant position in the market. Problem of Slovak producers is that the prices of wood pellets are determined by the market prices of foreign producers. The main aim of the paper is to present the possibilities of calculation method in wood processing industry in Slovakia based on the case study of selected company.

The pelletization of biomass consists of a series of unit operations: drying, size reduction, densifying, cooling, screening, and warehousing. Pellet production cost for a base case plant capacity of 500 t/month. Raw material cost was the largest cost element of the total pellet production cost (48.6%), followed by overhead cost (35%) and labour cost. It is possible state that the determination of selling prices in the production of wood pellets as a homogeneous production,

selection of calculation method and schedule basis is non-important, but the decisive factor is the structure and value of cost items.

Pellet heating is considered to be a CO2 neutral and having a considerable contribution to the air protection. People using wooden pellets for heating do not contribute to the global climate change and at the same time they help reduce the global warming and prevent other natural disasters. Before you decide for a certain energy source, you should compare investment costs to heating costs and take account of their probable development. This is the way how to easily calculate the pellet heating costs [8]:1 kg of pellets contains approx. 4,8 kWh of energy,1 m3 of oil correspond to approx. 2,1 ton of pellets, 2.1 ton of pellets correspond to approx. 8-10 m3 of lump wood. Transition from oil or gas heating to pellets would save up to 35% per a family house. However, the main “end user” is our environment and future generations.

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WOOD SUPPLY IN POLAND IN RELATION TO THE EXPECTATIONS OF WOOD INDUSTRY

Wood, xylem (ksylos in Greek means wood) is the name for a compound heterogeneous plant tissue which is created in the process of vascular plants growth. Depending on the fundamental directions of its anatomy (longitudinal radial, longitudinal tangential and transverse) it manifests various mechanical characteristics. As an organic renewable resource, it has been accompanying people on everyday basis since prehistoric times. Civilization development has also promoted wood utilization as a resource essential for distinct areas or developing industry. It has been currently estimated that wood is used in over 10 thousand applications[32.] The versatility and in numerous cases even irrevocability of wood usage makes it a highly desirable resource. Its temporary shortage causes many conflicts between the sellers and the buyers as well as the recipients themselves.

MONOPOLY OF THE STATE FORESTS NATIONAL FOREST HOLDING

According to the data of Central Statistical Office the area of forests in Poland currently amounts to 9 329 thousands of square hectares. Due to the subsidies which were implemented in Poland following our accession to the European Union and which embraced farmers who decided to plant forest on their grounds the ownership structure of Polish forests has recently changed. From year to year there has been a small increase in the share of private forests. Even though privately owned forests currently account for over 18% of the total forest area in Poland (table 1), those forests are very fragmented and individual owners hardly ever possess forest area large enough to justify implementing rational forest policy. In our country the domineering model is the one where forest only accompanies the main farming activities „An average area of private forest amounts to 0,54 ha, while an average forest area at a farm is over twice that size approximately 1,30 ha."[33] In such situation private forest owners are not really interested in active forest management. Additionally they do not possess specialized equipment which forces them to use expensive services of external companies or do that themselves which does not favor rational sales of possessed wooden resources. Most frequently it is being used for their own purposes especially as a heating fuel. Such management induces the situation where supply of round wood from private producers is marginal and annually amounts to 3-4% (Table 2). Resources from private forests are treated by wood recipients processing them further as an additional source of cheap round wood which does not have any significant impact on the production of the majority of those recipients.

Analyzing table 1 and 2 – one may state that due to its forest area owned as well as average annual size of round wood being possessed, which amounts to approximately 95% of wood supply State Forests National Forest Holding may be considered an undisputed monopolist and in many cases it is the sole wood provider (natural monopolist). Due to its substantial dominance in the supply of wood onto domestic market State Forests National Forest Holding fully controls wood sales in Poland. Moreover, despite the fact that forests are owned by Polish State Treasury according to §8 paragraph 1 point 5 of National Forests Status which has been binding as of 18th May 1994 , (…)„General Director determines especially: (…) the rules of wood sales by National Forests".(…) That record clearly establishes that the supreme right to set the rules concerning wood

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sales is the sole responsibility of National Forests General Director, who while making such important decision has a special duty to take into account the needs of wood industry.

Table 1. Forests ownership structure in %

Elements	Year									
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
	[%]									
Public in total, including:	82,6	82,6	82,5	82,5	82,3	82,2	82,1	82,0	81,8	81,5
those under State Forests management	78,3	78,3	78,3	78,3	78,2	78,1	78,0	77,9	77,8	77,5
Private	17,4	17,4	17,5	17,5	17,7	17,8	17,9	18,0	18,2	18,5

Source: Leśnictwo 2011, Central Statistical Office, Warszawa 2011

Table 2. Wood acquisition

Elements	Year					
	2000	2005	2007	2008	2009	2010
	[thousand m³]					
Total, including:	27659	31945	35935	34273	34629	35467
Merchantable bole, including:	26025	29725	34146	32407	32701	33568
Public forests, including:	24593	28601	32797	31159	31612	33568
Those owned by Polish State Treasury, including:	24446	28472	32657	31011	31482	32325
State Forests National Forest Holding	24097	28164	32314	30695	31188	31882
National Parks	231	198	234	216	192	201
Owned by communities	147	129	140	147	130	131
Private forest	1432	1124	1349	1248	1089	1243
Small-sized timber	1634	2200	1789	1866	1928	1899
Rootwood	0,3	0,2	0,1	0,1	0,2	0,1

Source: Leśnictwo 2011, Central Statistical Office, Warszawa 2011

STATE FORESTS NATIONAL FOREST HOLDING WOOD SALES RULES

Until 2006 practically the only form of wholesale of round wood in Poland was through trade negotiations and contracts were signed with individual forest districts, regional or general directorates . In case of the sales of the most precious type of wood periodical submissions have been and still are in practice. In 2006 new rules of wood sales were introduced – forest and wood portal was set up and an Internet system of wood sales was implemented by State Forests. Its aim was to bring along a full transparency of all operations related to wood trade. Its authors also assumed that it should have diminished the so called gray area in the sales of that product. During the subsequent years of sales carried out via that Internet tool the process has been undergoing

various changes and modifications. In its current form it provides wood sales for clients representing wood industry in the following stages:

- Internet limited auctions on forest and wood portal are informally called “portal”. Since 2009 such auctions have been organized every six months and they are restricted only to those clients who have a so called “purchase history”; that is they bought round wood from State Forests in the previous year.

- System Internet auctions using application called: „e-drewno”, are referred to as „e-system auctions”. They are also organized every half a year. They have a form of open internet auctions which can be attended by every company or an individual following deposit payment.

- Internet auctions in „e-drewno” applications are informally called „e-drewno”. Those in terms of rules governing them are identical with system Internet auctions and the only difference is that they are organized very irregularly throughout the whole year.

- Other auctions and submissions – are open auctions of especially valuable types of wood (such as veneer wood). Sales are often very individual in nature as they may concern one log only.

Wood sales system in Poland has been and still is causing a lot of controversies and conflicts between State Forests and representatives of wood industry. Wood industry has been continually accusing State Forests of monopolistic practices on the side of wood supply. The decisions of present State Forests Director , who this year appointed an advisory group consisting of the representatives of various wood industry sectors as well as National Forests brings along a lot of optimism. This group drafted a project of changes in the current system of wood sales, which apart from a series of facilitations for the buyer also envisages the implementation of long-term contracts for wood supply which should result in at least partial stabilization of wood market in Poland.

CLASSIFICATION OF TIMBER OFFERED BY STATE FORESTS

State Forests offer merchantable timber in four basic trade categories that is: small-sized timber, medium-sized timber and large-sized timber as well as rootwood. Individual sectors of wood industry try to adjust the profile of its production to the resources available on the market. However even at this stage there have been conflicts of interest being the result of the possibilities of using the resources on offer, for example on one hand energy industry is able to use the whole volume of timber sold (and burn it all), while on the other hand for the production of veneer or lathed elements there is a demand for a specially selected material.

Small-sized timber so called „slash”. It’s characteristics are diameter up to 7 cm with bark at a lower, thicker end, sufficient snagging and allowing for the majority of faults among them large curvature and fall-off. This material is offered in a form of pole-wood and slash assigned for heating. Elements classified within that group are used mainly by pulp and paper industry as well as the sector of wood-based materials and for heating purposes. All of that influences its price which in comparison with the remaining trade groups is the lowest. With an exception of M1PO (small-sized coniferous timber assigned for mechanical processing) – it is material obtained in small quantity, specialty selected for specific characteristics used by the producers of garden architecture for lathed elements and its price often exceeds the price of large-sized timber.

Small-sized timber used by pulp and paper industry and the sector of wood-based materials during processing is being further fragmented into chips. In that case one can state that there are no significant differences between the recipients’ expectations and the products offered by State Forests. The most controversies arise from a large number or curvatures and defects in snagging, which has negative effects on material efficiency as well as the possibility of optimal usage of transport space which significantly increases the overall costs of transport.

Medium-sized timber (S), is the material of top diameter (at a thinner end) without bark of 5 cm and more. Depending on the harvested material it is measured individually in groups or piles. The most typically offered material is a so-called „pulpwood”, which can be obtained on the market

in S2A standard (that is medium-sized timber for industrial usage) and S2B (medium-sized usable timber). Division into material S2A and S2B was introduced a long time ago but only this year, present General Director of State Forests issued a directive number 34 dated 17 April 2012 which regulates standard technical requirements for both groups of material. Currently it may be stated that this directive finished a conflict that lasted for many years and related to the quality and measurements of medium-sized timber: S2A and S2B offered by State Forests and a compromise has been found that was accepted by both the seller as well as the buyer.

The remaining elements from that group of medium-sized timber, yet offered by State Forests in significantly lower quantities are: S3 (poles), S4 (fuel wood), S10 (mine-timber) and S11 (pillars). Wood material from that category is used in pulp and paper industry, sector producing wood-based materials and only recently in wood industry sectors producing wood garden architecture and pallets.

Large-sized timber (W) is the material of top diameter (at a thinner end) from 14 cm without bark, measured in individual units or in case of logged wood, due to the onerousness of so called „individualized "[34] receipt an alternative receipt in piles just like in case of medium-sized timber is also accepted. In a group of large-sized timber there are two subgroups: large-sized timber for general usage and special large-sized timber .

In case of the latter one, that is so called material with choice, which constitutes timber classified as valuable (informally called: veneer, plywood, match-stock, tele-energetic or tele-technical wooden pylons) there have not been any major complains concerning its form and quality as it is regulated by clear norms which have been accepted by both the recipients and State Forests.

The most controversial has been material from large-sized timber assigned for general usage called W_STANDARD, in case of which there have been major discrepancies between industry expectations and what State Forests have been offering. In terms of its quality as well the length and class. The recipients of that material are mainly: sawmills as well as the producers of wood garden architecture who due to the character of their products expect certain features from the round wood which they purchase. Also the wood packaging industry especially pallets sector uses in its production approximately 20% of large-sized timber of lower quality classes (C and D; 80% of it is pulpwood = that is medium-sized timber: S2A and S2B). On one hand the material should meet their quality standards on the other it should have acceptable price.

In group: W_STANDARD there are 4 quality classes (A, B, C, D) and 3 classes related to thickness (1, 2, 3), which in total make up 11 types of material. The best and simultaneously the most expensive quality classes A and B constitute on average up to 20% of the material offered in W_STANDARD; while the differences in prize between the subsequent quality and size classes amount to a dozen to several dozens PLN. Quality class C meets both the expectations of sawmills as well as producers of garden architecture[35]. Receipt of material in quality classes: A, B and D exposes them to unjustifiable economic loss, as the products manufactured using material from quality classes A and B (a much more expensive material) will not be obtained at a higher cost and the material from class D, due to its acceptable defects – in many cases does not meet sawing criteria . It can be stated that each quality group of large-sized timber offered individually would find its recipient as timber of A and B class is a highly demanded by the producers of plywood and veneer and class D may be successfully used by pulp and paper industry as well as the producers of wood-based materials.

