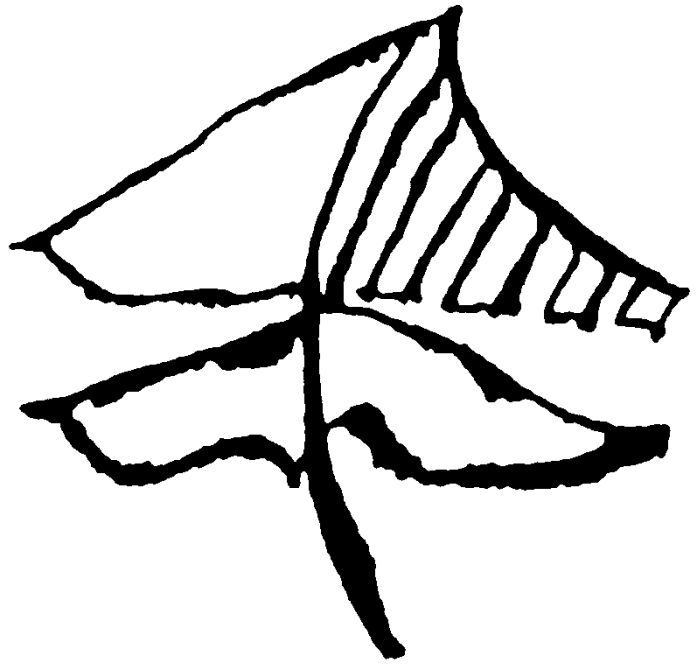


ISSN 1640-3622



INTERCATHEDRA

No 27/4

POZNAŃ 2011



INTERCATHEDRA
SCIENTIFIC BULLETIN OF THE ECONOMICS DEPARTMENTS
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Published by: Department of Economics and Wood Industry Management
 Poznań University of Life Sciences,
 Wojska Polskiego 38/42, 60-627 Poznań, Poland
 intercathedra@intercathedra.pl

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ISSN 1640-3622 (print) original version

www.intercathedra.pl

Poznań 2011

Printed in 500 copies



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Dear Readers!

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

International scientific collaboration presented in the four editions of Intercathedra 2011 links a number of cities: Poznań (the Host City), Brno, Košice, Kraków, Presov, Tarnów, Trnava, Warszawa, Zagreb, Zvolen, Žilina and other Polish and foreign scientific centers. The *Intercathedra* brings together university cities, departments, but first and foremost - it unites people. We invite you to co-operate with other

cities and research centers.

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

We are pleased to provide you with the Fourth Edition of Intercathedra 2011. This edition marked as 27/4 includes, inter alia, papers presented at the Economic Forum 2011. This year's Economic Forum, held in Laski near Kepno, at the Conference Center of Poznań University of Life Sciences on 13 - 15th September 2011, concerned The conditions and development perspectives of wood industry enterprises in the situation of recovering from the economic crisis in Europe and the World.

Academic conferences known as the Economic Forum have been taking place annually since the early nineties of the 20th century. As is tradition, the Economic Forum 2011 was organized by the Department of Economics and Wood Industry Management of Poznań University of Life Sciences, in co-operation with:

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

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

Intercathedra 2011 has been issued under the auspices of IATM, whose members provided materials for the volume, were responsible for its review, and prepared both mentioned scientific conferences. They deserve our deepest gratitude. We cordially invite our Readers to a useful, creative reading of scientific articles, and wish you much success in the New Year 2012!

Wojciech Lis

Jan Chudobiecki, Zygmunt Stanula, Marek Tabert¹

SELECTED ASPECTS OF LUMBER MARKET IN POLAND

Abstract: Since online auctions and new rules for the wood sales were introduced by The State Forests National Forest Holding, business transaction participants have been dealing with uncertainty. Lack of understandable rules, unpredictability of the auctions' results, rising prices of wood and, in particular, lack of a stable economic policy towards the forest-wood industry – all of these factors contribute negatively to the market's development and the competitiveness of the Polish wood industry. This article is an attempt to diagnose the situation and formulate recommendations, which may contribute to the implementation of economically justifiable changes.

Key words: lumber/round wood market, sale of wood, online auctions, forest policy.

1. INTRODUCTION

Wood is a commonly used renewable resource of organic origin. It is estimated that there are over ten thousand different applications for wood. Versatility and often necessity to use wood results in a growing demand for it. As a consequence of such situation, a shortage of wood is observed both on the domestic market and on the macroeconomic scale.

Forests in Poland cover over 9 million hectares of area and 7.5 million hectares are owned by The State National Forest Holding (State Forests NFH). The NFH supervises forests owned by the State Treasury in Poland. Concurrently, via the Forest Management and Geodesy Bureau, the State Forests (NFH) have a decisive influence on the way other private and public owners exploit their forests covering further 1.5 million hectares. As a result, every felling of tress requires consent from a local forest inspectorate. That is why reference points for trade issues mentioned in this article are the creation of the ownership structure of forests (see Table 1) as well as the wood acquiring shares for public and private forests (see Table 2) within the researched period which mainly covers the last decade (a 10-year period).

Table 1. The ownership structure of forests in Poland.

Description	Year									
	2000	2001	2002	2003	2004	2005	200	200	2008	2009
	[%]									
Total Public Forests, Including :	82,8	82,6	82,6	82,5	82,5	82,3	82,2	82,1	82,0	81,8
State Forests	78,4	78,3	78,3	78,3	78,3	78,2	78,1	78,0	77,9	77,8
Private Forests	17,2	17,4	17,4	17,5	17,5	17,7	17,8	17,9	18,0	18,2

Source: author's own study based on [1]

2. LEGAL AND OWNERSHIP CONDITIONS

It is worth noting that even though the ownership share of private forests is almost 20% (see Table 1), production of wood from those forests is low and this trend is decreasing – it represents approximately 3% of the annual wood removal in Poland. The same indicators, which refer to The State Forests National Forest Holding, place The State Forests National Forest Holding (State Forests NFH) as a market monopolist company, which for the majority of Polish wood industry companies is the only supplier of material (see Table 2). In addition, in accordance with the State Forests National Forest Holding's (State Forests NFH) statutes, the General Director of the State Forests National Forest Holding unilaterally establishes the wood sales conditions [6].

¹ Department of Economics and Wood Industry Management, Poznań University of Life Sciences, Wojska Polskiego 38/42, 60-627 Poznań, Poland, chudobiecki@up.poznan.pl, mtabert@up.poznan.pl

In the last five years, rules for the wood material sales have drastically changed. Until 2006, practically the only form of wholesale of lumber had been trade negotiations. Depending on the buyers' needs and potential, the negotiations were carried out at local Forest Inspectorates, Regional Directorates of the State Forests National Forest Holding' offices or the State Forests National Forest Holding. In case of the large-size special purpose wood, it has been sold in the bid submission/bid offer system. These forms of selling caused many accusations regarding the existence of „grey markets” in the wood selling business and potential corruption dangers. In 2007, the Forest-Wood portal (see: <http://www.zilp.lasy.gov.pl/drewno>) was launched. Its main objective was to assure a full openness and transparency of wood sales transactions.

Table 2. Removals

Description	Year					
	2000	2005	2006	2007	2008	2009
	Thousand cubic meters (TCM)					
Total, including:	27659	31945	32384	35935	34273	34629
Timber, including:	26025	29725	30228	34146	32407	32701
Public forests, including:	24593	28601	29130	32797	31159	31612
in forests owned by the State Treasury ,	24446	28472	29008	32657	31011	31482
<i>The State Forests</i>	24097	28164	28700	32314	30695	31188
national parks	231	198	200	234	216	192
owned by municipalities	147	129	122	140	147	130
Private forests	1432	1124	1098	1349	1248	1089
Slash	1634	2200	2156	1789	1866	1928
Stump wood	0,3	0,2	0,1	0,1	0,1	0,2

Source: author's own study based on [1]

3. HOW TO DOMINATE ONLINE AUCTION ON THE WOOD MARKET?

The Forest-Wood Portal has not become a stable solution and undergone several modifications in the subsequent years. Currently, pursuant to the regulation of the General Director of the State Forests [7], transitional rules for the sales of wood apply (see in [7]: §3 Procedury sprzedaży drewna” - Wood Sales Procedures):

“The following procedures for the sales of wood for business entities can be distinguished:

- a) restricted tenders via the Forest-Wood Portal,
- b) system internet auctions via the „e-drewno” application,
- c) internet auctions via the „e-drewno” application,
- d) other auctions and bid submissions,
- e) trade negotiations,
- f) the retail price list.”

Internet restricted tenders in the Forest-Wood Portal are organized every six months. Access to these tenders is limited to only such buyers, who have so-called „purchase history”. In other words, only those buyers who bought round wood from the State Forests National Forest Holding in the preceding year. The buyers are entitled to make a purchase offer for up to 55% of purchases made from October 1 until September 30 in the preceding fiscal year. Additionally, owing to a half-year frequency of the restricted tenders, a total volume of the wood purchases for which the purchase offers can be made at the first tender is 27,5% of the annual volume of wood to be sold in this mode. Hence, the tender is in some sense a lottery, because the cover ratio of a given purchase offer² cannot be estimated by other purchasers. This leads to a situation when in some forest inspectorates

² Sales offer: volume of the offer for the given assortment of one type of wood in an individual Forest Inspectorate



the number of purchase offers exceeds the supply of wood. The offer assessment algorithm used³ in such situations – despite having received a maximum grade, a purchaser is sold only a part of the volume specified in the purchase offer. On the other hand, in other forest inspectorates, the volume of wood for sale is bigger than the volume in the purchase offers. Even though it is possible to satisfy all submitted purchase offers in full, the above-described tool is rather regulated by a high dose of randomness than a relation between supply and demand

In theory, there is a possibility to buy a reduced offer from the first restricted tender. On application of the industry representatives, starting from 2010, The State Forests National Forest Holding now organizes the second restricted tender. Taking part in the second restricted tender is available to the entities whose purchase offers have not been fully satisfied. Maximum volume of purchased wood is equal to the volume of wood which was not made available for sale in the first tender (was reduced by this amount). In reality, the supply of wood material at this stage is even smaller. Internal regulations stipulate that the volume of wood put on sale is the volume, which has not been sold in the first tender minus the sale offers in which there is less than 51 m³ of the given assortment of wood⁴. It leads to a situation that in relation to all purchasers in restricted tenders, there is always a certain number of offers, which have not been satisfied.

System internet auctions in the „e-drewno” application take place every six months too (see: www.e-drewno.pl). This auction system of The State Forests National Forest Holding offers wood, which has not been sold in the restricted tenders, and 45% of the total volume intended for the half-year sales. The sales are organized as open internet auctions, separate for each individual offer. After having registered in the system and having paid a bid security, every business entity can take in the auction. Minimum bid security is 4000 PLN and entitles to submit a purchase offer for up to 1000 m³ of wood. For each additional cubic meter of wood, extra 4 PLN of bid security must be paid. If a bid security of 120,000 PLN is paid, all volume limitations are abandoned and it is possible to make an offer for the whole volume of wood put on sale. Individual auctions take around 4 weeks Monday to Friday between 7AM and 5PM. Depending on the volume and the variety of the wood assortments, which a purchaser is going to buy, it may turn out that the participation in several hundreds of auctions every day will be necessary. It requires the involvement of a team of numerous salespersons. In theory, the auctions should end every two minutes

However, Paragraph 12 (8) of the aforementioned regulation[7] specifies that: „if an auction user makes a winning bid within a 30-second period before the closing of an auction (...) the duration time of this action is extended for the number of seconds which is equal to 30 seconds minus the number of seconds until the scheduled closing of the auction when the bid has been registered” This rule, in case of a high demand for wood (and such situation has been observed for several years), leads to a continual extension of the auction time of individual auctions. This results in numerous auctions overlapping in time. It practically makes it impossible for a purchaser to place another bid in the right time and the involvement of a high number of salesperson bidding on its behalf is necessary which in turn incurs additional costs and, in the worst scenario, may force a purchaser to give up on bidding in the auctions. According to information gathered by the authors, the difference between a bidding price in the „e-drewno” auction systems and a purchase price in the restricted tenders is almost 100% of the price

Internet auctions in the „e-drewno” application are generally organized according to the same rules as the abovementioned „System internet auctions”. They differ in frequency as the auctions described here take place all year. Via the „e-drewno” application, the material put on sale is the one that has not been sold through the System Internet Auctions. Also the wood, which has been

³ Decisive factors are an offered purchase price (80%) and the value of purchases in the preceding year (20%) whereas, depending on the total grade, a suitable volume of wood is assigned to each offer and when the supply is limited, it leads to the reduction of all offers that have been made.