Sales of merchantable timber of W_STANDARD in its current form is convenient only for the sellers as it saves them costs and problems related to separation of large-sized timber which becomes a sole responsibility of the buyer. A kind of solution for this problem seems to be a gradual

[34] *Method of receiving round wood based on individual assessment and receipt of each unit. – annotation by Z. Stanula*
[35] *Informal name used for production of garden architecture made of wood. Annotation by S.Bieńkowski*

introduction of logged wood into the sales of State Forests. However the one being currently on offer only partially meets the expectations of sawmill industry (very rarely being available in quality classes A, B and D). It is offered in individual lengths in thickness classes. The buyer bearing in mind the variety of its products is not able to use the whole of the purchase in an optimal way. Therefore part of that timber is sawn with a substantial material loss. Also the quality of logs on offer seems to be far from ideal as in majority of cases they are possessed by harvesters. Very often during machinery operations some of the logs are being incidentally debarked which deprived of its natural protective layer in a form of bark significantly faster due to changeable Feather conditions loses its value.

Rootwood (K) is a material possessed in marginal quantity (from 100 to 200 m³ per year - table 2). It is obtained from whole rootwood – it is so called stump wood or splint rootwood divided into chips.

Sales of merchantable timber in Poland currently induces a lot of emotions both on the side of the seller as well as the buyers. The most controversies arise from the conditions of sales as well as the quality and division of the material offered. Negotiations between the representatives of State Forests and wood industry that have been carried out for a long time now have been gradually bringing positive results what was proved by introducing in 2012 basic technical standards for medium-sized wood: S2A and S2B as well as determining changes that will be binding as of the beginning of 2013 in currently used sales regulations which in a way threaten both the interests of the seller as well as the buyer. Unfortunately, there have still been many debatable issues that require further talks and negotiations. Let us hope that in the future they will be solved and stabilization in the unstable wood industry will be achieved.

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Edita Szombathyová, Jaroslava Janeková, Andrea Krauszová[36]

OPTIMISATION OF RELATIONSHIPS IN WORK SYSTEM

Abstract: The goal of solving relationships in the system „human – machine – environment" is reaching the optimal functionality of the system at minimal costs so that well-being, health protection and safety of human at work may be maintained. In this article is introduced a simple model which can be utilised at optimisation of work position as well as workplace as a whole. The solution is proposed so that it may respect the basic ergonomic criteria.

Keywords: workplace, work system, optimisation, work comfort, value analysis.

INTRODUCTION

The work system comprising human, machine (technique) and environment is a complex unit the optimal functioning of which is based on investigation and solution of different criteria influencing the given system. If these criteria do not reach the necessary values, it is inevitable to take measures and propose alternative solutions for elimination of problems. The optimal solution requires also enumeration of costs connected with technical, organisational or other measures.

WORK SYSTEM

The unit composed of human, machine and environment does not consist only of individual elements, but also of connections between them. Individual elements of the system together with mutual connections create a new quality with specific features and values. Criteria of system human – machine – environment should reach values which assure such adjustment of work for human that the damage of human health may be prevented and simultaneously the given work may be performed effectively. It is necessary to respect these criteria in the phase of planning of the system, because corrections of already existing and functioning systems are economically unfavourable.

Criteria for planning or optimisation of existing work system can be divided as follows:

- Dimensions of workplace:
  1. minimal workspace area,
  2. height of manipulation (working) plane,
  3. area of reach of upper limbs,
  4. area of reach of lower limbs.
- Work position:
  5. appropriateness from the point of view of performed work activity,
  6. location of controls within the reach of limbs (while respecting the basic work position),
  7. location of indicators within visual field of worker (while respecting the basic work position),
  8. possibility of change of work position during short breaks at work,
  9. prevention of physiologically unfavourable work positions.
- Work movements:
  10. enabling change of activities of individual muscle groups,
  11. respecting of economy of movements.
- Workload:

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12. observing limits at manipulation with burdens,
13. equipment of workplace with mechanisation.

- Action of harmful factors of work environment:
  14. respecting valid Slovak Technical Standards, regulations and other measures,
  15. screening control of permitted values of factors.

Optimal arrangement of relationships in work system contributes to work comfort and utilisation of working capacity of worker. At the same time it decreases the negative health action of technical equipment and technologies as well as the harmful factors of working environment.

POSSIBILITIES OF OPTIMISATION OF WORK SYSTEM

For optimisation of work system a model was created, which respects the basic ergonomic criteria. The proposed model consists of several steps (Fig. 1):

Creation of workplace with utilisation of anthropometric data (utilisation 5, 50 or 95 percentile according to character of work activity).

1. Respecting the size of visual field including uneven perception of colours.
2. Specification of outreach area for work of upper and lower limbs.
3. Respecting of permitted limits for physical, mental and sensory load.
4. Specification of factors of working environment and decrease of their harmful action.

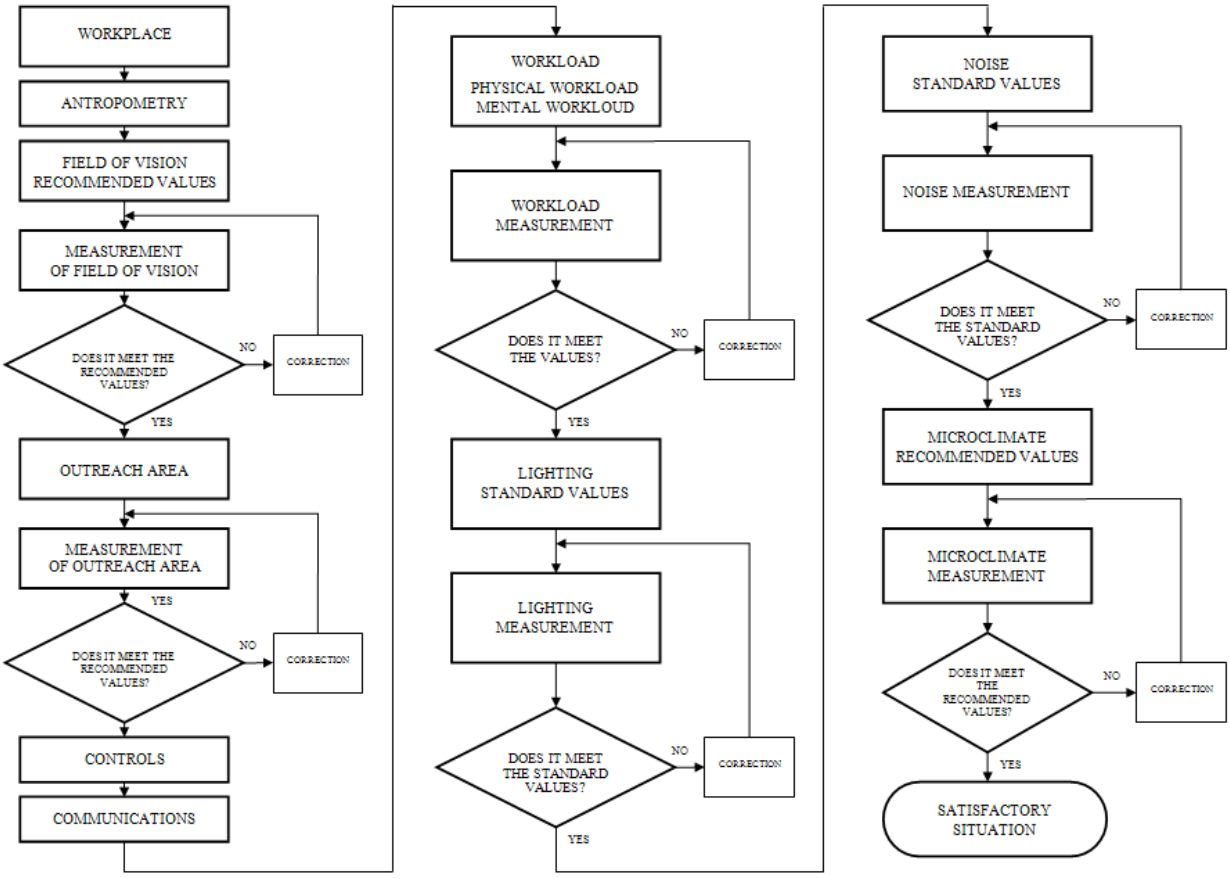

Figure 1. Model of optimisation of work system on the basis of ergonomic criteria

Source: own elaboration

Individual components of the model contain specific data which are usable for its application at planning or optimisation of the workplace.

The model is elaborated in the form of a simple program which is usable in practise. A part of the program is the database of valid Slovak Technical Standard, regulations of the Ministry of Health of the Slovak Republic and Directives of the Government of the Slovak Republic or recommended parameters according to professional literature.

The selection of regulations and standards, which are valid in the Slovak Republic for individual ergonomic criteria, can be found in Tab. 1

Table 1. Ergonomic criteria and regulations for their measurement and assessment

Criteria	Regulations	Brief characteristics
Antropometry	TNICENISO/TR 7250-2	Statistical reviews of dimensions of human body in individual populations of member countries of ISO.
	STNENISO 14738	Anthropometric requirements for proposing of workplaces at machines.
	STNEN 547-3+A1	Anthropometric data.
Perimetry	STNEN 894-4	Location and arrangement of displays and controls.
Outreach area	Notice No. 542/2007	Area for movements of hands at work in standing position and sitting position. Area for legs.
Controls	Notice No. 542/200.	Types, shapes, positions and the manner of control.
	STNEN 60073:6/2002	General rules for allocation of certain meanings to individual controls.
	STNEN 894-3+A1	Controls.
Communications	STNEN 60073:6/2002	General rules for allocation of certain meanings to optical, acoustic and other communications.
Workload	Notice No. 542/2007	Protection of health against physical, mental and sensory load at work.
	STNENISO 10075	Ergonomic principles in relation to mental workload.
	STNENISO 10075-3	Principles and requirements for methods of measurement and determination of mental workload.
Lighting	STNEN 12464	Lighting of workplaces.
	Notice No. 541/2007	Values of maintained illumination on workplaces.
Noise	Government Regulation No. 115/2006	Limit and action values of noise exposition.
Microclimate	Notice No. 544/2007	Protection of health against load of heat and cold at work.

Source: own elaboration

For correct functioning of the model of optimisation of work system it is necessary to check and update the validity of regulations for individual ergonomic criteria. It is possible to utilise the model also for partial solution of problems in system human – machine – environment, for example solution only of the field of work load or individual factors of working environment.

ECONOMIC ASSESSMENT OF OPTIMISATION OF WORK SYSTEM

Selection of optimal solution of work system can be realised by help of value analysis, which is based on two basic principles: analysis of object function and analysis of costs invested to assure this function. Both principles are included in complex criteria of object effectiveness (relations (1), (2).

$$E = \frac{\sum_{i=1}^{n} {}^{\circ}F_n}{\sum_{i=1}^{n} N_n} \qquad (1)$$

$$\sum_{i=1}^{n} {}^{\circ}F_n = \frac{Measured\ value\ of\ illumination}{\uparrow Standardized\ value\ of\ illumination} + \cdots + \frac{Measured\ value\ of\ noise}{\downarrow Standardized\ value\ of\ noise} \qquad (2)$$

Where:

E - rate of effectiveness of new value of product, service, etc.,
°Fi - functionality of new utility value = expectations,
Ni - costs for assurance of new utility value,
n - number of monitored criteria.

The result is a number which can be assessed only by comparison with a similar object or proposed alternative solution.

CONCLUSION

The rate of effectiveness of new utility value, i.e. adjustment of parameters of workplace, optimisation of work load and adjustment of individual factors of working environment to permitted values (expectations) can be increased as follows:

- increase of functionality by increasing the level of fulfilment of some or all functions of the object at maintaining costs necessary for fulfilment of these functions,
- by simultaneous increasing of functionality and decreasing of costs,
- by significant increasing of functionality at moderate increase of costs.

The advantage of value analysis lies in the unity of technical and economic thinking without subordination or super ordination of one above the other.

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Peter Trebuňa – Milan Fiľo[37]

METHODS FOR MODELING BUSINESS PROCESSES

Abstract: Constantly increasing demands for experimental modeling of engineering processes across the board helps fill a very powerful computer. Despite this fact, it is extremely important to find and verify the mathematical model, which actually corresponds to reality. This allows you to perform difficult analysis of observed values observed phenomenon. By this purpose, we need to design methodologies for modeling which is the aim of presented article.

Keywords: methodology, modeling, process, ARIS, MMABP, BSP

INTRODUCTION

Understanding the problem for our efforts is that we will facilitate decisions about the correctness of hypothesis.

The work that we perform is then reduced to the following:

- finding sufficient information for decision making,
- formulation of reasonable requirements and issues that we want to answer,
- selection of the correct method of modeling a particular process.

Enterprise modeling captures, shapes, visualizing knowledge, skills and knowledge to add value to the business, describes the needs of business affairs, functions, behavior, information, resources, organization, economic or other aspects of the enterprise as the basic economic and legal form of organization of production, trade services and economic systems based on commodity-money relations.

REASONS FOR MODELING

Reasons for modeling are:

- diagnosis of failures and irregularities,
- restructuring of the business unit as a whole in order to improve performance,
- reengineering processes,
- wide range of system integration,
- tune the organizational structure given the changing business environment,
- compliance with standards, implementation of quality management.

Business model cannot be monolithic, but a group, cluster models, the company views from different angles.

Modeling business processes allows us not only to analyze and monitor processes, but mainly is focused, organized and efficiently uncover new opportunities to improve the business.

The process approach to the introduction of knowledge management in the company can transfer the knowledge and business processes.

The basic principles of this approach are as follows:

- linking information and knowledge from those who have to those who need to be implemented in knowledge flow accompanying the activities of business processes.
- Information and knowledge are brought into the process in many ways, especially by workers, but also of information and knowledge bases, it is important to perceive the context of the process.
- Knowledge of the most cumulative points in the decision-making processes.

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- Knowledge of practical significance only if it leads to effective action, thus to improve decision making within a business process.

THE TYPOLOGY OF METHODOLOGIES

1. ARIS - Architecture of Integrated Information Systems. The author is professor of methodology A.W. Scheer of the University of Saarbrücken. The methodology does not define the exact procedure, rather it is a set of insights and tools, which is shown in Fig. 2, which is used for modeling various aspects of existence and operation of the company, including the processes.

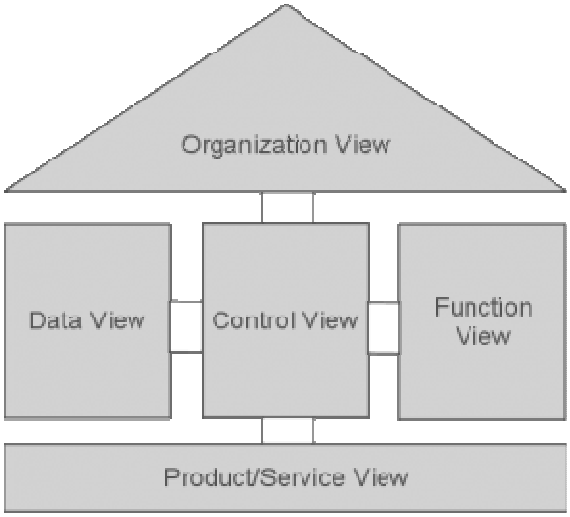

Figure 1 Two main views of ARIS methodology

2. Methodology BSP: BSP methodology was introduced by IBM in 1981 as a method designed to analyze the proposal and called enterprise information architecture, the design and implementation of the IS.

   Information architecture should:

   - support all processes in the enterprise,
   - respect the organizational structure,
   - meet all short-and long-term information needs of the organization.

   BSP methodology defines 14 basic steps:

   1. Getting the award (contract) by senior management, resp. depending on the extent of the department.
   2. Preparation of studies, that is to say setting the schedule, meeting documents, and the selection of managers.
   3. The study.
   4. Defining business strategies.
   5. Defining business processes.
   6. Defining data classes.
   7. Analysis of the current state of information support.
   8. Discussed with management the results of the analysis.
   9. Formulation of conclusions of the analysis.

10. Defining information architecture.
11. Validation studies on the impact of IS management.
12. Identifying priorities for IS development.
13. Draft recommendations and a roadmap.
14. Presentation of the results.

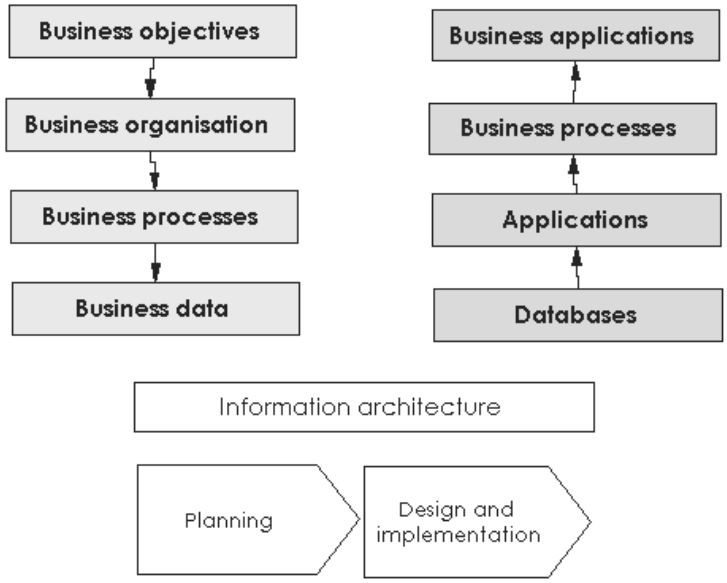

Figure 2. Scheme of BSP methodology

3. MMABP methodology (Methodology for modeling and analysis of business process) - modeling methodology and analysis of business processes.
   It is intended to create a model of a process that:
   - respects the objectives, status and characteristics of the enterprise (organization),
   - respect the need for objective, which may play an important role in the business (organization),
   - is optimal in the economic / effective than a single sense, while maintaining full functionality,
   - to process optimization, system introduction and implementation processes.
   - Methodology for analysis of processes governed by three interrelated principles:
   - The principle of modeling
   - The principle of different process architectures
   - The principle of abstraction
   - The basis for the specification of business processes are:
   - identified core activities,
   - understanding of the basic events and the expected response;
   - understanding of the basic objects of interest and their life cycles.

ANALYSIS AND MODELING OF THE PRODUCTION PROCESS

For the analysis of a particular production process seems to be the most appropriate methodology MMABP.

MMABP methodology is divided into three phases which are closely related with each other. In the first stage are identified and subsequently analyzed elementary processes. Linkages between the elementary processes are defined by its individual components. Consequently, in this phase is analyzed and the consistency of the proposed elementary processes.

It has a great impact on the analysis of production time in its various stages, as it can thus be based on the analysis to reduce production times. In the second stage are identified, then the third stage analyzed the key processes. Key processes are applied to the particular product which is produced.

CONCLUSION

Output modeling should not only be modified process model, but also simultaneously emerging object model organization, as well as possibly other intermediate and secondary outcomes (as long as have more general significance not only for the formation of the final process model and to the terms as far as possible to ensure their full consistency. It is obvious that the above methodology for modeling business processes in order to be practically useful, must be accompanied by the appropriate permitting process modeling tools in accordance with these principles.

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THE IMPORTANCE OF STANDARDIZATION AND NORMALIZATION IN CLUSTER ANALYSIS

Abstract: The values of each character as they are often the results of measurements in different units, and it can cause that some characters seem to be dominating a few other characters influenced the course of cluster analysis. The methods of cluster analysis based on the quantitative expression similarity relations, it would not work with data-dependent unit of measurement. Therefore, it is appropriate to transfer their characters to standardization or normalization.

1. OBJECTS AND CHARACTERISTICS OF CLUSTER ANALYSIS

Objects intended for cluster analysis are subjects or phenomena that are characterized by p features. Characters are differentiated:

1. Qualitative characters - describing a finite set of terms, which can be assigned codes. Can be distinguished:
   - nominal (1 - white, 2 - red, 3 - black)
   - ordinal that can be arranged (1 - light, 2 - medium, 3 - dark).

Special type of qualitative characters are called. binary (dichotomous) characteristics (gender - male / female)

2. Quantitative characters - real or interval in whole numbers (length, temperature).

2. STANDARDIZATION OF DATA CLUSTER ANALYSIS

Standardization means assigning appropriate a priori sign of the importance of all of the source matrix.

Whether a given matrix $X = (x_{ij})$ data type $n \times p$. In our case, a data matrix

$$X = \begin{pmatrix} 1 & 1 \\ 1 & 2 \\ 6 & 3 \\ 8 & 2 \\ 8 & 0 \end{pmatrix}$$

Types of cluster analysis of objects in space according to the data matrix is graphically illustrated in Fig. 1.

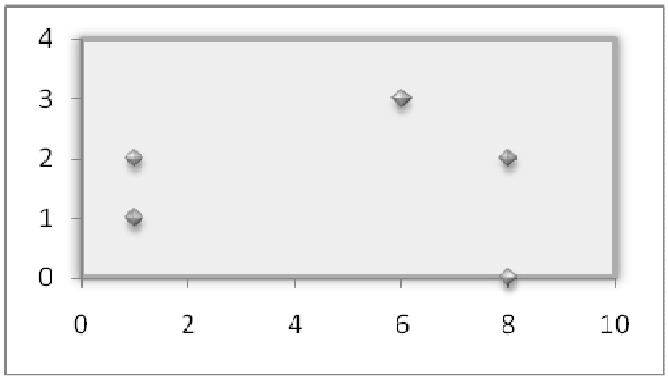

Figure 1. Illustration of the objects of cluster analysis

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Each column in the matrix for each character x_j *(j=1,...,p)* be made following adaptations data:

1. calculated the mean value of the $\bar{x}_j$ j -th feature x_j and standard deviation s_j for j = *1, 2, ..., p* according to the relation

$$\bar{x}_j = \frac{1}{n}\sum_{i=1}^{n} x_{ij},$$

$$s_j = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}\left(x_{ij} - \bar{x}_j\right)^2}\ .$$

2. original values x_{ij} the *j*-th character of the *i*-th object is converted into so-called. standardized values as follows $z_{ij} = \frac{x_{ij} - \bar{x}_j}{s_j}$, for *i=1,2, ..., n, j=1,2, ..., p.*

Individual standardized characters are no longer dependent on the units of measurement, but they become dimensionless.

Input data matrix (Tab. 1) in the simplified entry in a table is standardized as follows:

Table 1. Input data matrix E0

Object	1. character	2. character
1	1	1
2	1	2
3	6	3
4	8	2
5	8	0

Mean value:

$\bar{x} = 4,8$

$\bar{y} = 1,6$

Sample variance:

$$S_{xx} = \frac{1}{5-1}\left[(1-4,8)^2 + (1-4,8)^2 + (6-4,8)^2 + (8-4,8)^2 + (8-4,8)^2\right] = 12,7$$

$$S_{yy} = \frac{1}{5-1}\left[(1-1,6)^2 + (2-1,6)^2 + (3-1,6)^2 + (2-1,6)^2 + (0-1,6)^2\right] = 0,66$$

Standard deviation:

$S_x = \sqrt{12,7} = 3,6$

$S_y = \sqrt{0,66} = 0,81$

Standardized data:

$$A_1 = \left(\frac{1-4,8}{3,6}; \frac{1-1,6}{0,8}\right) = (-1,06; -0,75)$$

$$A_2 = \left(\frac{1-4,8}{3,6}; \frac{2-1,6}{0,8}\right) = (-1,06; 0,5)$$

$$A_3 = \left(\frac{6-4,8}{3,6}; \frac{3-1,6}{0,8}\right) = (0,33; 1,75)$$

$$A_4 = \left(\frac{8-4,8}{3,6}; \frac{2-1,6}{0,8}\right) = (0,89; 0,5)$$

$$A_5 = \left(\frac{8-4,8}{3,6}; \frac{0-1,6}{0,8}\right) = (0,89; 0,8)$$

Determined by calculating the standardized values of the input data matrix are shown in Tab. 2.