⁴ If in the first tender, the volume of 50 m³ of the given assortment has been put on sale, but it has not been sold, it does not appear again in the second tender.

collected throughout the year and possible surpluses from removals. In practice, it refers to so-called „damage timber” which is sourced as a result of extraordinary situations (natural disasters) such as fires, hurricanes, floods, droughts, excessive snow precipitation). In practice, it usually means that during an economic boom and when no natural disasters occur, it is almost impossible to buy round wood in Poland outside the biannual restricted tenders and the System Internet Auctions via the „e-drewno” applications.

Other auctions and submissions – these are open auctions in which selected and valuable assortments of wood are put on sale, for example veneer wood or plywood. They are organized periodically by forest inspectorates, which have such raw material. Due to the age-species structure of Polish forests, such submissions have a marginal share in total sales (approx. 0.03% of the total annual sales). As a result, they do not have any serious impact on satisfying the demand from the wood industry.

Trade negotiations take place when wood material have been put on the „e-drewno” auctions several times, but has not found a buyer. A Forest Inspector appoints a special committee and is entitled to hold trade negotiations with selected companies. In principle, such situations do not occur during an economic boom, but, paradoxically, their occurrence during a recession is rare, too. Negotiations occur very rarely due to possible corruption allegations possibly targeted at a Forest Inspector.

The retail list price sales take place directly at individual forest inspectorates. A relatively large volume of wood, which is approx. 17 %⁵ of the annual round wood sales in the State Forests. The greater part of the offer is fuel wood for local retailers. Such policy implemented by the State Forests is unclear. A relatively large share of the annual wood removal is directed at retail sales and, conventionally described as fuel wood, reduces the offer for the wood industry. Additionally, the fact that only Forest Inspectors decide on the volume and assortments of the wood for retail sales constitutes sort of an internal demand control mechanism in The State Forests National Forest Holding, which, in principle, is not subject to any means of control.

It must be emphasized that the regulations in force with regard to wood sales by the State Forests do not correspond in full with neither the needs of an effective forest policy nor the expectations from the Polish wood industry. Lack of stable economic policy in the forest sector, resulting in an uncontrollable collision of interventionist regulations with market mechanisms, does not contribute to the development of the Polish wood industry and the rise of its competitiveness. It has, however, a direct influence on the rise of wood prices, which we have observed in the past years (Fig. 1).

⁵ It arises out of the division of the wood material sales volume pursuant to guidelines of the General Director of the State Forests [7].

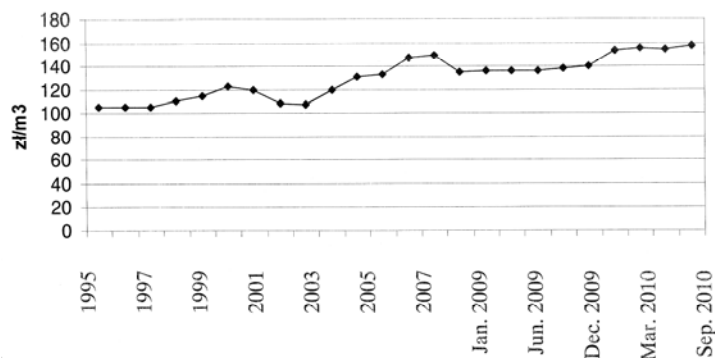


Figure 1. Average price of wood in the State Forests National Forest Holding in the years 1995-2010

Source: Data from the State Forests National Forest Holding [7]

4. CONCLUSIONS:

1. Introduction of the Forest-Wood Portal and new rules for the sales of wood have led to a lack of direct contact between a seller and a buyer and make it practically impossible to assess the quality of wood to be purchased. Because the wood material to be bought in such circumstances does not have all expected qualities, it hampers and sometimes makes it impossible to use it reasonably in the industrial processing.
2. Purchase of wood material of a lesser quality results in a substantially lower material efficiency and significantly higher production costs in the wood industry
3. Current rules for the wood material sales make it virtually impossible for a company in its first year of business activities to buy a cheaper wood in the restricted tenders (lack of purchase history). Thus, it is almost impossible to commence wood processing business activities in Poland without solid financial provisions and securing financial resources for such business activities is extremely difficult.
4. Wood sales rules in force in Poland do not guarantee stable deliveries of wood material and are incomprehensible to many purchasers and, as a result, effectively inhibit the development of the already existing companies.
5. Partial solution to at least some of raw material problems experienced by the wood industry would be to introduce a possibility to enter into long-term wood material deliver agreements with the market monopolist - The State Forests National Forest Holding. Such agreements should guarantee stable deliveries of raw material adequate to current needs of the industry and at the same result in the predictability of wood prices within the period of the agreement (in reference to, for example, exchange rates for key currencies or other macroeconomic indicators).
6. It seems that, depending on the volume of purchases, wood material sales agreements should be concluded by Forest Inspectorates, Regional Directorates of the State Forests or the Directorate-General of the State Forests.

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Jaroslava Kádárová, Renáta Turisová⁶

RESTRUCTURING OF INDUSTRIAL COMPANIES

Abstract: The article is focused on company's crises and principles of solving them. One of the way how to resolve the company's crisis is to restructure the company. The management could also use turnaround as a fast way of company's restructuring. This article describes the importance of turnaround planning, process of turnaround and basic steps of turnaround.

Key words: restructuring, turnaround, industrial company, company's crisis.

INTRODUCTION

For companies suffering financial distress, assistance arrives in two principal, somewhat distinctive personalities - Restructuring Advisors and Turnaround Managers.

The checklist of warning signals of financial crisis consists of the following questions.

- Is the company a heavy borrower of working capital?
- Are gross margins narrowing?
- Is the company's business environment subject to rapid change?
- If volume drops, can production cover expenses?
- Is the company operating on outdated marketing data?
- Is the company so highly structured that it takes a long time to generate decisions? The longer it takes to make decisions, the more projecting s treasury manager should do.
- Is equipment old? If it is, any economic downturn will hit the company harder.
- How intense is competition in your industry? Heavy competition will make any economic slowdowns more challenging for a company, and subsequently cut its cash flow.
- Is your company increasing its borrowing without an increase in sales?
- Are investors and receivables on the rise without a concomitant increase in sales? [4]

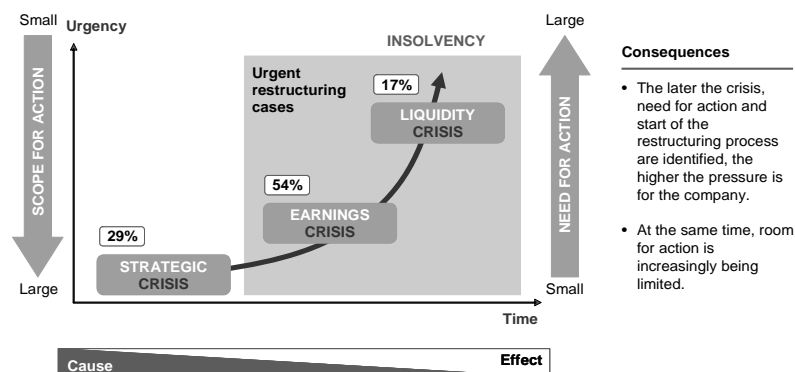


Fig. 1. Company's restructuring [1]

71% of companies in a crisis start reorganizing too late. Distress in companies with annual turnover in excess of 350-500 million euro is nearly always approached as a restructuring, rather

⁶ Technical University of Košice, Faculty of Mechanical Engineering, Department of Management and Economics, Némcovej 32, 042 00 Košice, Slovakia, Tel.: 055/602 32 42, fax: 055 / 602 32 34, Renata.TurisoVA@tuke.sk



than turnaround. Turnaround management solutions in multi-billion euro enterprises require a window of time beyond the usual patience level of creditors and other constituencies. Restructuring is simply quicker.

1. DEFINITIONS OF RESTRUCTURING AND TURNAROUND

The points of view of restructuring and turnaround professionals, particularly given their differing origin and backgrounds, are distinctive.

Restructuring is a complex financial exercise in projection and valuation, preparatory to a delicate, often painful, negotiated balancing of creditor needs and attitudes toward accepting less-than-full repayment. Its practitioners' origins are most often in accountancy or, for very large distressed enterprises, investment banking; most do not have prior backgrounds as industrial managers but rather have spent their careers in accountancy, banking or consultancy. Most advisory work outside the US is restructuring-oriented and principally conducted by accounting professionals. The largest accounting firms dominate this landscape, supplemented in the US by a number of accounting-derived practices [5].

Restructuring is an exercise focused upon:

- the balance sheet,
- the current cash-generating capability of the enterprise and/or its constituent parts,
- valuation of the enterprise and/or its constituent parts,
- its debt-carrying capacity, with an eye toward:
 - selling/liquidating the enterprise and/or its constituent parts,
 - effecting a forced reduction or conversion of debt levels to match cash-generating capabilities. [7]

Turnaround consulting is a complex operational exercise in first providing experienced leadership to quickly and drastically reshape the business for improved performance, then persuading highly reluctant managers, owners and investors to execute the painful change they have assiduously avoid and impatient creditors to vouchsafe a window of time for change to occur. Turnaround professionals must additionally develop similar restructuring skills because they are often engaged so late that inadequate time remains to execute a turnaround and/or lender fatigue has set in so heavily that patience has been exhausted. Furthermore, turnaround efforts can be an incomplete solution and must be followed by some restructuring.

Turnaround consultants provide leadership under trying conditions and therefore are nearly always proven, experienced business leaders generally not consultants or advisors by background. Their leadership-by-example must win the respect and acceptance of the distressed company's owners and managers. The most difficult part of turnaround consulting is frequently not the formulation of the turnaround strategy, but gaining acceptance for it. Such leaders often come to turnaround consulting later in the careers, having served as CEO (often on multiple occasions) with on-the-job experience working within distressed situations. Such leaders are often senior. Within Morris Anderson & Associates, for example, only 5 per cent of our professionals are under 40 years of age. This is very different from the "pyramid" structure typical of major accountancy and investment banking groups [3].

Turnaround management solution first focuses upon:

- the cash flow (and profit & loss) statement,
- operational effectiveness of the enterprise's management, systems, procedures, pricing, purchasing, production and market strategy,
- segmented profit contribution by element (division/facility/ product line/product),
- redundant or under-utilized assets,
- the "depth-of-distress",
- window of time remaining before funds are exhausted,
- pressure, patience and support among the constituency with an eye toward:

- effecting a significant increase in cash flow through cost reduction, improved working capital management, redundant asset liquefaction, and rationalization of investment,
- providing leadership and talent to support such change,
- gaining/regaining credibility and support within the constituencies for necessary, often drastic change,
- all within a time frame delimited by cash flow and the forbearance of constituents,
- moving to restructuring strategies (above) only if and when the company has maximized its self-help opportunities.

2. IMPORTANCE OF TURNAROUND PLANNING

Distressed companies frequently require both improved efficiency of operations as well as a contraction of the business by withdrawal from diseconomic activity. For owners and managers, who frequently believe they have already pared costs to the maximum, further "improved efficiency" is distressing. Withdrawal from diseconomic activity, particularly activities nurtured to provide important future growth, is even more painful. Turnaround managers, as advocates of necessary change, are often the much-unloved deliverers of pain. There is thick emotional content in disassembling what others have carefully built diseconomic or not. For these reasons, skilled Turnaround Consultants first take a careful assessment of the "degree of distress", analogous to an emergency room physician taking the temperature of an incoming patient. Subsequent actions depend greatly on whether that temperature is 38°C, 39°C, or 41°C, dictating whether one wields a scalpel, knife or hatchet and whether there is time for analysis, contemplation and buy-in versus a requirement for immediate, often draconian, action. The "art" of turnaround is a measured balancing of the necessities dictated by the painful present counterbalanced against future growth prospects.

Our analogy for clients is the pruning of a tree. If the root system is unable to sustain the whole tree, one must identify (often difficult) and prune dead or dying branches which in turn helps provide adequate nourishment to the remaining tree. Even more emotionally charged and debilitating is the pruning of new shoots and branches which require a disproportionate share of nutrient.

The need for turnaround planning arises when:

- in failed routes no signs of structured patterns with regard to turnaround planning to be found,
- important bottlenecks stem from lack of planning and systematic approaches towards the problems risen,
- top 3 regarding causes of distress often not enough addressed,
- so, an urgent need exists for more systematic turnaround action based on success and "reversed" failure factors.

A framework for turnaround planning seems necessary and helpful for business practice [6].

An integrated written business plan for a company in financial difficulties that serves as a foundation for a rescue operation aiming to restore the long-term viability.

Four reasons for writing a turnaround plan are:

- focus - gives clear and integrative picture of what should be done,
- compass - avoids losing track of needed actions to be taken,
- performance measurement - gives quantitative and qualitative goals,
- conviction and giving account - helps in negotiations with financiers.

In general: a steering mechanism for company management to avoid failure factors in a situation of distress.

3. PROCESS OF TURNAROUND

A turnaround can be defined as reorganization route which takes place outside the statutory framework with the objective of restoring the health of a company in financial difficulties within the



same legal entity. It is a restructuring without aiming to use judicial bankruptcy proceedings (informal reorganization).