Table 2. Standardized data input matrixe E_0

Object	1. character	2. character
1	-1,06	-0,75
2	-1,06	0,5
3	0,33	1,75
4	0,89	0,5
5	0,89	0,8

3. NORMALIZATION OF DATA

The aim of normalization is to give character to the design values range from 0 to 1, which can be achieved by matrix Euclidean norm. Euclidean norm matrix is one of the essential standards. It is defined as the square root of the sum of squares of matrix elements:

$$\|A\|_E = \sqrt{\sum_{i=1}^{n}\sum_{j_1}^{m} a_{ij}^2},$$

where a_{ij} is the element of the matrix on the *i*-th row and *j*-th the column *n* is the number of rows *m* is the number matrix columns matrix.

Normalization of data from the input data matrix E_0 is as follows:

$$\|A\|_{E_1} = \sqrt{1^2 + 1^2} = 1,41$$

$$\|A\|_{E_2} = \sqrt{1^2 + 2^2} = 2,24$$

$$\|A\|_{E_3} = \sqrt{6^2 + 3^2} = 6,71$$

$$\|A\|_{E_4} = \sqrt{8^2 + 2^2} = 8,25$$

$$\|A\|_{E_5} = \sqrt{8^2 + 0^2} = 8$$

Euclidean norms input data matrix E_0 are reported in Tab. 3, and the resulting normalized values are in Tab. 4.

Table 3. Euklidean norm

Object	1. character	2. character	$\|A\|_E$
1	-1,06	-0,75	1,41
2	-1,06	0,5	2,24
3	0,33	1,75	6,71
4	0,89	0,5	8,25
5	0,89	0,8	8

Table 4. Normalized input data matrix E_0

Object	1. character	2. character
1	0,71	0,71
2	0,45	0,89
3	0,89	0,45
4	0,97	0,24
5	1	0

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Rafael S. Wollny[39]

TOTAL SUPPLIER MANAGEMENT AND PRODUCT RECALL MANAGEMENT IN AUTOMOTIVE

Abstract: In this article the relationship between Total Supplier Management and product recall is presented. Survey results will confirm that Total Supplier Management (TSM) is an important success factor of Product Recall Management (PRM).

Based on a survey on quality assurance and product recall management in automotive, the different group opinion on market positions and the importance of major aspects of quality assurance and product recall management has been analyzed.

In result, the importance and details of total supplier management compared to quality assurance and product recall management could be correlated. This information has been derived step by step and by means of direct auto-correlation techniques. Both motivation and hindering factors for supplier integration are discussed, and it could be shown that good total supplier management helps reduce costs and product faults improving collaboration.

TSM has a positive effect on current and future preparedness for quality assurance and product recalls, and will be an absolute necessity for distributed modern markets.

Key words: product recall, supplier integration, unsafe product, hypotheses, matrix, correlation.

1. INTRODUCTION

The recall of a product is an expensive and traumatic incident for manufacturers and customers. The manufacturer has the responsibility to remove the product from circulation and use to prevent damage and injury. The customers may find that they must stop using an essential item because of a serious hazard. It is to everyone's benefit that this be done expeditiously and economically. In some instances government agencies can force the recall of a product. It is in the best interest of the manufacturer to see that the recall be promptly performed. In all cases the manufacturer bears the cost, therefore it is advantageous that the task be performed as economically as possible, which depends on the result of handling the critical situation: Avoiding and correcting defects that may cause damage or potential harm.

Major improvements in the economy of recall can result from preplanning. Many people in large organizations today simply think procuring product liability insurance will take care of the liability responsibility for unsafe products. This only provides protection against financial losses due to claims and lawsuits and normally does not protect against the high cost of handling a product recall. This is why manufacturers have to do all possible to avoid defective products, and be ready with an immediate recall plan.

Prevention in modern business structures implies integration of all suppliers of modules and components, as complex products can only be guaranteed if every single component is thoroughly tested and assured. It also means that companies let themselves integrate in manufacturers Quality Assurance (QA). Though at first view this is unpleasant as manufacturers often pose hard quality assurance criteria, but in the long run customer's satisfaction and thrust helps improve the product market position and ensures the delivery contract of the company.

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It hardly passes one day, on which a manufacturer[40] does not have to recall one of his products because of checking, routine maintenance or repairing. Thus spectacular product recall actions in the automotive industry cause for million-damage again and again. Organizations can avoid possible product errors and product recalls with their financial effects through improving their quality safety system and a continual prevention.

The causes for this change are:

- Global development.
- Higher complexity of products and organizations.
- Shorter development time and shorter product life cycle.
- Higher outsourcing of components or even whole assembly groups by vehicle manufacturers (VMs)/ Original Equipment Manufacturers (OEM) to "Tier 1" suppliers.
- More and more components will be delivered by "Tier 1" suppliers from all over the world.

The automotive industry is particularly affected by these problems, because it manufactures vehicles in large series (OE) over comparatively long periods with hard cost goals and high quality yardsticks, and it has to supply also after End of Production (EOP) with spare parts in Parts&Service ((Aftermarket is the topic term which can be divided in Independent Aftermarket (IAM) and OES)). This situation forces the vehicle manufacturers and their suppliers for spare parts to new concepts in management. Many reasons speak for the fact that the number of the recalls will increase. The numbers of the German Kraftfahrt-Bundesamt (KBA)[41] show a frightening, constantly rising tendency of the number of recall actions (source: Kraftfahrt-Bundesamt, annual report 2010). The figure 1 shows this development of the product recall actions from 1998 to 2010 in the following overview.

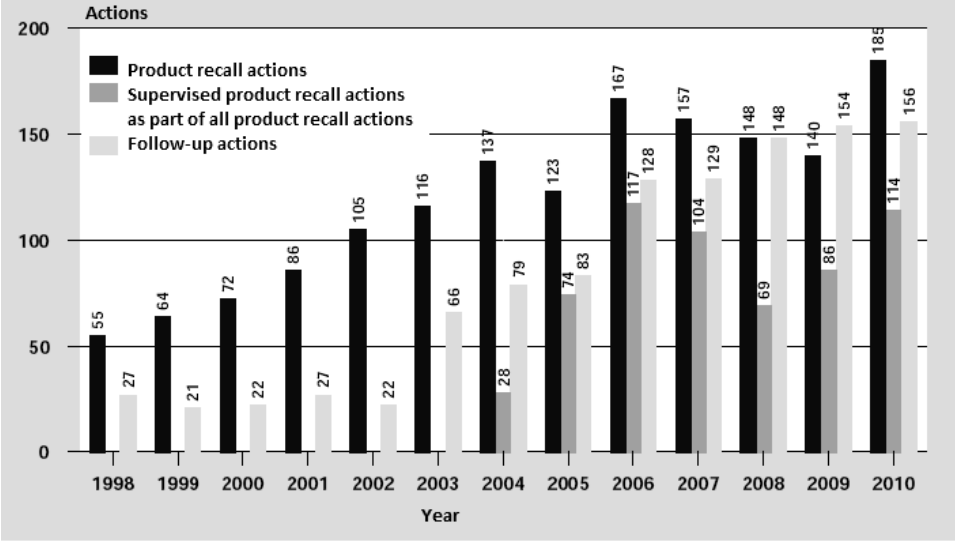

Figure 1. Product recall statistic from 1998 to 2010 in Germany.[42]

[40] *All names of manufacturers, suppliers, sub-suppliers, etc. are anonymous.*

[41] *The Kraftfahrt-Bundesamt (KBA) is the official German Federal Motor Transport Authority which provide information and services for vehicles and their users. The Kraftfahrt-Bundesamt is within the scope of the German Federal Ministry of Transport, Building and Urban Affairs and their tasks are allocated by laws and ordinances. www.kba.de.*

[42] *Annual Report from the Kraftfahrt-Bundesamt (KBA), report from 2010.*

2. PRESENTATION OF THE PROBLEM

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

In recent time above all the number of recalls in the automotive manufacture and supply industry found large attention.

A substantial challenge consists of it, that serious changes and the high dynamics in the sociocultural, technological, ecological, economical and politically legal surrounding fields of the company have grown and new tasks in a ever more aggressive becoming market fulfill, in which many companies must maintain ground.

Reasons for this development are the ever shorter product life cycles, shorter development times, technological complexity as well as in the introduction on the market come prematurely due to the ever stronger pressure of competition, which intensifies the market situation increasingly from Eastern Europe (e.g. Poland, Slovakia, Czech Republic, Rumania, etc.) and especially the new economic powers e.g. China, India and Russia, Brazil, Mexico and South Korea, in addition, Australia, Gulf or the Baltic states would like to compete on eye level with the old industrial nations[43] for markets and resources. In addition, it is often no longer possible to recognize product specific deficits and possible damage because of increased technological complexity of the products. Due to these numerous changes there are more and more questions. Which business basic attitude leads to the largest effects? Which strategies make a contribution to success? What product recall resolution mechanisms are successful? Under which conditions are they successful? Why are they successful? There is an increasing scientific interest in explanation because of novel changes, different open questions and at the end risen product recalls.

3. TOTAL SUPPLIER MANAGEMENT AND PRODUCT RECALL MANAGEMENT

In a more and more changing world Supplier Management must note completely new challenge and lead his global supplier network. A holistic implemented supplier management which is preventive and lasting is necessary because of new existing risks for the supplier/customer relationship. Especially in the automobile and automotive supply industry must lead, monitor and control their supplier network efficiently, because these industry companies manufacture complex products during a high external creation of value. This can be supported by a high performance network of all suppliers, which will be realized by "Total Supplier Management".

Definition of tsm[44]

Total Supplier Management brings together the complete range of other relevant and important disciplines "elements" as an integrated solution incorporating by the Information Technology platform. Important elements are Procurement Management, Risk Management, Supplier

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[43] *By "old industrial nations" will be understood USA, Japan and Western Europe, which controlled the world economy in past.*

[44] *Reference sources in literature could be not found. It seems that there is rare literature (potentially even research gaps) which could show a full consolidated picture of all important disciplines (Purchasing Management, Risk Management, Supply Chain Management, etc.). This full picture with all important implemented "elements" can be seen or described as "Total Supplier Management". In this work will be made an own definition which will be linked to Product Recall Management.*

Relationship Management (SRM), Supply Chain Management (SCM), etc. The result is a combination of ultimate savings and efficiencies in process and cost potentials and the elusive 'single view' of supplier activity. Total Supplier Management is incorporating a high level of value added.

Total Supplier Management is setting on prevention and capability which allow monitoring and controlling suppliers over all areas and life cycles.

From the beginning deficits will be recognized and product failures availed. Cost-intensive special measures or rework will be avoided. These process improvements are a substantial advantage because it is a competition factor.

TSM puts the customer in the position to lead, monitor and control their suppliers holistically. In addition, it evaluates and prognosticates the achievements of all suppliers. It identifies achievement deficits preventively, introduce corrective measures immediately and ensure material availability and quality effectively. With the help of a risk management you can evaluate events such as insolvencies, misalignments or approaches standardised, in order to avoid and/or minimize acute or threatening risks. Additionally, an interdepartmental or cross-functional team supports with risk evaluation and suitable measurements. In order to get an efficient co-operation between supplier and customer it must be ensured that all processes are standardized. Due to all parties establish a solid basis for a stable and partnership related “supplier/customer relation”. The Total Supplier Management supports and coordinates holistically the selection, integration and controlling of the suppliers and therefore it can be stated that TSM is an important element of a Product Recall Management.