The process of turnaround consists of three basic steps.

First Step of Turnaround is to take an initial pass through the financials, control systems and management team and develop detailed, 13-week cash flows. In companies experiencing a high degree-of-distress we have seized control of the checkbook and immediately begun the pruning process. In most situations, we have determined we have weeks or a few months of cash, rather than days, and commence our normal Phase 1: getting our "hands around the business" and mapping out the turnaround strategy. Dependent upon size and complexity, this will require 1-6 professionals for a month or two. After 3-4 weeks, we provide the Board and management with our unwashed, independent view of the company as well as a strategy of turnaround and/or restructuring steps and/or alternatives. This is often an uncomfortable process. More "personal" agenda items are, of course, the most difficult to face: incompetent owner/manager/blood relative, inadequate senior managers, asphyxiating future avenues of growth, identifying management blunders, axing treasured owner/management fringe benefits, trimming health plans, scheduling sizeable layoffs, shuttering long-standing facilities, facing liquidation, etc. Our view is sometimes challenged and a different point of view is advanced by management. If we can be convinced, our view and next steps are modified. If unconvinced, we will present both competing points of view in our presentation, usually made shortly thereafter, to secured lenders.

Second Step of Turnaround is to win acceptance for a plan beset with woeful human consequence and its blows to ego and self-esteem. Acceptance faces a simmering stew of economic necessity, survival, lender pressure, aspiring rationality, Board support, backbone, conflicting loyalties and denial. When reflecting on more successful vs. less successful outcomes over the past 20 years, the key difference was not the quality of the proposed turnaround strategy, but whether at this stage, a steadfast commitment to execute the plan emerged. Less successful outcomes arise from a tentative, wavering acceptance that ultimately bogs down in the harsh realities of implementation. Given consensus, we either move forward during the next several months on plan execution (typical of smaller, lower middle market companies) or on more tactical planning based upon the strategic outline. For larger companies, we may proceed 2-4 months into the engagement before implementing the turnaround plan. In conducting "profit improvement" work for underperforming-but-not-distressed companies (typically the under-achieving portfolio companies of equity and mezzanine investors), the implementation process is slowed somewhat as we form working groups, in conjunction with middle management, to provide buy-in to ensure the ultimate sustainability of the turnaround goals.

Final Step of Turnaround is a not an insignificant commitment of talented professional support. The return on investment on such an undertaking is usually an annual savings 5-10 times the cost of the outside turnaround team, plus the liberation of substantial capital, on a one-time basis, due to more effective working capital management and rationalization of redundant assets. In many cases, the resulting change is sufficient to stabilize the company, giving it renewed life. In other cases, particularly when we begin late in the degenerative spiral, these changes must be followed by refinancing, reinvestment, or whole or partial sale of assets. In nearly all events, there is more-than-sufficient value generated in the process to have justified the turnaround solution.

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This article is a result of partial solutions to the grant ITMS 26220120060 Centrum výskumu riadenia technických, environmentálnych a humánnych rizík pre trvalý rozvoj produkcie a výrobkov v strojárstve.

Andrea Krauszová, Edita Szombathyová⁷

FACTORS OF THE PRODUCTION PROCESS AND THEIR EFFECT ON EFFICIENCY AND PRODUCTIVITY

Abstract: Recently the determining factor of entrepreneurial success is making the entrepreneurial processes more effective that leads to the growing of productivity and to the overall efficiency of the company. The basic requirement is the identification and knowledge of those factors and indicators that fundamentally affect the production process of the company, their thorough analysis and optimal application.

Key words: production process, factors of efficiency, technical-organizational level of a production process, technical-economic level of a production process, productivity.

INTRODUCTION

The current task of production-oriented enterprises is the constant increase of competitive capacity of products and services, making production more effective and innovating the productions base. Ensuring the fulfillment of these tasks takes place at the cost of extensive system changes and internal production structure. The successive fulfillment of these leads to the overall increase of productivity and efficiency of the given company. Therefore, the basic moment of efficiency of the company is the knowledge and optimal application of all production factors of the company.

BASIC FACTORS OF EFFICIENCY

If a company wants to achieve better knowledge of production factors, it has to find the primary reasons, i.e. it has to go to the basic factors, from the level of which the achieved results depend, i.e. the basic factors of efficiency. Knowing that the basic moment of efficiency is the optimal use of company sources, it is possible to select factors that are present within the technical and organizational level of production.

Technical and Organizational Level of Production

Table 1 shows the chosen indicators, through which it is possible to characterize the partial factors of the technical and organizational level of production.

Each of the mentioned indicators is of complex character and can be divided to further partial indicators or their systems. The single indicators describe the technical and organizational level of production, and/or its dynamics and characterize its single elements. The amount or dynamics of

⁷ TU v Košiciach, Strojnícka fakulta, Katedra manažmentu a ekonomiky, Némcovej 32, 040 01 Košice, andrea.krauszova@tuke.sk, edita.szombathyova@tuke.sk



each of these indicators (and/or processes that these indicators reflect) has a certain importance of its own, but it has mainly importance in connection with the effect that it evokes.

A point of reference for analysis of technical level of production should be the evaluation of external relations of production units and evaluation of internal structure of processes, operations and elements. The application of the determining production factors and their efficiency in correlation is primarily evaluated.

Table 1. Characteristics of technical and organizational level of production

Partial factor	Indicator
Technical level of machinery and equipment	Structure of Machinery and Equipment - by age - by character of technology - by functional characteristics
Degree of mechanization and automation	- share of mechanized and automated production in overall production - share of mechanized and automated activities in overall labor content of production (products)
Work and technology	- share of machinery and equipment in cost of acquisition per worker, - energy consumption
Production organization	- length and structure of production process - rhythm of production
Degree of mass production	- average size of production batch - indicators of level of specialization
Qualification of workers	- qualification structure of workers
Degree of technology use	- share of progressive type of technology in overall labor content of production (products)
Degree of product construction	- indicators of technological construction

An important factor of technical and organizational level of production is organisation of production. For its main indicators are considered to reveal the production structure of the company, prevailing type of production and level of specialization. The conditional factors of the development of specialization are: the application of all forms of constructional unification of production (classification, unification, normalization) and all forms of technological standardization. It is necessary to focus on the standardization of all elements of the production process, from machinery and equipment, through produced products, to technology.

Technical and Economic Level of Production

The technical and economic level depends on the technical and organizational level of the company. Some parameters, mainly those that ensure changeability and operational liability, are not only of technical character, but it is possible to express them even through economic indicators. Technology and organization of production reach partially into the technological, i.e. technical issue, but also into economic and organizational issues, i.e. into the issues of management.

The main track of increasing technical and organizational level of production is its complex modernization - application of highly productive technological methods, complex mechanization and automation of production. It is possible to classify the factors that affect the technical and economic level of the production process as follows:

- production, material, energy, technologies, machinery and equipment,
- organization and management, workers, suppliers.

The dominance of some of the factors and their overall combination determines the character of expenses of the production process. It is possible to increase the technical and economic level of production in all fields of the entrepreneurial activity. Regular analysis of the selected indicators of company performance and the need to achieve planned economic goals create the necessity to determine and evaluate the reasons that positively or negatively affected the results.

It is the issue of the technical and economic analysis that focuses mainly on the following:

- utilization of production capacity,

- evenness and quality of production,
- output standards,
- production reserves,
- unfinished production,
- level of defectiveness,
- changes of assortment.

Through the analysis of the above-mentioned fields it is possible to judge the level of basic factors of efficiency.

PRODUCTIVITY AND PRODUCTION PROCESS

Each unit and department in the company defines its own factors that limit its productivity. Although, it is the management that has to make such decisions that ensure growth of productivity within the whole company. Therefore it has to judge all existing factors, arrange them into groups and sub-groups, and determine their importance, priorities. Having said this, the companies have to bear in mind the issue of productivity that is an inseparable part of the overall strategy of production.

Productivity of the Production Process is described by Fig. 1 [1].

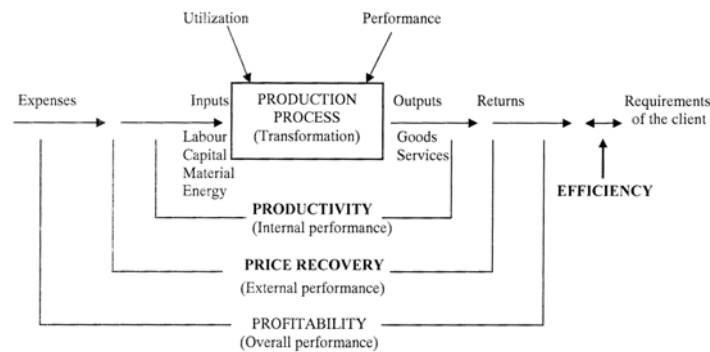


Fig. 1. Productivity of the Production Process

Productivity is directly and indirectly influenced by a number of factors from outside and inside of the company. There are a number of effects that are possible to divide into two main groups: physical (technological and material aspects of processes, time or capital utilization) and psychological (behavioral models of employees, motivation factors).

Selected factors of the production process in relation to productivity and its growth are in Fig. 2.

Productivity growth is connected mainly with technical equipment and organization of the production process, but also with quality of work force that the company has in its disposal. Mutual effect of all these fields and indicators that are characterized by the single fields should create the precondition for a faster and more effective production process and contribute to its optimization. Also, feedback in all fields should not be forgotten: on measurement, analysis and evaluation.

Therefore, productivity is the result of the overall effect of a number of factors: process improvement, improvement of organizational methods and management of production, and increase of the human factor quality. Mutual harmonization and balancing of these factors plays an important role that leads to stabilization and becomes the main factor of a successful company.

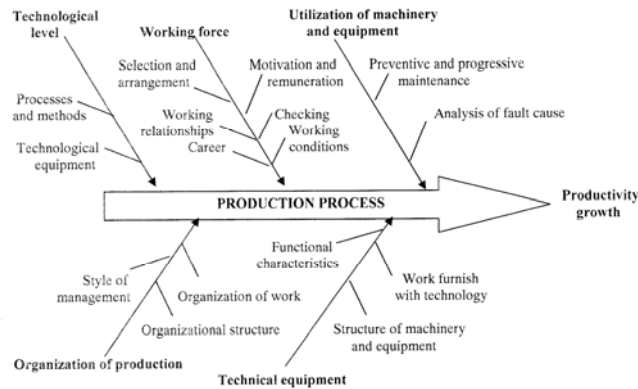


Fig. 2. Factors of the production process in relation to productivity

CONCLUSION

The increasing harshness of the market environment forces production companies to pay attention to improving operational conditions and to analyze their own production processes. The company has to operate in such a way that the transformation of inputs to outputs takes place at optimal consumption of production inputs, optimal selection of production processes and at optimal utilization of production capacity. On the other hand, at the same time it has to ensure competitiveness and achievement of economic goals of the company.

Without regard to the technical, organizational and economic level of production it is not possible to explain and judge profitability, labor productivity, capital turnover rate etc. in the company. This is why factors in these fields are the basic factors of efficiency and productivity of the production process.

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The paper is part of solving the grant task VEGA 1/0052/08 System Approach to Rationalization of Work Processes at Production Companies.

*Wojciech Lis*⁸

BIOMASS AS AN ENERGY SOURCE

Abstract: Basic source of a renewable energy in Poland is a biomass. It results from the calorific value of a wood, good accessibility and relatively low cost of a wood raw material. This paper focuses on certain aspects of use of the biomass as a source of energy in Poland as well as its economic implications.

Key words: biomass, calorific value, energy resources

PREFACE

Biomass is considered to include biodegradable, solid or liquid residues of plants or animals, which originate from products, wastes and residues from the agriculture and forestry sectors, as well as from industries that process their products. Biomass also includes those parts of wastes that are biodegradable. Biomass is the third largest natural energy source in the world [1].

SOURCES OF BIOMASS

Biomass (the feedstock to boilers in power stations or heat and power plants) may include:

- firewood (chips, shafts, branches),
- biomass fuel (whole-tree chips, bole chips),
- wood waste (bark, slabs, edgings, bricks, sawdust, wood chips),
- products designed to be combusted (briquettes, pellets),
- agricultural waste (straw, chaff, husks, litter, manure),
- grains,
- energy crops (hay, Pennsylvanian mallow, miscanthus, canary, Jerusalem artichoke),
- fast-growing trees (varieties of poplars, willow),
- municipal solid waste.

A major source of the biomass, apart from the wood, can be straw, willow and thornless rose. To heat up a significant part of the Trzcianka City there was used a willow. A plantation of 25 ha area was established in Trzcianka in 2002. Since then, the willow crops have been regularly increasing their share in the energy production. In 2005 the plantation reached 130 ha. Ultimately 500 ha are planned to be cultivated. A plantation of such area should satisfy needs of Municipal Heating Company in the Trzcianka City (Miejskie Przedsiębiorstwo Energetyki Ciepłej MEC Spółka z o.o. w Trzciance).