4. TOTAL SUPPLIER MANAGEMENT IS NECESSARY FOR PRODUCT RECALL MANAGEMENT

A survey on quality assurance and product recall management in automotive is conducted through 2ask. More than 10,000 contacts from all areas of automotive industries have been asked to participate. Topic of the survey is to analyze the confidence in quality assurance depending on company size, type of business, industrial sector, etc. and chances for improvement; the preparedness for product recall now and for future requirements. Aim of the survey is to obtain a statistical analysis on the market structure and organization schemes in practice, and an analysis on most important factors for improvements and hindering factors, and future expectations. One of the answers addressed is, which specific company characteristics and types of organization structures and opinions leads to the best results in confidence in quality assurance and product recall management. Regarding mathematical theory of statistics, a scheme is developed to answer specific questions from the survey using Top Correlations. This article will be focused on the context between risks and product recall related issues and finally, the correlation results which confirm that Risk Management is an important success factor or element of a Product Recall Management.

4.1. The survey

In total, more than 10000 people have been contacted through e-mail. About 850 have taken a look at the survey, more than 167 (count still increasing) have answered so far. At 155 answers we have made an evaluation.

The survey consists of 19 questions in 29 fields. In total, 146 features can be selected. The survey can be divided into the following parts:

- **Language Selection**

Question 1: English / German

- **Company characteristics**

Question 2: Number of Employees
Question 3: Volume of Sales

Question 4: Branch of Trade (raw materials to vehicle manufacturers)
Question 5: Types of Products (semi finished goods to whole systems)
Question 6: Kind of business (vehicles, different types of parts, semi finished goods)
Question 7: Industrial Sector (metal works, electronics, etc.)
Question 13: Comparison to Competitors

- **Company Organization**

Question 8: Strategy used for Quality Assurance and Customer Complaints (QM, ISO9001, PRM)
Question 9: Description of QM and PRM System
Question 10: Organization for product recalls.

- **Data acquisition on QM and PRM Opinions**

Question 11: Preparedness on Product Recalls
Question 12: Factors for successful QM and PRM Management
Question 12: Factors for successful QM and PRM Management
12.1: Communication, 12.2: Organization, 12.3 Resources, 12.4: Costs andSavings, 12.5: Awareness.
Question 14: Most important Benefits for QM and PRM Management
14.1: Economic Advances 14.2: Trust and Honour, 14.3 guaranteed quality,
14.4: Gain experience, 14.5: Safety and Security.
Question 15: Main prejudices or Hinderings for QM and PRM
Question 16: Achievability of key goals for QM and PRM Management
Question 17: Chances for Improvement through Quality Assurance and Product Recall Management
Question 18: Development of Product Recalls in the next Years
Question 19: Preparedness on future requirements in QM and PRM

4.2. The Company Structure Observed

Regarding the survey, more than currently 11,468 people have been invited through e-mail to participate in our survey. 850 have had a look at the survey, and 167 have participated.
Evaluation data for 155 participants:

Table 1. Branch of Trade.

17.8% motor vehicle manufacturers 6.7% automotive suppliers 2% raw materials	57.7% automotive suppliers 16.8% processing and manufacturing

Table 2. Turnover of companies participating in this survey

4.7% < 2 mil. € 15.3% 50-200 mil. € 9.3% 5-20 bn. €	9.3% 2-10 mil. € 24.7% 200-1000mil. € 10.7% 20-100 bn. €	12.7% 10-50 mil. € 8% 1bn.-5bn. € 5.3% > 100bn. €

Company turnover and employees have a 1:1 correlation: 53% are exactly 1:1 increasing and 41% with turnover directly above (26%) or below (15%).

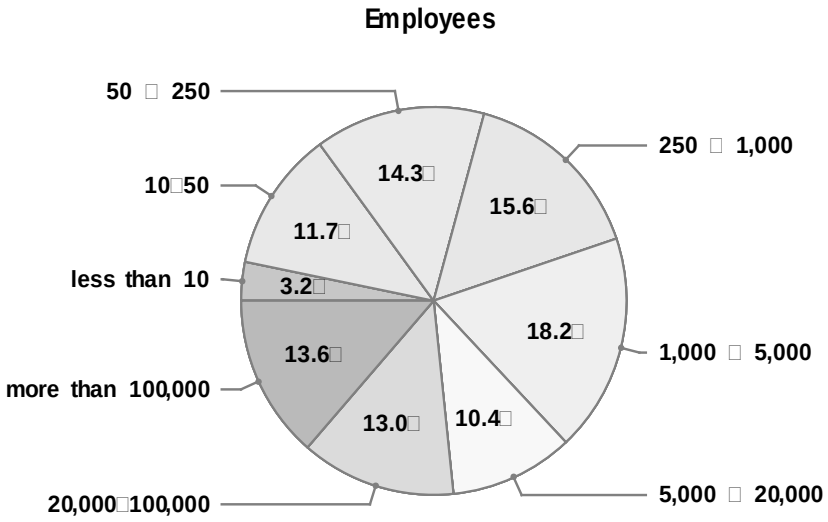

Figure 2. Number of Employees.

Table 3. Types of Products

28.0% whole systems 36.7% components	23.2% modules 12.1% semi finished and raw materials

Companies divide into (whole systems and modules and components), and (semi finished goods and components). There is no strict separation. Companies with whole systems to components tick about 25% raw materials, and 50-75% different product types each. Semi finished and raw materials companies produce components in 80%, and other products in 50% of all cases.

Motor vehicle manufacturers concentrate in 43% on whole systems; other products are ticked with 19% each. Automotive suppliers produce components (40%) and 25% modules or whole systems each, 10% else. Engineering services 25+/-10% all, raw materials mainly semi finished goods and raw materials (75%) and components (25%).

Table 4. The Kind of Business.

21.0% OEM (Original Equipment Manufacturer) 27% OE suppliers 10.2% free market spare parts 6.3% semi finished and raw materials and components	14.0% special purpose vehicles 14.3% OE spare parts 7% remanufactured parts

The kind of business divides quite clearly into different sectors. The average side clicks per entry are 25% for OEM and OE suppliers, 30% for special purpose vendors and semi finished goods and raw materials, 35% for free market spare parts and 40% for OE spare parts and remanufactured parts. Companies producing OE spare parts often are OE suppliers (75%); remanufactured parts are free market parts (80%), semi finished goods and raw materials often originate from original equipment suppliers (80%).

4.3 Description and visualization of the used correlation-matrix

In the following will be described the correlation-matrix design which will be used for the examinations which will be discussed in chapter 5.

Due to that it is better to give an in-depth description for a better understanding. In the following example the following two variables will be used: Question Number 4: Your Company´s Branch of Trade Question Number 19: Is Your Company´s quality assurance and Product Recall Management system prepared for future requirements

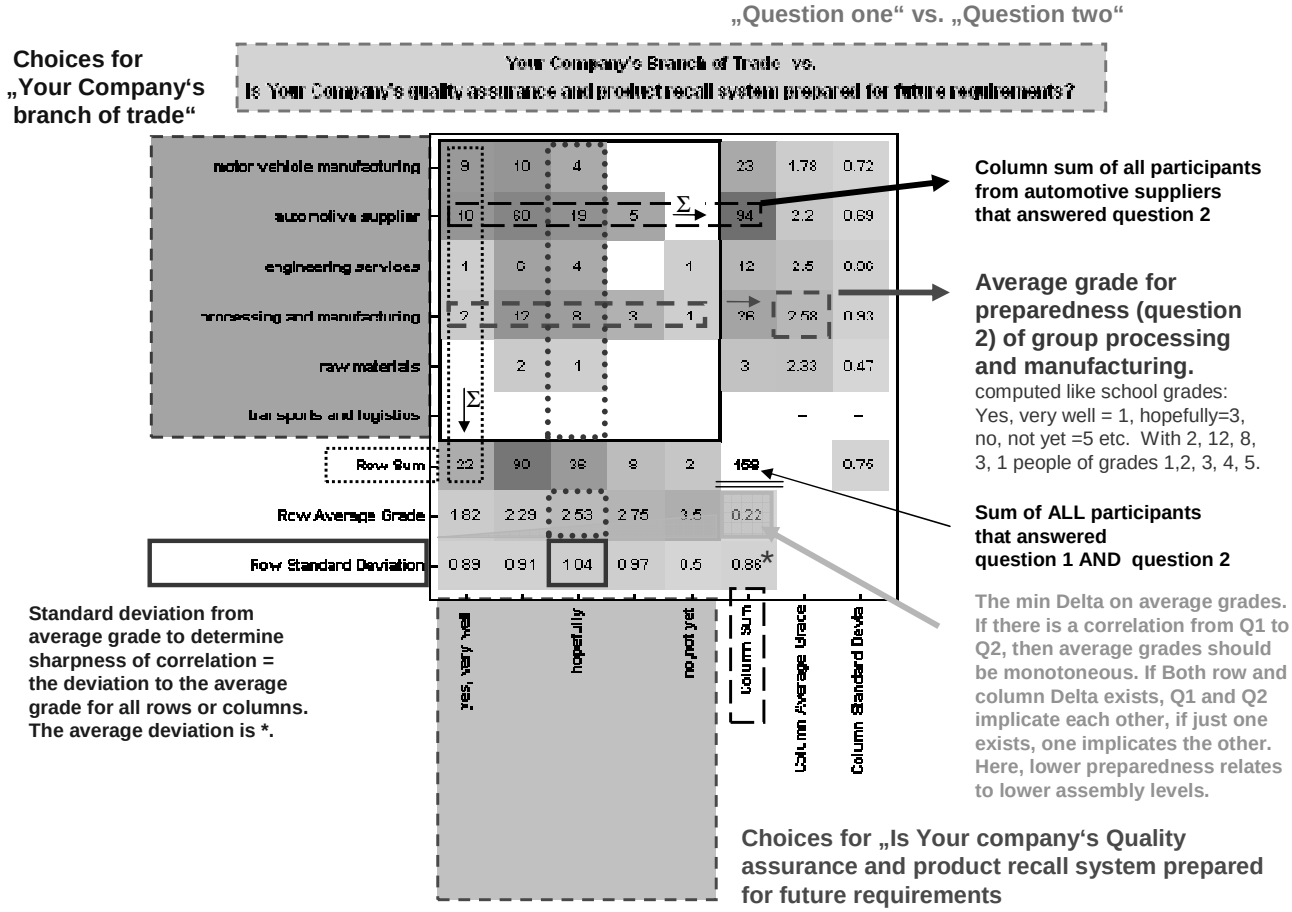

Figure 3. Description of correlation-matrix.

4.4 Hypotheses regarding Total Supplier Management

The following topics are addressed: Collaboration and the integration of suppliers,

Fault identification and supplier reliability, gain of experience through product fault management and supplier reliability.

The wish for collaboration and the integration of suppliers.

Question 16: With regard to your company, please rate the achievability of the following key goals of quality assurance and product recall Management! Collaboration of company, suppliers and clients.

Question 12: How would you rate the following factors for a successful implementation of QM and Product Recall Management in your company? Supplier integration in company processes.