Straw in the power industry is currently of little use. However, the straw may be used to supply small local heating stations for sure (e.g. in small communes or private houses). Unused surplus of the straw in Poland is estimated to be 9 - 10 million tons per year [5,6]. Presently it is the cheapest fuel; its calorific value is a little bit higher than the value of wood (Table 1). Professional, automated systems intended for straw combustion, however, are very expensive.

The largest investment of the above-described type is being carried out in Lubań Śląski. Depreciation time of the afore-mentioned investment is estimated for 20 years. The straw is used as a source of the energy also in Frombork, Zegartowice and some communes in the Wielkopolska region [4].

⁸ Department of Economics and Wood Industry Management, Poznań University of Life Sciences, Wojska Polskiego 38/42, 60-627 Poznań, Poland, wlis@up.poznan.pl

Table 1. Calorific value of selected fuels

Calorific value of selected fuels (in MJ/kg)	
petrol	45,00
LPG (propane-butane) (50/50%)	43,03
diesel	42,50
heating oil	42,00
methane natural gas GZ-50	34,43
ethanol	30,40
coal	29,33
charcoal	29,10
nitrogen-rich natural gas GZ-35	25,00
methanol	20,10
lignite	19,70
pellet	18,00
peat	15,90
straw	15,00
wood	14,00
oat grain (rye)	14,00

Source: own elaboration

ENERGY CROPS

Some attempts have been made to implement elephant grass crops onto Polish lands since it is very efficient and does not require much care. Experiments are also carried out with new crops in Polish environmental conditions, for example: miscanthus (*Miscanthus sinensis gigantea*), Pennsylvanian mallow (*Sida hermaphrodita*), Sakhalin water pepper (*Polygonum sachalinense*). Annual growth rates of the afore-enumerated plants are huge, and their energy utility was successfully tested in other countries.

It is better to use a willow and a stave rose as a source of "green energy". Willow plantations in the classification acc. to European statistics - including Eurostat, are regarded as forests [2]. Subsidies for their production are significantly lower than the rate of subsidies for agricultural field crops. A grant requires energy crops on at least one hectare of land. Subsidies are not available for farmers/manufacturers who cultivate rose willow for their own needs. A condition is a multi-year contract with a power supplying company.

The aim of biomass power stations is to create a network of willow plantations. Energy companies co-finance machineries for farmers who sign long-term contracts. These companies accept any quantity of a material, but require that the biomass is free of metallic impurities. Crops cannot be located, for example, in the direct vicinity of highways and roads, where the land is unsuitable for agricultural needs.

Energy supplying companies are interested in long-term contracts with major producers of willow, for example - production groups or cooperatives. Despite the above-mentioned grants farmers/producers are not prone to focus their efforts on the willow cultivation. Willow is troublesome to grow. Fertilization requires a systematic, labor-intensive care and expensive equipment to convert the biomass into a fuel. Problems related with the processing and high requirements for soil humidity effectively discourage farmers (or foresters). The same problems exist in other countries such as the Scandinavian ones.

The experience of countries that are "green energy-focused" and have been developing such technologies for years with great success, such as Norway and Denmark, proves that the most important factors are efficient logistics and a reliable supply system assuring regular supplies to energy generating plants, or plants generating the heat from the biomass [7,8].

THE CALORIFIC VALUE OF THE BIOMASS

Some of the calorific values of fuels, expressed in MJ/kg are shown in Table 1. The calorific value of wood (14 MJ/kg) is equal to half of the calorific value of coal (29,33 MJ/kg). In this manner there is recovered the energy generated by a tree during tenths of the photosynthesis process. Thus, there are no problems associated with the use of post-consumer wood waste and low-quality wood. We have a green energy source.

The calorific value of air-dried wood (12 - 15%), measured by weight (in kg) and volume (in m³) and expressed in different units of energy (calories, MJ, kWh) is provided in the Table 1. Therefore, it can be assumed that the calorific value of wood (1kg of mass) is: 3400 kcal, or 14 MJ or 4 kWh, which corresponds to the calorific value of wood of a volume equal to 1 m³ - almost 1000 times more (more accurately, nearly 750 times more): 2500 Mcal or 10 GJ or 3 MWh [3]. It is important to calculate weight (kg) per volume (m³) of wood (i.e. specific mass [weight]).

The calorific value of air-dried wood expressed in different units - shown in Table 2. These data should be combined with the values provided in Table 1.

Table 2. The calorific value of air-dried wood expressed in different units

Calorific value of the air - dried wood												
3346						771	742	10,8		3		
		14		3,89		760		10,64		2,96		
					kWh/kg	714						2623
3400	kcal/kg		MJ/kg		g	694	kg/m ³	10	GJ/m ³	2,78	MWh/m ³	2584
						760		10,94		3,04		2361
		14,4		4		750	750	10,8		3		2500
3442												
Converting units of energy:					1 kcal = 4,1868 kJ		1KJ = 0,239 kcal		10/36 = kWh/MJ			
Air-dried wood - in Poland it means the relative humidity equal to 12% or 15%												
Mass of wood					wood is characterized by the following calorific value			Volume of wood				
1 kg								1 m ³				
3400	14	4						2500	10	3		
Kcal	MJ	kWh						Mcal	GJ	MWh		

Calorific values (average value for natural gas, electricity and coal) are as follows:

- wood - 10 GJ/m³,
- natural gas – 0,0952 - GJ/dm³,
- propane – 0,0240 GJ/l,
- fuel oil - 0,0357 GJ/l,
- electricity, tariff I and II – 0,0036 GJ/kWh
- coal - 29,33 GJ/t.

Apart from the calorific value of fuels, in the context of logistics processes (storage, transport) their volume is important as well, in particular for power stations and power plants. Table 3 compares the volume of carbon fuels and the biomass. The volume of the straw and the biomass necessary to produce 1 MWh of electricity is much greater than the volume of carbon-based fuels – such as coal powder, sludge granules - had, mud, and the volume of pellets - comparable to carbon fuels - the most similar to the mud.

Table 3. The volume of fuel consumed to produce electricity

Fuel		had	sludge granules - had [70/30%]	sludge	straw	biomass		pellet
Specific gravity	kg/dm ³	0,9	0,9	1,3	0,15	0,28	0,28	0,7
Calorific value	MJ	20	17,6	10	15	8,5	12	18
	Kcal	4780	4200	2390	3585	2030	2870	4300
	kWh	5,56	4,89	2,78	4,17	2,36	3,33	5
	GJ	18	15,84	13	2,25	2,38	3,36	12,6
	Mcal	4300	3780	3110	540	570	800	3010
	MWh	5	4,4	3,61	0,63	0,66	0,93	3,5
The volume of fuel	M ³ /MWh	0,2	0,23	0,28	1,6	1,51	1,07	0,29
	time	1	1,14	1,38	8,00	7,56	5,36	1,43
		0,88	1	1,22	7,04	6,66	4,71	1,26
		0,72	0,82	1	5,78	5,46	3,87	1,03
		0,13	0,14	0,17	1	0,95	0,67	0,18
		0,13	0,15	0,18	1,06	1	0,71	0,19
		0,19	0,21	0,26	1,49	1,41	1	0,27
		0,70	0,80	0,97	5,60	5,29	3,75	1
Converting units of energy:		1 kcal = 4,1868 kJ						
		1KJ = 0,239 kcal						
		10/36 = kWh/MJ						

Source: own elaboration based on "Energetyka" 7-8/2004.

CONCLUSIONS

From the standpoint of use of the biomass for energy production purposes the following properties and efforts are important:

- calorific value (Table 1) and moisture content in the fuel,
- security and stability of supply,
- transportation and storage conditions not impairing the quality (Table 3).

Wood and wood wastes are too valuable materials for the economy to let them be regarded as the main source of the biomass to be used for needs of energy production. Only roundwood assortments and wood, which are unsuitable for production, should be intended for combustion.

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Miroslava Mlkva, Dagmar Rusková⁹

THE IMPORTANCE OF ASSESSMENT OF THE PRINCIPLE OF "MUTUAL SUPPLIER-CUSTOMER RELATIONSHIPS" IN INDUSTRIAL ENTERPRISES IN THE SLOVAK REPUBLIC

Abstract: One of the fundamental principles of quality management is building mutual supplier-customer relations. Many organizations found in practice that effectively meeting customer needs could be achieved by creating partnerships with several reputable and capable suppliers. Partnering with suppliers should become an essential tool in the structure of supply relationships, which are essential for success of business. The aim of this contribution is to show the importance of partnership.

Key words: quality management, supplier-customer relationships, process improvement.

INTRODUCTION

Supplier-customer relationships are commercial contracts, or various forms of cooperation between the supplier and customer companies in the market of organizations. These relationships are usually contracted out, under the legislation of commercial obligations. Power and strength of these relationships is often a key element for the success of both sides. Creating mutually beneficial supplier-customer relations focused especially on the identification and selection of key suppliers, establishing of such supplier relationships that balance short-term chains with long-term objectives between the organization and the whole society, creating a clear and open communication, initiating common development and improvement of products and processes, common formulation of a clear understanding of customer needs.

BUILDING MUTUALLY BENEFICIAL SUPPLIER-CUSTOMER RELATIONSHIPS

One of the fundamental principles of quality management is building mutual supplier-customer relations. Many organizations found in practice that effectively meeting customer needs can be achieved via creating partner relationships with several reputable and capable suppliers. Partnership with suppliers should become an essential tool in the structure of supply relationships, which are necessary for success of business. Partnership is a systematic process for the development, implementation and continuous improvement of business relations. Without the basis of effective relationships the management of materials and information flow within the supply chain could be unsuccessful. Partnerships among organizations are one of the ways how to find and retain the competitive advantage.

Relations between the organizations may have different nature: from the common trading relations, which consist either of single transactions or multiple transactions to vertical integration of two businesses. The most relations among organizations have the nature of common trading relations: two organizations deal with each other, often over a long period of time when commercial exchanges includes a series of transactions. When the commercial exchange ends, thus is also the ending of business relationship. Although in many cases, the common trading relation is sufficient and the appropriate type of relationship, there are situations where a closer, more integrated relationship called the partnership could bring significant benefits and advantages to both organizations [3].

The partnership is a special business relationship based on mutual trust, openness, risk-sharing and sharing of profits, which brings (to both mentioned parties) a competitive advantage resulting in higher business performance than would have been possible to achieve by the participating

⁹ *Institute of Industrial Engineering, Management and Quality, Institute of Engineering Pedagogy and Humanities, Faculty of Materials Science and Technology, Slovak University of Technology, Paulinska 16, 917 24 Trnava, Slovak Republic, miroslava.mlkva@stuba.sk, dagmar.ruskova@stuba.sk*

organizations separately. The issue of partnership with suppliers is also dealt with in the standard ISO 9004:2009, Art. 6.4, literally named "Partners and suppliers" and states: "The organization and its partners are mutually independent and their mutual helpful relationship enhances their ability to create value. The organization must consider the partnership as a specific form of relationship with suppliers, where suppliers can invest in and share the profits or losses of the organization" (ISO 9004:2009). The partnership between customers and suppliers in the final form must be based on mutual trust, openness, risk-sharing, but also rewards sharing. Its creation is very time consuming and requires great efforts of all concerned.

APPLYING THE PRINCIPLE OF "MUTUAL SUPPLIER-CUSTOMER RELATIONSHIPS" IN QUALITY MANAGEMENT IN ENTERPRISES IN SLOVAKIA

Within the frames of the research project "Perspectives of quality management development in coherence with requirements of Slovak Republic market," we have approached issues of quality management applications in various branches of industry (e.g. automotive industry, mechanical engineering, wood industry, and electrical industry, food processing and alike). Through research, we assessed the level of application of fundamental principles that are the basis for designing quality management systems.

The survey we conducted via a questionnaire was attended by 124 organizations in Slovakia from enterprises of different sizes. In evaluating the data, we divided the organization into four groups according to firm size and we also surveyed, whether they have an introduced or certified quality management system. The structure of surveyed enterprises according to size of the business was as follows: 4% of micro businesses, 19% of small business, 30% of middle-sized businesses and 47% of large businesses. Almost all surveyed businesses have an implemented and certified quality management system, so when evaluating the data we did not use this criterion for the distribution of businesses.

The survey included also questions by which we tried to find out, how activities related with the principle of mutual supplier-customer relationships are implemented in practice.

First of all we have tried to figure out how the mentioned principle is understood and applied in business practice, in quality management and whether there are differences in its application in business practice, in organizations of various sizes. In this paper we present some results obtained from a survey of the issues. In the questionnaire there were the following questions.

1. How do you understand the concept of partnership with suppliers?
2. Is it necessary to choose a supplier with a certificate of quality management system?
3. Which criterion is the most important for your organization in the evaluation of suppliers?
4. How would you evaluate the communication with your suppliers?

Today, we see how increasing the importance of promoting partnerships with suppliers, which represents a systematic process for the development, implementation and continuous improvement of business relations. Therefore, we tried to find during the survey how is this concept understood in individual organizations involved in the survey.

Up to 58% of respondents stated that the concept of partnership with suppliers is perceived as a mutually beneficial relationship, 15% as an economically beneficial cooperation, to 11% as effective communication and loyalty (Fig. 1).

If we have to look at the issue in terms of business size, it can be concluded that the size of the business does not affect the implementation of partnerships with suppliers.

In the next question we investigated whether it is necessary to choose a supplier with a certificate of a quality management system. 37% of questioned organizations require QMS certificate from all suppliers. Up to 47% of organizations require QMS certificate especially from their key suppliers. The stated requirement in choosing a supplier can be considered as correct, because the existence of the certificate should indicate the organization's ability to supply in the long term the products which meet stated requirements.

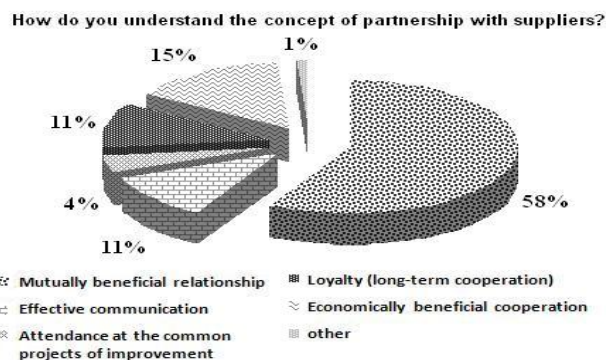


Fig. 1. The concept of a partnership with suppliers in surveyed organizations

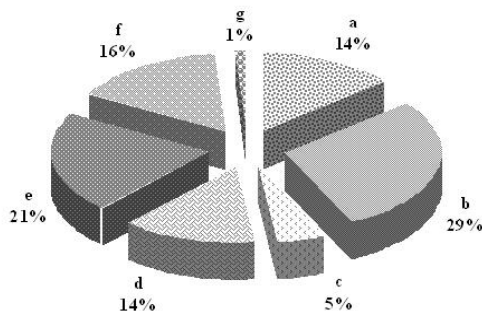


Fig.2. The most important criteria in the process of suppliers' evaluation

Another area of the survey was the issue of the evaluation of supplier. In regular evaluation of suppliers several criteria are used. In the survey we were interested in knowing what criterion is perceived by the organization as the most important in the process of suppliers' evaluation. The order of the selected criteria was as follows (Fig. 2): 29% identified as the most important the number of complaints (option b), 21% indicated the price of input materials (option e), 16% indicated the combination of several criteria (option f), and 14% indicated the on-time application and the implemented SMK of the supplier (options d, a). The most important criterion was the number of complaints, which is a positive fact. In case of a large number of complaints against the organization it can mean not only financial loss but also loss of reputation of the organization.

How would you evaluate communication with your suppliers?

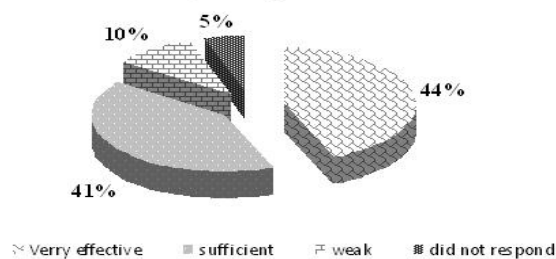


Fig.3. Evaluation of communication with suppliers

As the communication between the organization and suppliers is very important and necessary, the next question in the survey was the assessment from the individual respondents. 44% of respondents identified communication as very effective - throughout the entire product creation, 41% of respondents identified the communication as sufficient - especially during the signing of contracts. 10% of respondents identified the poor communication with suppliers, which is not good information for creating good relationship between two sides (Fig. 3). Communication between suppliers and customers should not finish with the agreement on the requirements, but it should continue in the form of feedback on deliveries or it should have the form of mutual assistance in solving problems. The forms, channels and frequency of mutual communication and of course its content should correspond with the basic objective of the partnership, i.e. they should create and strengthen the relationships of mutual trust and solidarity.

Based on survey results as shown, we may conclude that the issue of building mutual supplier-customer relationships which are based on partnership with suppliers has a good perspective in future. The long term positive effects will become evident when building customer relationships is based on principles of partnership, e.g. [2]:

- customer may offer reliable suppliers favorable, long-term contracts and thus motivate the supplier;
- the supplier will work under conditions of uncertainty and will be willing to use sources for the development of staff as well as the development of technologies and their products;
- suppliers will not have to invest such large amounts of energy and resources when searching for new customers, thus lowering their costs;
- lower costs may result in more attractive prices for the customer;
- the frame of the real strategic partnership will be developed through a mutual effort for continuous improvement.

CONCLUSION

The problem of building mutually beneficial supplier-customer relationships, and especially creating partnerships with suppliers, should in the future become an important tool in the structure of supply relationships, which are essential for the success of business. Without the foundation of effective relationships the management of material and information flow within the supply chain may be unsuccessful. Partnerships between individual organizations are one of the ways in finding and retaining a competitive advantage.

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The contribution provides some results of a survey which was realized in the research project "Perspectives of quality management development in coherence with requirements of Slovak republic market".

Renata Nováková, Andrea Tománková¹⁰

THE USE OF INTEGRATED MARKETING COMMUNICATION IN THE WOODWORKING INDUSTRY

Abstract: The use of integrated marketing communication in practice has several advantages. The most important advantage is that such a way of communication is chosen that will strike the target group for which the information is intended the most efficiently and that will at the same time save costs. Integrated marketing communication is also a tool of competitiveness. Properly chosen marketing communication can help even in the woodworking industry. The aim of this paper will therefore be to highlight the benefits and effectiveness of such communication.

Key words: integrated marketing communication, communication process, strategy, woodworking industry.

INTRODUCTION

The growth of product competitiveness in the globalizing markets is one of the main strategic objectives of the economic policy of the European Union countries. Woodworking industry belongs to the group of sectors with the highest dynamics of deepening the competitive environment. As there currently appears a lot of competing products, it is important for the woodworking industry to choose an appropriate communication mix to present its products (or company) to the market.

The concept of integrated marketing communication comes to the forefront more and more often, because the individual use of different marketing communication tools is not sufficient. A certain synergy is created, where tools cooperate together and create a comprehensive image of the company for a customer. When the customer is offered information, tools and media in a way that perception and sub-consciousness are integrated, he understands the communication message better and faster and creates a unified and comprehensive image of the communicating company. Synergy is also an element supporting the building of marketing relations on the principle of long-term loyalty.

INTEGRATED MARKETING COMMUNICATION AS A TOOL FOR COMPETITIVE ADVANTAGE

Mass, undifferentiated – the term marketing had used in the past - has now been changed into a narrowly specialized one, which a lot more cares about smaller groups of customers with specific needs. Integrated marketing communication which we understand as the perfect combination and the optimal use of all communication tools comes to the forefront. Integrated marketing communication is dealt with by several authors and experts in marketing. All agree that the mutual interaction of tools is currently the only option to succeed in such a highly competitive environment. Although the integrated marketing communication can be defined variously, a common sign of these definitions is that they contain the same idea: individual tools of marketing communication that were independent of each other are now combined so as to achieve a synergic effect and communication is becoming homogenous. The main benefit of integrated marketing communication is primarily the fact that a consistent set of communications and information is passed to the target groups by the most suitable means. Communication becomes more effective and efficient, based on the synergic effect and harmony between the different used communication tools with what we want to communicate to the customer. We can say that an integrated marketing communication compared to traditional marketing communication creates and represents a new value.

¹⁰University of Ss. Cyril and Methodius in Trnava, Faculty of Mass Media Communication, Nám. J. Herdu 2, 917 00 Trnava, re.novakova@gmail.com, andrea.tomankova@ucm.sk

CREATION OF THE COMMUNICATION PROCESS

The process of marketing communication must be systematically planned. Effective marketing planning requires a selection of target markets and identity of target customers, precisely specified goals, based on which the communication is set up, the selection of communication channels is performed and a budget is made. Next comes the choosing of appropriate media. After the realization of communication the results are evaluated (it is found out whether the objectives have been met).

Matúš divided the efficient operation of marketing communication tools and its better focus on its target market into six areas or steps:

- identify the target audience,
- decide what reaction we want to provoke,
- choose an effective message which will provoke an expected reaction,
- choose appropriate media,
- choose the source of message,
- find out the feedback.

Both these definitions are simple and clear, we could in fact immediately assign a particular plan of actions and tasks to each step. However, what we lack is that we do not know in which step a specific strategy is being formed with regard to the need to meet the required strategic communication objectives. Jedlička included this element of formation of the promotion strategy into his algorithm of creation of promotion strategy. His steps are:

- input dispositions,
- clarifying the strategic nature,
- forming the strategy,
- planning of stabilization,
- implementation decomposition,
- control measures.

According to Jedlička, defining the process of creation is considerably more difficult, but we see there also a particular step of strategy forming, i.e. its position within the whole algorithm. Input dispositions include determining the input targets, clarifying links to other strategic documents and evaluating the input information. Within the stage of specifying the strategic nature, he describes the importance of proposal of so called “strategy soul”, setting support and additional goals and defining the risk factors of the process. According to him forming the strategy further includes creating the alternatives, selecting the final variant, selecting the tools and specifying the techniques to achieve the objectives, determining the budget and implementation process. The stage of planning the stabilization includes determining the teams to perform the content of strategy, defining competence, timing and regulatory and control measures. The implementation decomposition then includes dividing the plans into smaller tasks and goals, setting the incentive program for the staff and a detailed specification of the necessary resources for implementation. Subsequently, control measures are associated with the selection of methodology of the control process, setting up the procedure for performing the inspection, identifying the control team, suggestions how to process and hand over the results, evaluating the benefits and the like.

When making the prognosis for the woodworking industry, we should come from the fact that the countries of the European Union by the accession of new countries which have enough wood raw material and advanced wood-based industries have become a surplus territory instead of the lacking one with respect to wood raw materials, wood semi-finished products and wood products. The correctly chosen marketing communication may help in the process of getting into this competitive market.

CONCLUSION

There are currently more and more companies which start to implement a program of integrated marketing communication. This is the way of planning the marketing communication that realizes the added value of a single plan evaluating the strategic role of the full range of communication tools which are combined in such a manner that clarity, consistency and a maximum impact of communication through a perfect integration of particular messages are achieved. A growing number of businesses and companies realize that they must organize their advertising and PR campaigns with the campaigns of direct marketing in a uniform and harmonized manner. Companies must strive to perfect knowledge of their clients and based on this knowledge and integrated marketing communications to create long lasting customers relationships. This also applies to woodworking industry which is one of the most important industrial sectors in the EU.

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The contribution is part of a research project VEGA No 1/0107/11 Quality Management in the Areas not Covered by ISO Standards for Quality Management Systems.

Renata Nováková, Andrea Vadkertiová¹¹

TRANSFER OF THE RESULTS OF SCIENTIFIC ACTIVITY TO THE WOODWORKING INDUSTRY AS A COMPETITIVE MARKETING ADVANTAGE

Abstract: In Slovakia, the transfer of technologies is supported by the National Support System for Technology Transfer. This system also includes different institutions and organizations such as: the Centre of Scientific and Technical Information, the National Centre for Science and Technology Popularization, the Patent Information Centre, clusters, technology parks, innovation centers and the like. Activities of mentioned institutions are directed to raising awareness of the protection of intellectual property and technology transfer in economic and social practice. Without the use of marketing activities, however, these efforts are not likely to succeed. The subject of my paper will be to highlight the current trends in marketing, specifically in the areas of marketing communications strategies.

Key words: marketing, social marketing concept, technology transfer, communication mix tools.

INTRODUCTION

The aim of this lecture is to highlight the impact and utility of the use of marketing activities during the transfer of knowledge of science and research into practice, specifically into the practice in the woodworking industry. We believe that although this issue is often discussed, it is not always

¹¹University of Ss. Cyril and Methodius in Trnava, Faculty of Mass Media Communication, Nám. J. Herdu 2, 917 00 Trnava, re.novakova@gmail.com



understood and properly developed in practice and so it happens that instead of the fact that the results of scientific and technical progress would come to the forefront of companies which would use them, relevant information is being obscured and not fully utilized. Of course, this fact is not positive, because we all realize that only those companies that can flexibly adapt to new requirements often associated with innovation, can succeed in a competitive environment. In addressing the various grant tasks, we noticed that the public had no information about many research activities or that there are no general rules for the protection of knowledge in its transfer. Although the area of marketing is a relatively unknown area, developed in the works of well-known experts, the use of marketing during the transfer of knowledge into practice, at least in my opinion, is not properly addressed in this context. It is understandable that within the scope of our paper it is not possible for us to deal with all areas that would be worth mentioning. Therefore, at least we try to highlight the link of marketing and transfer of the results of scientific activity into economic and social practice.