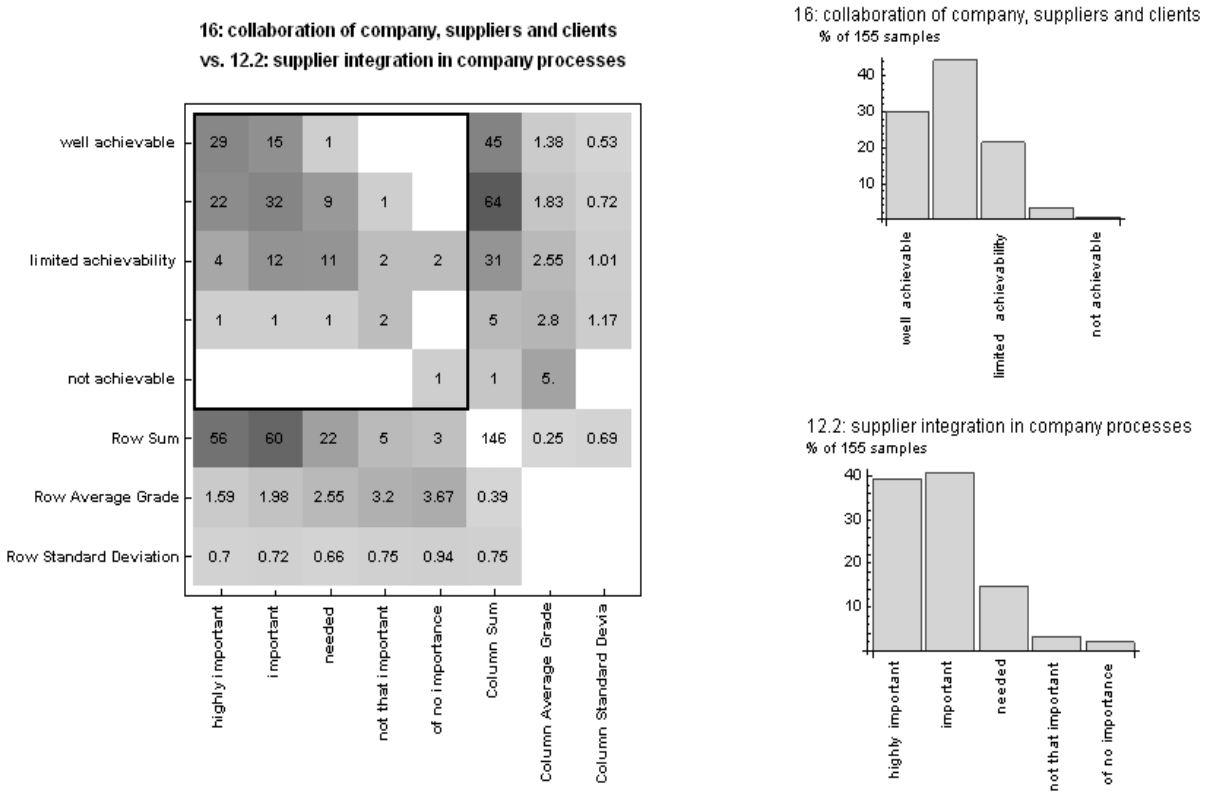

Figure 4. Collaboration of company, suppliers and clients vs. Supplier integration of company processes.

- There is a direct correspondence between importance of supplier integration and achievability of collaboration between company, suppliers and clients.
- The average column grades for the collaboration with respect to the importance of supplier integration changes from 5.0 =”not achievable” for no importance of supplier integration to 1.38 =”well achievable” for highly importance of supplier integration.
- 67% say that collaboration is (well) achievable and supplier integration is (highly) important.
- 15% believe that supplier integration is needed with average grade of achievable to limited achievability (2.55) for collaboration of company, suppliers and clients.
- Only 5.5% say that supplier integration is less important with average grade (3.4) =”limited achievability” for collaboration.
- 20% say that collaboration is well achievable and supplier integration is highly important.

Fault identification and supplier reliability: who is to blame?

Question 14: Regarding your company, which are the most important benefits of quality assurance and Product Recall Management? Identification of fault originator.

Question 14: Regarding your company, which are the most important benefits of quality assurance and Product Recall Management? Gain Experience: Identification of reliable suppliers.

- There is a direct link between Identification of fault originator and Identification of fault originator.

- If identification of reliable suppliers is assured, then identification of fault originators is assured as well. More than 48% of all participants have this opinion.
- 20% say that identification of fault originators and of reliable suppliers is (really) needed.

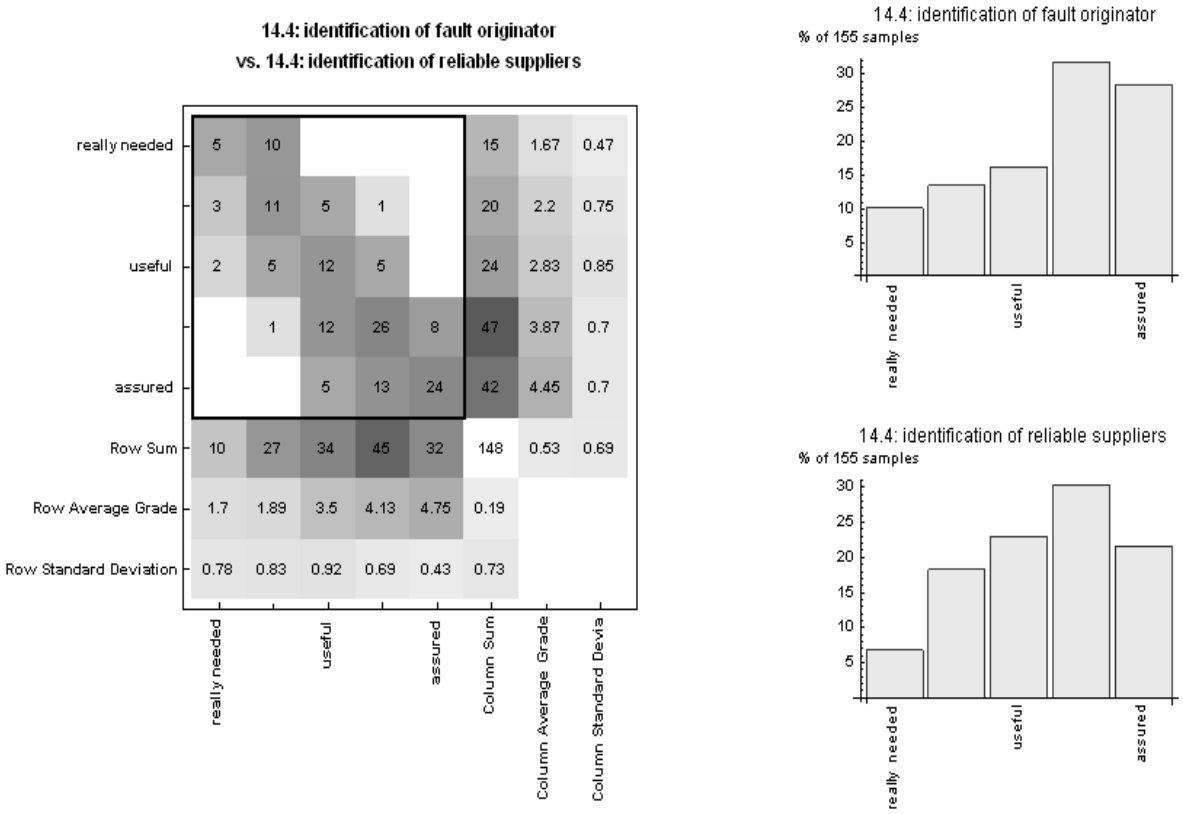

Figure 5. Identification of fault originator vs. Identification of reliable suppliers.

Gain of experience through product fault management and supplier reliability: What to learn?

Question 14: Regarding your company, which are the most important benefits of quality assurance and Product Recall Management? Identification of reliable suppliers.

Question 14: Regarding your company, which are the most important benefits of quality assurance and Product Recall Management? Gain Experience through product fault management.

- There is a direct link between Identification of reliable suppliers and gain experience through product fault management.
- 30% say that both identification of reliable suppliers and gain experience through product fault management is needed.
- 70% say it is useful to assured.

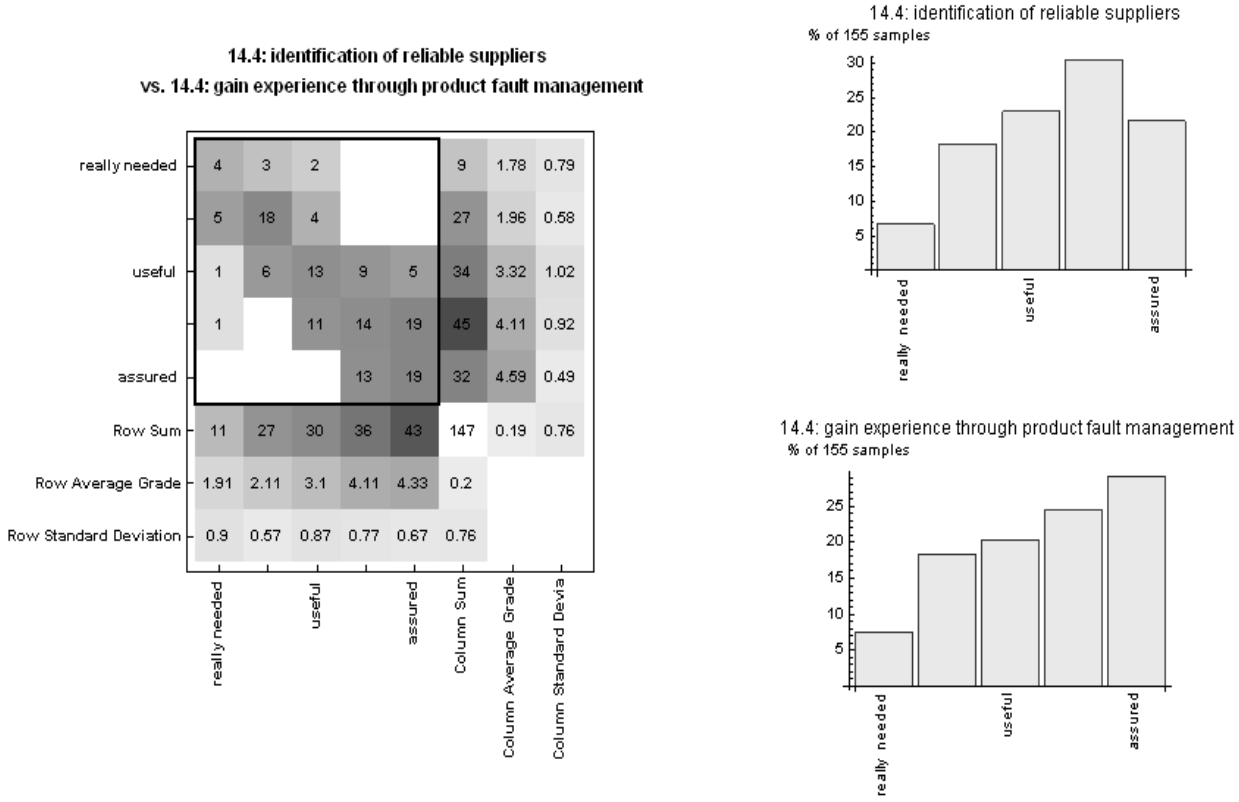

Figure 6. Identification of reliable suppliers vs. Gain experience through product fault management.

Conclusion:

- Identification of fault originators goes hand in hand with identification of reliable suppliers.
- Collaboration is important for the integration of suppliers into company process, which helps ensuring reliable suppliers. Supplier integration support supply chain process optimization.
- Profound product fault management helps gain knowledge even when suppliers' reliability cannot be fully assured.

Hence it can be confirmed:

- H1: Supplier integration has a positive effect to reducing errors because of supply chain process optimization.
- H2: Total Supplier Management has a positive effect to manage a product recall.

5. AUTOCORRELATION STUDY

In other words, the importance of supplier integration correlates most with: Awareness, Cooperation and Collaboration, Immediate Replacement Requirements, Experience and Education of Personnel, Future Markets and System Robustness, and results in: Integration of Suppliers in Company QA, and Centralisation due to Integration of all Suppliers in Manufacturing.

The Most Important Correlations to Supplier Integration [>20% correlation] are

Correlation	12: How would you rate the following factors for a successful implementation of QM and PRM in Your Company? 1. ORGANISATION: Please rate... supplier integration in company processes
0.497902	AWARENESS: Please rate... attention and sensibility
0.475177	COMMUNICATION: Please rate... cooperations with customers, suppliers and public authorities
0.447458	How would You rate the development of product recalls for the next years? subject: transition from integrated service to immediate replacement
0.441667	"How would You rate the following factors for a successful implementation of QM- and Product recall management in Your Company? Subject: Awareness
0.394048	With regard to Your Company, please rate the achievability of the following key goals of quality assurance and product recall management! Subject: collaboration of company, suppliers and clients
0.377193	RESOURCES: Please rate... experience of employees
0.354209	RESOURCES: Please rate... educated personnel
0.343132	"How would You rate the development of product recalls for the next years? ", "improvements as future market will stabilize"
0.330561	How would You rate the development of product recalls for the next years? improving system robustness
0.292003	With regard to Your Company, please rate the achievability of the following key goals of quality assurance and product recall management! integration of suppliers into company QA
0.252381	How would You rate the development of product recalls for the next years? centralisation due to integration of all suppliers in manufacturing.