1. General background - the social concept of marketing

Marketing is generally regarded as a socio-scientific discipline, representing a range of activities that reflect the attitudes and philosophy of business. We must also say that marketing is the subject of study of all management study programs. Companies, in their use of modern marketing ideas, differ to a large extent. Some companies know their importance and consequences in marketing activities and consistently apply them, other companies deal with marketing activities only marginally. Many times this is also due to the financial resources that are available.

According to the author Kotler, a marketing concept is based on the recognition of the principle that achieving the company's goals depends on understanding the needs of the target market and the ability to offer meeting the needs by more effective way than competitors.

More accurate statement can be found in defining the Concept of Social Marketing. This is based on the marketing concept and is described as follows:

The purpose of the social concept of marketing is meeting the needs of people based on knowledge of the market, while achieving a competitive advantage and at the same time contributing to meeting the needs of society and public interest. It deals with various issues such as environmental issues, the lack of resources, rapid growth of population, inflation, social services. It seeks to align the interests of companies, the society and customers [1].

If we consider the above-mentioned definition of the social concept of marketing, we inevitably get to the concept of management of social responsibility. The term "management of social responsibility" means the planning, organizing, leading and managing of the company in order to fulfill its mission, vision and strategy and of course objectives in accordance with the accepted values, including the social responsibility and the manifesto. Thus, this relates to awareness, ability and duty of people and companies to bear the consequences in their relations for their behavior in the production, exchange and use of (material and cultural) property in a given area and time.

We can further divide the factors of social responsibility as follows:

- the code of business conduct of the company,
- transparency,
- behavior towards customers,
- behavior towards suppliers,
- behavior towards investors,
- relations with shareholders,
- protection of intellectual property,
- development of human capital and education of employees,
- balance of the work and personal life of employees,
- philanthropy and the like.

We can view the above-mentioned factors in two ways. Firstly, they are the areas that could be generated by us also in addressing the issues of marketing communication in the transfer of the knowledge of science and research into practice. Secondly, they are the areas that deal with internal and external relationships in the company. Only the company that can harmonize these factors of social responsibility with its strategies and objectives can be successful in a competitive environment. Currently, a great emphasis is placed on flexibility, the ability to adapt to new trends. New trends are related to innovations and innovations, vice versa, are related to the transfer of knowledge and technologies into practice.

Two seemingly different fields, such as the transfer of the results of scientific activity into economic practice and marketing are interrelated and mutually conditioned. Only the marketing communication strategy which is set up with a high quality can ensure that the information directed from the sender could be received by the recipient in a correct form, in a timely manner and without unnecessary misunderstandings, so that this information could be adequately understood and used by the recipient.

Just for completeness, it is necessary to mention that the basic means of a communication mix, which are used in the context of marketing communication strategy, include the following: advertising, sales promotion, direct marketing and public relations, the so called PR.

2. Public relations and their importance for the transfer of results of scientific activity into practice

Perhaps the greatest importance in the transfer of results of the scientific activity into practice could be played by public relations. The main goal of PR is to reach a positive impression not only in the company, but also to create favorable attitudes of the public towards the company. The PR communication philosophy is based on:

- a) the philosophy of links to external social environment
- b) the philosophy of links to other marketing communication tools

Ad a): PR significantly influence the level of corporate culture in relation to the external environment and ethical, moral and human capabilities of the company are the most obviously seen in PR, therefore this area is considerably perceived in the social aspect. PR form the link between social, market, marketing and promotional communication, therefore, they have a great importance for strategic management of the company.

Ad b): Personal sales, sales promotion and advertisement are mainly focused on positive reports about products.

Basic PR techniques are:

- c) presentation of company symbols,
- d) print information,
- e) mass media publicity,
- f) socio-cultural events,
- g) press conferences,
- h) consulting,
- i) professional symposia and conferences,
- j) sponsorship,
- k) lobbying,
- l) exhibition events,
- m) networking, etc.

All the basic techniques of PR are fully applicable also in creating marketing communication strategy that supports the transfer of results of scientific activity not only into economic practice, but also among professionals.

Now we should give answers to the following questions.

1. Are companies adequately and timely informed about the results of scientific activity?



2. Which communication means are used to send relevant information to potential interested parties?
3. What principles are used in the communication in transferring the results of scientific activity into economic and social practice?
4. How are these results protected at the level of specific communication channels?
5. Are there any general rules on how to proceed in transferring the results of scientific activity into economic practice?

We could generate many similar questions through brainstorming. But much more interesting, however, would be the answers to these questions. Finding facts in this area are the subject of research activities within the proposed grant task. We can only mention that many companies are complaining that the said area is not adequately controlled, not just in marketing, but also in its organization and legislation. On the other hand, we must say that there are many activities that support the transfer of knowledge or the results of scientific and research activity, not only at national but also international level.

As an example we are giving different databases whose task is to ensure the cooperation of companies and scientific and research institutions. One such database originated with the support of the European Union within the solution of the grant task CENTROPE. It contains 1800 scientific and research institutions from four European countries (Slovakia, Hungary, the Czech Republic, Austria). The aim of the database is to facilitate more effective communication and better cooperation in science and research centers with small and medium-sized organizations. The database contains e.g. an overview of scientific branches, the number of researchers, but also the data on facilities of individual workplaces. Organizations can use the database to obtain contacts for research centers or enter a research contract in the country with the best researchers or financial conditions in the required branch (www.centrope-tt.info).

Another example is the formation of the National Centre for Science and Technology Popularization in the society. The core projects of popularization include:

- *Science in the CENTRE* - informal meetings of scientific personalities with the public;
- *Scientific "Confectionary"* - discussions of pupils/students of primary/secondary schools with scientists and professionals;
- *Week of Science and Technology in Slovakia* - supported by the Ministry of Education of the Slovak Republic;
- *Scientific Kaleidoscope* - electronic newsletter popularizing the events of the Slovak scientific scene, news from the world of science and technology;
- *Central Information Portal for Science, Research and Innovations*;
- *Patent Information Centre* - its mission is to prepare patent background research (searches for facts) and provide background research services relating to the status of technology, provide information on intellectual property issues and the process of ensuring the protection of industrial property rights, send patent documents in an electronic form and organize professional seminars.

In practice various institutions are established supporting the transfer of knowledge into practice, e.g. technology incubators, centers of excellence, spin-off centers, clusters, etc. However, the effectiveness of their activities is conditioned by a consistent application of marketing communication strategy.

CONCLUSION

Transfer of the results of scientific activity is not possible without high-quality marketing activities. The National Infrastructure for the Support of Technology Transfer in Slovakia includes to its planned activities in the area of promotion of technology transfer, also marketing of scientific knowledge and the search for partners for their commercial assessment, mentioning also the marketing of technology. This fact suggests that marketing itself has an important role in the transfer of knowledge. So far, however, its role and importance in this area have been neglected or

have been mentioned only marginally or dealt with intuitively. There are many ambiguities which must be firstly recognized and then properly clarified and developed. We have raised many issues in this paper that are the subject of the proposed grant task.

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Iveta Paulová, Ivana Mrvová¹²

AN APPLICATION OF TOYOTA PRODUCTION SYSTEM IN THE NON-AUTOMOTIVE INDUSTRY

Abstract: Over the last five decades the Toyota Production System (TPS) has evolved from an advanced socio-technical concept in manufacturing to a participative design for large-scale change management. Toyota has been able to sustain a strategic competitive advantage by applying TPS as a process innovation and intervention, as measured by quality, reliability, productivity, cost reduction, sales and market share growth, and market capitalization. Many automotive companies are trying to replicate Toyota's success with TPS in their respective business. But is it possible to effectively implement the TPS in non-automotive industry? This paper includes basic theoretical information about TPS and subsequently the application of this system in non-automotive industry.

Key words: Toyota Production System, non-automotive industry.

INTRODUCTION

The Toyota Production System (TPS), also known as Lean Manufacturing, is an integrated socio-technical system, developed by Toyota that comprises of its management philosophy and practices. It is well known that Lean Manufacturing had been influenced by many techniques and schools of thoughts. One such management thinking is TQM or Total Quality Management. Influence of TQM on Lean Manufacturing is very large and therefore many techniques are common to both. In Lean Manufacturing, we can discuss TQM as one of its prime tools used to achieve its objective. Many of TQM gurus like Deming and Juran played a major role in shaping the Toyota Production System. So it is worth learning some of the total quality management techniques and tools which are commonly used in Lean Manufacturing. It is said that Lean Manufacturing can bring all the results TQM alone can bring quickly.

PRINCIPLES OF THE TOYOTA WAY

The TPS organizes manufacturing and logistics for the manufacturer, including interaction with suppliers and customers. The main objectives of the TPS are to design out overburden (muri) and inconsistency (mura), and to eliminate waste (muda). The most significant effects on process value delivery are achieved by designing a process capable of delivering the required results smoothly; by designing out "mura" (inconsistency). It is also crucial to ensure that the process is as flexible as necessary without stress or "muri" (overburden) since this generates "muda" (waste). Finally the tactical improvements of waste reduction or the elimination of "muda" are very valuable. There are seven kinds of "muda" that are addressed in the TPS:

- 1) over-production,
- 2) motion (of operator or machine),

¹²*Institute of Industrial Engineering, Management and Quality, Faculty of Materials Science and Technology, Slovak University of Technology, Paulínska 16, 917 24 Trnava, iveta.paulova@stuba.sk, ivana.mrvova@stuba.sk*



- 3) waiting (of operator or machine),
- 4) conveyance,
- 5) processing itself,
- 6) inventory (raw material),
- 7) correction (rework and scrap).

The philosophy of TPS is to remove or minimize the influence of all these elements. Each aspect is equally important and complementary. TPS has proven itself to be one of the most efficient manufacturing systems in the world but although leading companies have adopted it in one form or another, few have been able to replicate the success of Toyota. The elimination of waste has come to dominate the thinking of many when they look at the effects of the TPS because it is the most familiar of the three to implement. In the TPS many initiatives are triggered by inconsistency or overburden reduction which drives out waste without specific focus on its reduction. The underlying principles are relating to two key areas: continuous improvement, and respect for people.

The 14 principles of the Toyota Way are:

I. Long-term philosophy

Principle 1: Base your management decisions on a long-term philosophy, even at the expense of short-term financial goals

II. The right process will produce the right results

Principle 2: Create continuous process flow to bring problems to the surface

Principle 3: Use "pull" systems to avoid overproduction

Principle 4: Level out the workload

Principle 5: Build a culture of stopping to fix problems, to get quality right the first time

Principle 6: Standardized tasks are the foundation for continuous improvement and employee empowerment

Principle 7: Use visual control so no problems are hidden

Principle 8: Use only reliable, thoroughly tested technology that serves your people and processes

III. Add value to the organization by developing your people and partners

Principle 9: Grow leaders who thoroughly understand the work, live the philosophy, and teach it to others

Principle 10: Develop exceptional people and teams who follow your company's philosophy

Principle 11: Respect your extended network of partners and suppliers by challenging them and helping them improve

IV. Continuously solving root problems drives organizational learning

Principle 12: Go and see for yourself to thoroughly understand the situation

Principle 13: Make decisions slowly by consensus, thoroughly considering all options; implement decisions rapidly

Principle 14: Become a learning organization through relentless reflection and continuous improvement

The Toyota Production system is an integrated and interdependent system involving many elements. I like to think of it as a triangle, where one side is philosophy, one side is technology; and the other side is management. Cradled in the middle of the triangle is what TPS is really all about - people. Human development is at the very core of TPS. It is often overlooked, as people seize on the more tangible aspects of TPS. Engineers are particularly likely to latch just on the tools and methods and think they have captured the essence of TPS. Of course the tools are also important. The basic tenet of TPS is that people are the most important asset, and, for that reason, management must have a shop-floor focus. Toyota managers are taught that all value-added activities start on the shop floor; therefore the job of managers is to support the team members. Production team members appreciate management on the shop floor only when they can see that we are out there to help them do their jobs, not as part of a command structure, bent on telling them what to do.

TPS uses following tools and methods:



Andon: A type of visual control that displays the current state of work (i.e., abnormal conditions, work instructions, and job progress information). It is one of the main tools of Jidoka.

Genchi Genbutsu: Go see the problem. This is the belief that practical experience is valued over theoretical knowledge. You must see the problem to know the problem.

Heijunka: The overall leveling, in the production schedule, of the volume and variety of items produced in given time periods. Heijunka is a pre-requisite for Just-in-time delivery.

Hoshin: Goals (with targets) and means for achieving it to address business priorities to move the organization to a new level of performance; variable from year-to-year; could also be multi-year; and is developed by executive management.

Jidoka: One of the two main pillars of TPS. It refers to the ability to stop production lines, by man or machine, in the event of problems such as equipment malfunction, quality issues, or late work. Jidoka helps prevent the passing of defects, helps identify and correct problem areas using localization and isolation, and makes it possible to “build” quality at the production process.

Jishuken: Management driven kaizen activity where management members identify areas in need of continuous improvement and spread information through the organization to stimulate kaizen activity.

Just-In-Time: One of the two main pillars of TPS. It refers to the manufacturing and conveyance of only “what is needed, when it is needed, and in the amount needed.” It is built upon three basic principles: The Pull System; Continuous Flow Processing; Tact Time.

Kanban: A small sign that is the key control for the Just-In-Time production; it serves as: Instruction for production and conveyance; Visual control tool to check for over production and to detect irregular processing speeds; Tool to perform kaizen.

Kaizen: A system of continuous improvement in which instances of “muda” (waste) are eliminated one-by-one at minimal cost. This is performed by all employees rather than by specialists.

Muda: Non-value added. As was mentioned before, there are seven types of “muda”: Overproduction, waiting, conveyance, processing, inventory, motion, correction.

Nemawashi: Preliminary work to involve other sections/departments in discussions to seek input, information and/or support for a proposal or change (policy, etc.) that would affect them.

Pokayoke: Low cost, highly reliable devices, used in the “jidoka” system, that will stop processes in order to prevent the production of defective parts.

Standardized Work: The Toyota Production System organizes all jobs around human motion and creates an efficient production sequence without any “muda.” Work organized in such a way is called standardized work. It consists of three elements: Tact-Time, Working Sequence, and Standard In-Process Stock.

Working Sequence: Working Sequence refers to the sequence of operations in a single process which leads a floor worker to produce quality goods efficiently and in a manner which reduces overburden and minimizes the threat of injury or illness.

Standard In-Process Stock: This is the minimum quantity of parts always on hand for processing on and between sub-processes. It allows the worker to do his job continuously in a set sequence of sub-processes, repeating the same operation over and over in the same order.

Yokoten: Across everywhere. Plant related activities and/or countermeasures that are communicated plant wide and with other company affiliates.

ROADBLOCKS TO THE SUCCESSFUL IMPLEMENTATION OF TPS

The most common roadblock to the successful implementation of TPS is the failure on the part of management - and particularly senior level leaders - to understand TPS as a comprehensive approach to manufacturing and management. Too often, company leaders lack the total commitment to, and understanding of, TPS, that are essential to its adoption, and are unwilling to be involved in its day-to-day implementation and application. TPS is not simply a set of concepts, techniques and methods, which can be implemented by command and control. Rather it is a fully integrated

management and manufacturing philosophy and approach which must be practiced throughout the organization from top to bottom and consistently applied and “kaizen” day in and day out. Another common reason TPS implementations fail is that managers try to implement individual elements instead of the entire TPS approach. Since the elements of TPS are integrated and interdependent, any attempt to implement TPS only partially is bound to produce very unsatisfactory results. For TPS to work effectively, it needs to be adopted in its entirety; not piecemeal. Each element of TPS will only fully blossom if grown in an environment that contains and nourishes the philosophies and managerial practices needed to support it. I liken this to a greenhouse, where just the right combination of soil, light, temperature, humidity, water and nutrients allow plants to grow and flourish. If any one of these elements is removed, the plants will weaken and eventually die.

RESULTS AFTER SUCCESSFUL IMPLEMENTATION OF TPS

Establishment and mastering of a TPS would allow you to achieve the following benefits:

- waste reduction by 80%,
- production cost reduction by 50%,
- manufacturing cycle times decreased by 50%,
- labor reduction by 50% while maintaining or increasing throughput,
- inventory reduction by 80% while increasing customer service levels,
- capacity in current facilities increase by 50%,
- higher quality,
- higher profits,
- higher system flexibility in reacting to changes in requirements improved,
- more strategic focus,
- improved cash flow through increasing shipping and billing frequencies.

However, by continually focusing on waste reduction, there are truly no end to the benefits that can be achieved. Implementing TPS not only reduces the cost per unit at a given production volume, it also reduces the minimum number of units a fabrication needs to turn out to be cost-effective. That is, TPS moves the cost curve down and also broadens it (fig. 1).

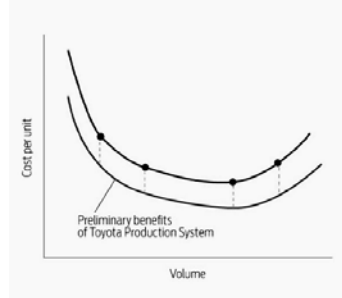


Fig. 1. TPS Lowers the Curve

The Toyota Production System secures profits through the principle of Cost Reduction. With the principle of cost reduction, the sales price of a product is determined by the customer and market. In addition, some customers are demanding yearly price reductions. In order to maintain margins and profits is necessary continuously eliminate waste and reduce costs.

$$\text{Cost Reduction ... Profit} = [\text{Sales Price} - \text{Cost}]$$

In contrast to cost reduction, there is the cost-plus principle in which price is determined by combining all the costs--such as those of raw materials, labor and other expenses needed for production with whatever company policy decides is needed as profit.

$$\text{Cost Plus ... Sales Price} = [\text{Cost} + \text{Profit}]$$

The Cost Reduction and Cost Plus are shown in fig. 2.

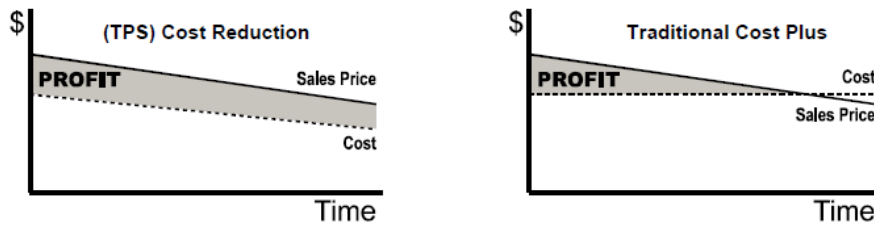


Fig. 2. Cost Reduction and Traditional Cost Plus

IMPLEMENTATION OF TPS IN NON-AUTOMOTIVE INDUSTRY

It is well known that TPS is an excellent tool to greatly reduce lead time and cost, while improving quality and is applicable in the automotive industry. For example applying the lean production tools of the Toyota Production System (TPS) has helped Porsche to increase their operational result from -122 million € in 1994 to 933 million € in 2004. But is possible to implement it in non-automotive industry? Many companies in different sectors of work (also other than manufacturing) have attempted to adapt some or all of the principles of the Toyota Production System to their company. These sectors include construction, health care, semiconductor manufacturing and also wood and timber industry. The Jim Womack and Dan Jones conducted a benchmarking study about Toyota Production System. They concluded that Toyota was really outperforming all other players in the market with regard to productivity, cost, quality and delivery performance. After a more thorough analysis, they realized that all tools and techniques that were used by Toyota are in fact universally applicable. Also in non-automotive factories they can provide a breakthrough in efficiency and competitiveness. The most recent developments in the US and also in Europe now show that Lean Thinking can also be applied in administrative and supporting processes. The next section includes few examples of application of TPS in non-automotive industry.

Semiconductor manufacturing: Semiconductor manufacturing consists of the following steps: First, silicon wafers are produced. Next, circuitry for these wafers is created. The fabricated circuitry is then assembled on each silicon wafer. Finally, the circuited wafers are tested and readied for use in countless devices, from computers to handheld devices. Essentially, semiconductor manufacturing enables highly connected digital world. The economics of semiconductor manufacturing are tied to a theory called "Moore's Law," which essentially states the density of transistors on a single silicon wafer will double each year. While this is a good thing for the advancement of everyday technology, this is bad news for the semiconductor manufacturing industry. As semiconductor materials grow more and more dense with circuitry, it becomes harder for chip fabrication plants to produce viable semiconductor materials and get the most out of every "batch" of silicon wafers produced without costs rising exponentially. The solution is implementation of TPS to increase output without increasing costs. Using Toyota's manufacturing model, semiconductor plants are able to reduce the cost per unit - wafer - by mass-producing at larger volumes while also maximizing the number of viable units per batch, which helps semiconductor plants increase cost-effectiveness, and thus profit. In early 2007, TPS has been implemented in one American company from semiconductor industry. In just seven months, the organization was able to reduce the manufacturing cost per wafer by 12 percent and the cycle time - the time it takes to turn a blank silicon wafer into a finished wafer, full of logic chips - by 67 percent. It did all this without investing in new equipment or changing the product design or technical specifications. These early results point to new economics of semiconductor manufacturing and that this will have a profound and lasting effect on the industry and create new

opportunities for growth. The full impact of Moore's Law on the semiconductor industry is illustrated by the dotted line in fig. 3, which shows how the cost per unit falls, but only at ever-rising manufacturing volumes. In contrast, TPS not only lowers the minimum cost but also changes the shape of the curve, making it possible to produce at low cost and at low volume. This is the new economics of semiconductor manufacturing.

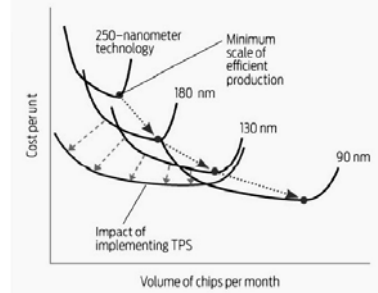


Fig. 3. New Opportunities for Profitable Growth

Timber industry: The timber industry is one of Missouri's 10 largest manufacturing sectors, employing some 30,000 people with an annual payroll of \$681 million. Although the numbers are impressive the contribution to the state's economy should be much higher. Unfortunately the timber producers are not operating at full efficiency and some are producing only lower grade forest products, from high grade raw materials. With that being said the Missouri Enterprise Business Assistance Center recognized the inefficiencies and partnered with the Missouri Department of Agriculture to submit an application for a U. S. Department of Agriculture Federal State Market Improvement Grant. The grant application proposed a study of the industry and development of ways for Missouri's timber producers to their enhance competitiveness in the global marketplace. Once the grant was approved in February 2004, the timber industry focused on putting the TPS principles into practice. They took the approach to focus on all facets of their business and identified all wastes in their production process. Once identified they effectively used lean tools to eliminate that waste. The elimination of waste took place in every area of business including customer relations, product design, supplier networks, production processes, and company management. The transformation has been an ongoing battle but the Missouri enterprise is convinced that Lean will be instituted throughout the timber industry. The cost savings are too large to be ignored.

Wood industry: Commercial Pallet (located in Baysville, Ontario, Canada) is manufacturer of specialty wood packaging. Commercial Pallet specializes in high option, low volume fabrication of specialty and customized wood packaging including pallets, skids, crates, reels, bunks and other wood products. The company provides on-site inventory services, just in time delivery and small lot production utilizing the Toyota Production System methodology. Commercial Pallet began its implementation of the Toyota Production System at pallet operation in September 2000 and since then they have been able to adapt TPS thinking to the wood working industry. They are now able to offer Toyota Production System products and services to other manufacturers who are implementing their own versions of TPS or Lean Manufacturing.

RESEARCH CONTRIBUTION

The authors have described in this research the theoretical and practical knowledge about Toyota production System. Results from research are useful for non-automotive companies, and gives the fact that is possible bring strengths of TPS and implement it to another sector.

CONCLUSION

The concepts and ideas of TPS are applicable in different sectors and organizations all over the world. The main focus of this particular production system is value. Through value definition and comprehension, TPS has assisted many companies maximize value. The benefits of the Toyota Production System includes: enhances quality, reduces waste, benefits consumers etc. To increase competitiveness, organizations should consider the implementation of TPS.

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Zuzana Petričová, Peter Malega¹³

USING THE METHOD OF PAIRED COMPARISON IN THE PROCESS OF PRODUCT EVALUATION

Abstract: Every company is trying to be successful on the market with its products. Companies can be evaluated on the basis of their economic results. One could also make such an assessment through various exact methods. This scientific article deals with the method of paired comparison. This paper includes the case study of a product evaluation using this method.