Correlation	With regard to Your Company, please rate the achievability of the following key goals of quality assurance and product recall management! integration of suppliers into company QA
0.480952	AWARENESS: Please rate... commitment for product quality and safety
0.431034	COMMUNICATION: Please rate... information services (data resources, journals, market intelligence)
0.40765	AWARENESS: Please rate... commitment for society and sustainable development
0.402222	With regard to Your Company, please rate the achievability of the following key goals of quality assurance and product recall management! Company integration within clients
0.363904	AWARENESS: Please rate... attention and sensibility
0.344828	How would You rate the development of product recalls for the next years? will there be problems due to standardized mass components for potential product recalls?
0.334483	RESOURCES: Please rate... experience of employees
0.315735	How would You rate the following factors for a successful implementation of QM- and Product recall management in Your Company? Subject: Awareness
0.310345	RESOURCES: Please rate... educated personnel
0.292003	ORGANISATION: Please rate... supplier integration in company processes
0.287755	With regard to Your Company, please rate the achievability of the following key goals of quality assurance and product recall management! Introduction of Quality Assurance standard procedures
0.277778	How would You rate the development of product recalls for the next years? increase cause of introduction of new technologies
0.268824	With regard to Your Company, please rate the achievability of the following key goals of quality assurance and product recall management! qualified personnel and training
0.238095	COSTS and SAVINGS: Please rate... insurances and contracts
0.216667	How would You rate the development of product recalls for the next years? decentralisation to module manufacturers due to modern IT
0.216054	How would You rate the development of product recalls for the next years? centralisation due to integration of all suppliers in manufacturing
0.206221	With regard to Your Company, please rate the achievability of the following key goals of quality assurance and product recall management! consistent fault analysis

In other words, achievability of “Integration of Suppliers into Company QA” relates to the importance of and awareness for commitment for product quality and product safety and society, the importance of information services across companies, and the experience and education of existing personnel and hiring of qualified personnel and training is based on insurances and contracts and decentralisation to module manufacturers due to introduction of modern IT and correlates with the achievability of “Companies Integration within Clients” (… reflexivity), and supplier integration in company processes, and introduction of new QA standard procedures and is seemingly initiated by the use of standardised mass components, and the increase of product recalls due to the introduction of new technologies, and improves consistent fault analysis.

6. COST REDUCTION THROUGH SUPPLIER INTEGRATION

Supplier Integration implies strict shared quality assurance directives within the supplier network. Therefore, suppliers participate in the quality assurance model, so that less “surprises” are found in case when product complaints should occure. Also, supplier reliability is increased, as it is assured that supplier products meet company requirements. Hence it can be stated that supplier integration helps to save costs. It also helps to improve cooperation and awareness for the total product, so that then product recall rate is positively influenced.

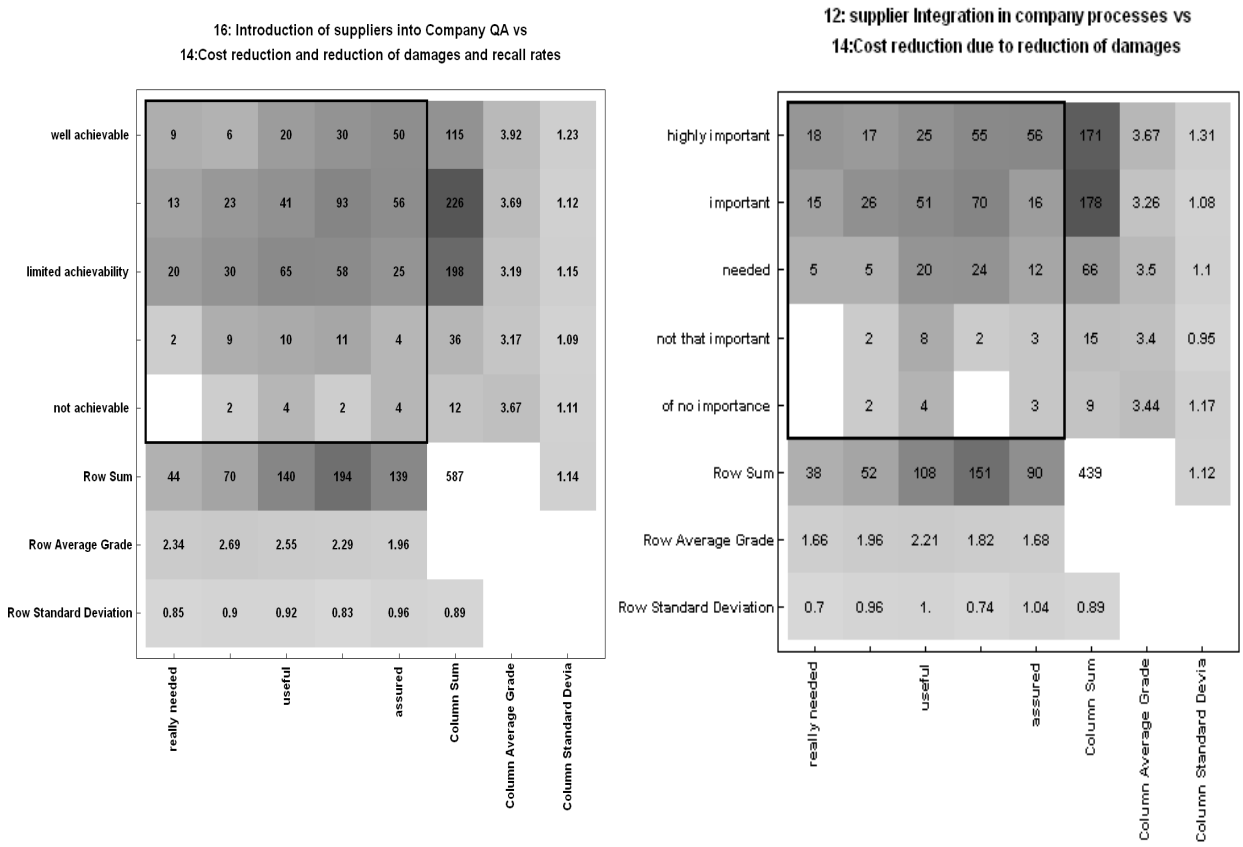

Figure 7. Total Supplier Management helps reducing costs.

Both images show that with increasing achievability of supplier integration, cost reduction is more and more assured. On the left, most clearly seen from the side of vehicle manufacturers and its suppliers, or tier-1 suppliers and their processing tier-2 etc. suppliers, etc, a clear one-to-one correspondence. On the right, analysis is seen from suppliers with regard to their integration. At first

guess, integration should mean more costs and risks for suppliers. But it also causes more transparency. So, the importance of supplier integration is not so high where the costs pressure is low, but those already integrated consider it as highly important, because it is part of the contract. And also, where cost savings due to reduction of damages is really needed, supplier integration is considered very important.

7. SUPPLIER INTEGRATION AND HINDERING FACTORS

The integration of the company's quality assurance and PRM system into the client's system is well achivable as long as there are no additional costs and maybe the client gives in on higher prices, and the question of extra qualification and extra staff is kept as low as possible. It is limited in achievability if the company has extra costs and the client doesn't give in, or bureaucracy occurs. Also it depends on the management focus. It is hard to achieve when the company is pressed for time and if product faults are not that serious.

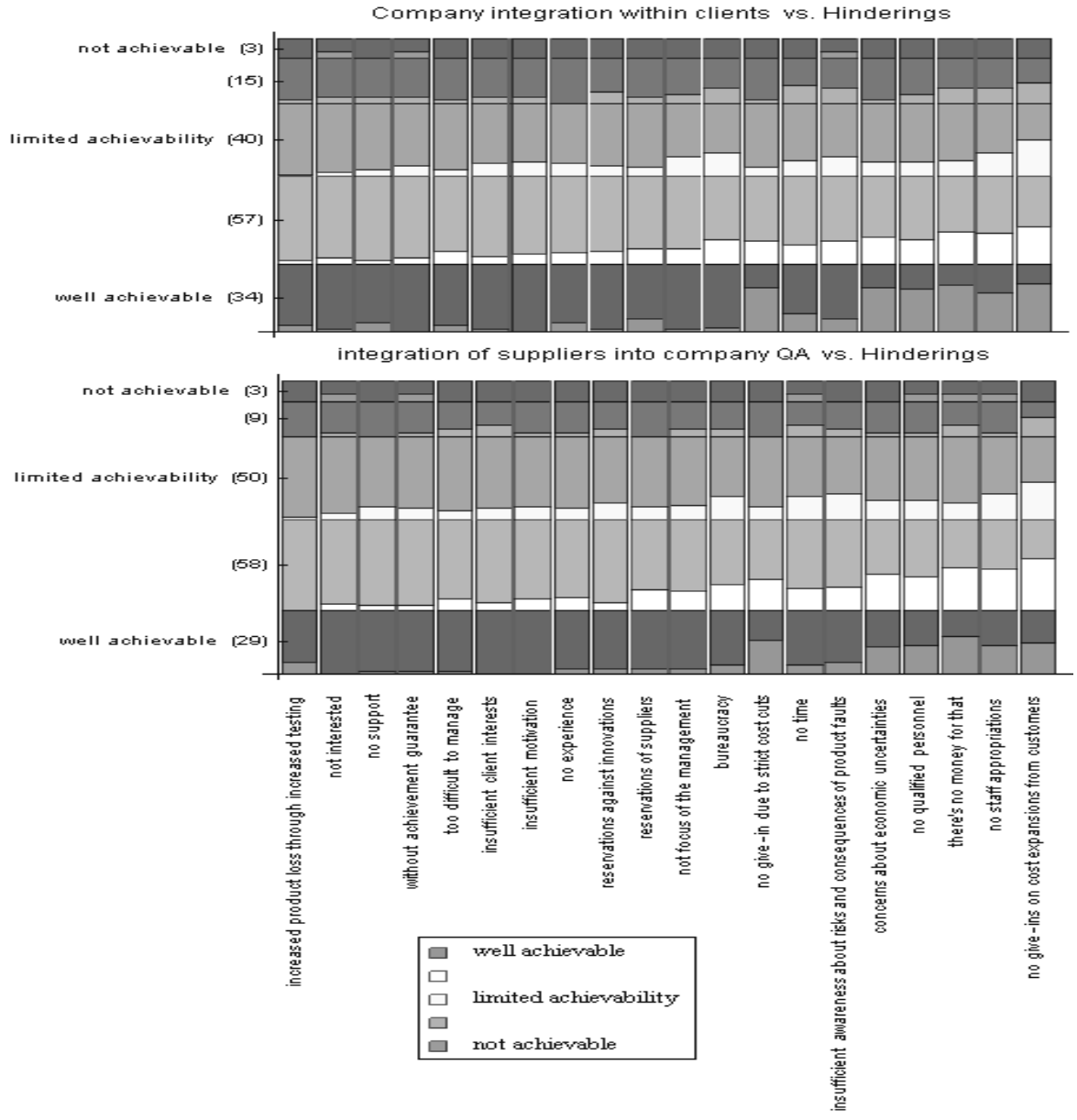

Figure 8. Different opinions between Suppliers and Clients on supplier Integration

A company, which wishes to integrate its clients into its quality assurance system, sees costs as main hindering reasons. If they have the urge for integration, management of the clients has to give in. Mainly insufficient client interests and cost expansions then are the most important hinderings from clients. Generally, a company sees less hinderings in integration of clients than vice versa, because it is easy to propose, but difficult to do, especially for several customers.

Advantages are that staff is delegated to supplier and time and costs can be saved.

8. SUPPLIER INTEGRATION AND MARKET POSITION

Supplier integration and market position is a weird topic. If there is but one well-known long-time supplier, then it is likely that during the long term relationship between vehicle manufacturer and supplier, intensive collaboration has been established. Hence, it is likely that this supplier is well integrated into company QA. Both “talk well” to each other.

But on free market, with few competitors, it suddenly is more economic for suppliers to avoid the issue of intense collaboration and integration, as on next contract there is no guarantee that they get the contract, and then what to do with all the quality assurance structures buildt up, whereas the other competitor could avoid it, and give lower prices for the same product by not showing the internals of his production, with similar but more cost-effective results?

Then, if the business structure gets more competitive, the pressure on give-ins to get contracts increases. Hence, the vehicle manufacturer or tier-1 supplier can dictateon quality control and PRM requirements. Hence, the more tense and critical the industrial situation of suppliers, the better becomes the integration with clients, for the advantage of the client. However, the more critical, also the less reliable the supplier will be, as it might not be stable anymore.

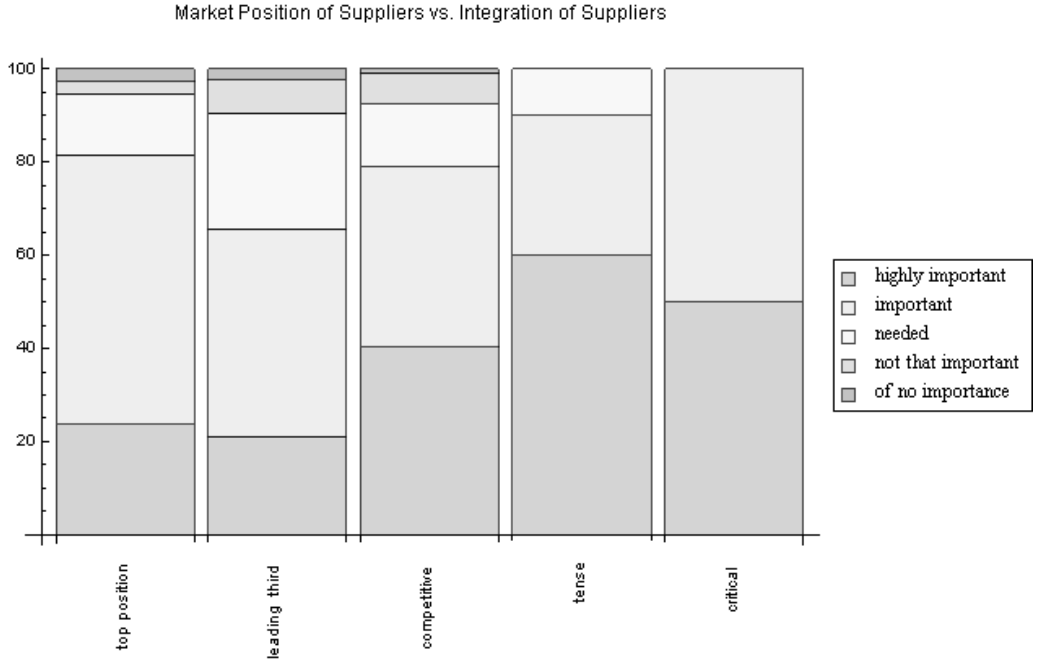

Figure 9. Market Position of Suppliers vs Integration of suppliers.

9. PREPAREDNESS VS. SUPPLIER INTEGRATION

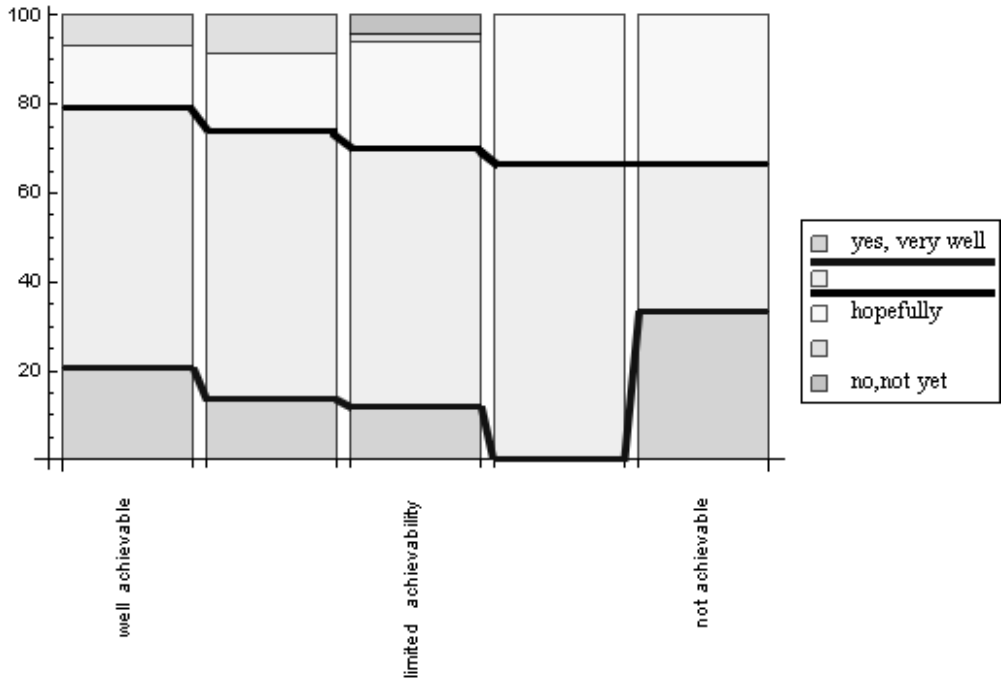

Figure 10. Preparedness for Product Recalls vs. Supplier Integration

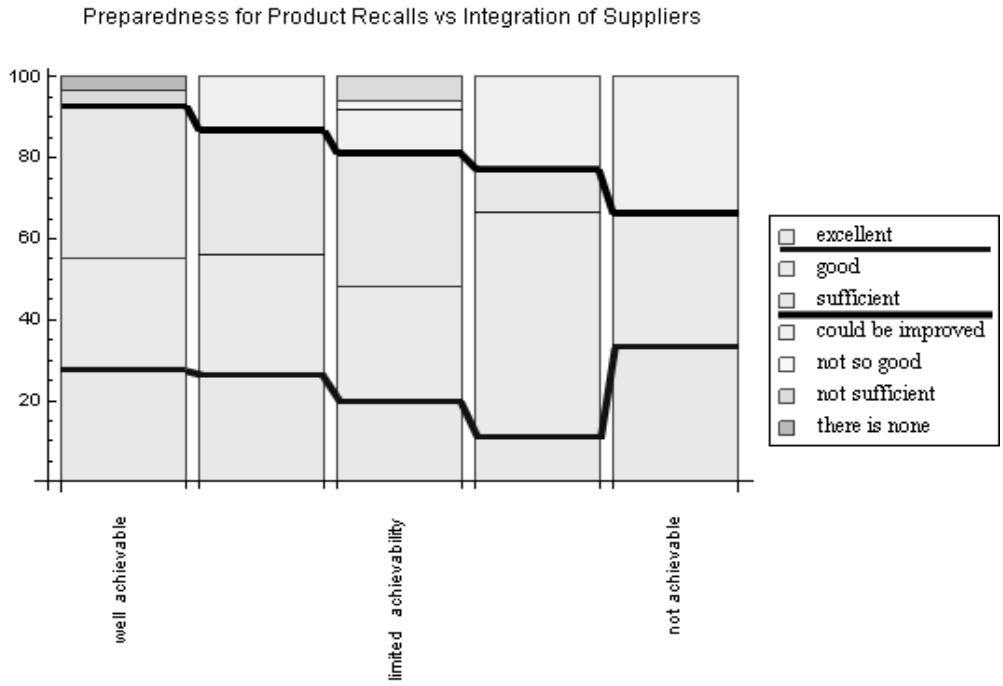

Figure 11. Preparedness for future Requirements vs. Supplier Integration

It can be learned that Suppliers Integration has an immense effect on Preparedness for product recalls. This is not surprising: If collaboration and integration with suppliers is bad, then product

recall is left to the vendor. It is much harder and costs are much higher to identify faults, and to fix and exchange components within adequate time on insufficient client integration. Especially in recent times of modularization, suppliers' integration has become a highly important necessity. The times where integration is unneeded (right edge) have definitively gone.

Hence, integration of suppliers now and in future is most important for handling product fault situations and gain experience in avoiding these situations, for the sake of our all safety on a global market.

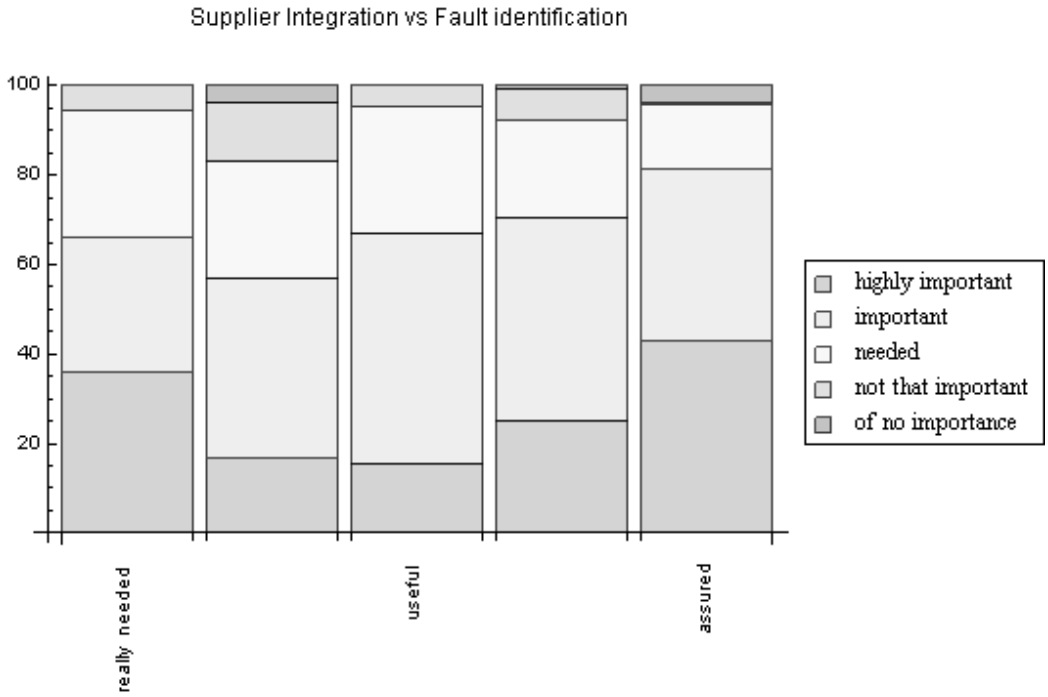

Figure 12. Supplier integration is absolutely needed for persistent fault identification.

10. CONCLUSION

A major increase in Product Recall Actions has been found in Germany in the last decades. As modern markets more and more tend to diversity into worldwide module and component manufacturers, the role of reliable suppliers in fault identification becomes more and more important. This topic is addressed by Total Supplier Management (TSM). Based on a self-report study in automotive conducted in summer 2011, it was shown that collaboration is highly important, and TSM helps to identify reliable suppliers, and improve product fault management and gain experience for product recall actions.

Integration in the company quality assurance management has to be seen from two sides, from suppliers and vendors. And in a hierarchical manufacturing process, suppliers themselves become component vendors (Tier-1) with their own processing (Tier-2) etc.

It could be shown that total quality management saves costs and reduces product faults.

The motivation for supplier integration is awareness, costs, market structure and future development Hindering factors for supplier integration are: different benefit balance between vendors and suppliers, costs and give-ins, but also time. A major influence on the achievability and give-in preparedness in supplier integration is market situation. Both cases market domination and high diversity ease supplier integration.

Due to its key role in collaboration and supply chain, supplier integration is an absolute necessity for successful quality assurance and effective product recall management both now and in the future.

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