Key words: paired comparison method, competitiveness of products, evaluation of products

INTRODUCTION

The success of each enterprise on the market depends mainly on the fact whether it can be successful in competition with its products. Products are the key outputs of the business production activity. Therefore it is necessary to evaluate their competitiveness. [1]

When evaluating products, it is important to compare them with similar products of the same designation. Different criteria for evaluating the object can assign different importance according to their application and evaluating aspects. There are a number of exact methods to rate the competitiveness of products. [3]

To determine the correct decision in choosing the appropriate method it is necessary to have assigned a target, to obtain enough information and then select the optimal alternative. [5] The aim of the decision process is to achieve the future state of the system through the realization of some

¹³ Technical University of Košice, Faculty of Mechanical Engineering, Department of Industrial Engineering and Management, Némcovej 32, 042 00 Košice, Slovak republic, zuzana.petricova@tuke.sk, peter.malega@tuke.sk



decision variant. Choosing the correct method of decision-making depends on numerous factors including particularly the time factor, repeatable factor of decision-making situation and the importance factor. [6]

THE METHOD OF PAIRED COMPARISON

The method of paired comparison is used to determine the relative importance of attributes. When two criteria are compared, the more important criterion is rated "1", the less important criterion is rated "0" and in the case of lack of information the rate is "0.5" [8]. The weight of criterion i -th can be calculated according to the relation [9]:

$$v_i = \frac{n_i}{N}$$

n_i - number of items

The total number of N can be calculated as follows:

$$N = \frac{n * (n - 1)}{2}$$

The paired comparison methodology was verified on 50 gears with their 20 properties. Selected gears are the following types [10]:

- TS 031 444 type E - single reduction worm gear with motor,
- TS 031 444 type C - double reduction with one helical and one worm gear with motor,
- ZAP.E - single reduction worm gear with electric motor,
- ZAP.C - worm gear with the front countershaft with electric motor,
- ZAP.D - worm gear with worm countershaft with electric motor,
- EZ - single reduction worm gear with electric motor,
- ECZ - double reduction front-worm gear with electric motor,
- EHR - double reduction worm-worm gear with electric motor.

Compared properties: performance, output shaft speed, torque moment on low-speed shaft, the operating factor, version, fixation, working position, nature of the operation index for moderate service, gear weight, lubrication, amount of lubricant, starting efficiency, electric motor speed, electric motor efficiency, torque running/nominal torque, running current / nominal current, electric motor weight, gear connection on the machined surface with roughness, gear connection to the machined surfaces with the flatness deviation, price.

For paired comparison were selected 20 features. Some of them are in verbal expression because we have scored them in the range from 0 to 1 as shown in the following paragraph [11]:

TS 031 444 typ E, C

Version:

0-0,5 - with single ended cylindrical output shaft,

0,6-1 - with double ended cylindrical output shaft - possibility of mounting the drive device on both sides.

Fixation:

0-0,4 - with large flange - difficult to fix,

0,5-0,8- with foot - difficult to fix,

0,9-1 - without foot - easy to fixation.

Working position:

0-0,5 - horizontal worm, more difficult access to repair, assembly and disassembly,

0,6-1 - horizontal worm over the wheel - easier access to repair, assembly and disassembly.

Lubrication:

0-0,4 - viscous oil grade ISO VG 220 for easy operation, it is important to change it after 500 hours operation and any further change after 4000 hours,

0,5-0,8 - viscous oil grade ISO VG-320 for heavy duty, it is important to change it after 500 hours operation and any further change after 4000 hours.



0,9-1 - synthetic grease - it is not necessary to change it, perpetual.

Roughness:

0-0,4 - Ra 12,5 - the worst roughness,
0,5-0,8 - Ra 6,3 - middle surface roughness,
0,9-1 - Ra 3,2 – best roughness among those listed.

ZAP E, C, D**Version:**

0-0,5 - with full shaft,
0,6-1 - with double full shaft - possibility of mounting the drive devices on both sides.

Fixation:

0-0,4 - fixation on large flange - difficult to fix,
0,5-0,8 - fixation on small flange - difficult to fix,
0,9 - 1 - basic fixation without special clamping elements - simple fixation.

Working position:

0-0,5 - horizontal worm, more difficult access to repair, assemble and disassemble,
0,6-1 - horizontal worm over the wheel - easier access to repair, assemble and disassemble.

Lubrication:

0-0,4 - synthetic oil - it is important to change it after several hours of operation,
0,5-0,8 - filled with grease – during the exchange procedure it is necessary to disassemble the output cap,
0,9 - 1 - synthetic lubricant - it is not necessary to change it, perpetual.

Roughness:

0-0,4 - Ra 12,5 - the worst roughness,
0,5-0,8 - Ra 6,3 - middle surface roughness,
0,9-1 - Ra 3,2 – the best roughness among those listed.

EZ, ECZ, EZZ**Version:**

0-0,5 - with single shaft,
0,6-1 - with mutual shaft - possibility of mounting the drive device on both sides.

Fixation:

0-0,4 - fixation on large flange - fixation is difficult, mounting gear externally,
0,5-0,8 - side foot - difficult to fix,
0,9-1 - foot in the body - simple fixation, it is part of the gear.

Working position:

0-0,5 - horizontal worm, more difficult access to repair, assembly and disassembly,
0,6-1 - horizontal worm over the wheel - easier access to repair, assembly and disassembly.

Lubrication:

0-0,5 - mineral oil ISO - VG 220 - for easy operation, it is important to change the oil every 4000 hours,
0,6-1 - mineral oil ISO - VG 320 - for heavier operation, it is important to change the oil every 4000 hours.

Roughness:

0-0,4 - Ra 12,5 - the worst roughness,
0,5-0,8 - Ra 6,3 - middle surface roughness,
0,9-1 - Ra 3,2 – best roughness among those listed.

First, we have to determine the weight of the gear characteristics as shown in the following table (Tab.1).



Table 1. Paired comparison of the gear characteristics

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total	Weight	
1	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19	0,1
2	0	-	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	0	14	0,073	
3	0	0	-	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	0	13	0,068	
4	0	0	0	-	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	0	11	0,057	
5	0	0	0	0	-	1	1	1	1	1	1	0	0	0	0	1	1	1	1	0	10	0,052	
6	0	0	0	0	0	-	1	0	1	0	1	0	0	0	0	0	1	0	0	0	4	0,021	
7	0	0	0	0	0	0	-	1	1	1	1	0	0	0	0	0	1	1	1	0	7	0,036	
8	0	0	0	0	0	1	0	-	1	0	1	0	0	0	0	0	1	0	0	0	4	0,021	
9	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0,5	0	0	0	0,5	0,0004	
10	0	0	0	0	0	1	0	1	1	-	1	0	0	0	0	0	1	0	0	0	5	0,026	
11	0	0	0	0	0	0	0	0	1	0	-	0	0	0	0	0	0	0	0	0	1	0,005	
12	0	1	1	1	1	1	1	1	1	1	1	-	0	0	1	1	1	1	1	0	15	0,078	
13	0	1	1	1	1	1	1	1	1	1	1	1	-	0	0	1	1	1	1	0	15	0,078	
14	0	1	1	1	1	1	1	1	1	1	1	1	1	-	1	1	1	1	1	0	17	0,089	
15	0	0	0	1	1	1	1	1	1	1	1	0	1	0	-	1	1	1	1	0	13	0,068	
16	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	-	1	0	0	0	7	0,036	
17	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	-	0	0	0	0,5	0,0004	
18	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	1	1	-	1	0	8	0,042	
19	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	1	1	0	-	0	7	0,036	
20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	19	0,1	

As a result, there will be 20 tables for each attribute where each attribute is compared with 50 gears and will determine their weight as shown in Tab. 1. A demonstration of this fact is shown in Tab. 2, where it is only the first feature. Due to the extensivity of this table only a part is shown below.

Accordingly, we can construct next tables for other properties. Finally it will draw up the scoreboard with weights of properties in each gear. In this table the weighted sum has also been counted and this weighted sum will determine the order of gears.



Table 2. Comparison of variants according to the first feature

	1	2	3	4	5	6	7	8	9	49	50	Total	Weight
1	-	0,5	0	0	0	0	0,5	0,5	0,5	0	0	20,5	0,0167
2	0,5	-	0	0	0	0	0,5	0,5	0,5	0	0	20	0,0163
3	1	1	-	0,5	0	0	1	1	1	0	0	36,5	0,0297
4	1	1	0,5	-	0	0	1	1	1	0	0	36	0,0293
5	1	1	1	1	-	0,5	1	1	1	0	0	41	0,0334
6	1	1	1	1	0,5	-	1	1	1	0	0	41	0,0334
7	0,5	0,5	0	0	0	0	-	0,5	0,5	0	0	20,5	0,0167
8	0,5	0,5	0	0	0	0	0,5	-	0,5	0	0	20,5	0,0167
9	0,5	0,5	0	0	0	0	0,5	0,5	-	0	0	19	0,0155
10	0,5	0,5	0	0	0	0	0,5	0,5	0,5	0	0	19	0,0155
11	0,5	0,5	0	0	0	0	0,5	0,5	0,5	0	0	19	0,0155
12	0,5	0,5	0	0	0	0	0,5	0,5	0,5	0	0	19	0,0155
13	0	0	0	0	0	0	0	0	0	0	0	1,5	0,0012
14	0	0	0	0	0	0	0	0	0	0	0	1,5	0,0012
15	0	0	0	0	0	0	0	0	0	0	0	8	0,0065
16	0	0	0	0	0	0	0	0	0	0	0	8	0,0065
17	0,5	0,5	0	0	0	0	0,5	0,5	0,5	0	0	20,5	0,0167
18	0,5	0,5	0	0	0	0	0,5	0,5	0,5	0	0	20,5	0,0167
19	1	1	0	0	0	0	1	1	1	0	0	32	0,0261
20	1	1	0	0	0	0	1	1	1	0	0	32	0,0261
21	1	1	1	1	0,5	0,5	1	1	1	0	0	41	0,0334
22	1	1	0,5	0,5	0	0	1	1	1	0	0	36,5	0,0297
23	1	1	0	0	0	0	1	1	1	0	0	29	0,0236
24	0	0	0	0	0	0	0	0	0,5	0	0	14	0,0114
25	0	0	0	0	0	0	0	0	0,5	0	0	10	0,0081
26	0	0	0	0	0	0	0	0	0,5	0	0	10	0,0081
27	0,5	0,5	0	0	0	0	0,5	0,5	0,5	0	0	18,5	0,0151
28	0,5	0,5	0	0	0	0	0,5	0,5	0,5	0	0	19,5	0,0159
29	1	1	0	0	0	0	1	1	1	0	0	29	0,0236
30	1	1	0	0	0	0	1	1	1	0	0	29	0,0236
31	0	0	0	0	0	0	0	0	0	0	0	4	0,0032
32	0	0	0	0	0	0	0	0	0	0	0	1,5	0,0012
33	0	0	0	0	0	0	0	0	0	0	0	8	0,0065
34	0	0	0	0	0	0	0	0	0	0	0	8	0,0065
35	0,5	0,5	0	0	0	0	0,5	0,5	0,5	0	0	20,5	0,0167
36	0,5	0,5	0	0	0	0	0,5	0,5	0,5	0	0	20,5	0,0167
37	0,5	0,5	0	0	0	0	0,5	0,5	0,5	0	0	20,5	0,0167
38	1	1	1	1	0,5	0,5	1	1	1	0	0	41	0,0334
39	1	1	1	1	1	1	1	1	1	0,5	0	45,5	0,0371
40	1	1	1	1	1	1	1	1	1	0,5	0	45,5	0,0371
41	1	1	0,5	0,5	0	0	1	1	1	0	0	36,5	0,0297
42	1	1	0	0	0	0	1	1	1	0	0	32	0,0261
43	1	1	1	1	0,5	0,5	1	1	1	0	0	41	0,0334
44	1	1	1	1	1	1	1	1	1	0,5	0	45,5	0,0371
45	1	1	1	1	1	1	1	1	1	1	0	45	0,036
46	0	0	0	0	0	0	0	0	0	0	0	1,5	0,0012
47	0	0	0	0	0	0	0	0	0	0	0	8	0,0065
48	0,5	0,5	0	0	0	0	0,5	0,5	0,5	0	0	20,5	0,0167
49	1	1	1	1	1	1	1	1	1	-	0	45,5	0,0371
50	1	1	1	1	1	1	1	1	1	1	-	49	0,04

Table 3. Scoreboard

Properties	Weight	1	2	48	49	50
1	0,1	0,0167	0,0163	0,0167	0,0371	0,04
2	0,073	0,0391	0,0367	0,0012	0,0102	0,0102
3	0,068	0,0016	0,00408	0,0375	0,0383	0,04
4	0,057	0,0326	0,0236	0,0383	0,0293	0,0032
5	0,052	0,02	0,02	0,02	0,02	0,02
6	0,021	0,0044	0,0044	0,0248	0,0248	0,0248
7	0,036	0,02	0,02	0,02	0,02	0,02
8	0,021	0,0257	0,0257	0,0053	0,0053	0,0053
9	0,0004	0,0281	0,0281	0,0008	0,0008	0,0008
10	0,026	0,0281	0,0281	0,0053	0,0053	0,0053
11	0,005	0,0044	0,0044	0,0391	0,0391	0,0391
12	0,078	0,0391	0,0367	0,0151	0,0151	0,0151
13	0,078	0,0179	0,0179	0,0261	0,0314	0,0008
14	0,089	0,0187	0,0187	0,0130	0,0346	0,04
15	0,068	0,0334	0,0334	0,0130	0,02408	0
16	0,036	0,0285	0,0285	0,0228	0,0085	0
17	0,0004	0,0306	0,0306	0,0171	0,00204	0,0008
18	0,042	0,0257	0,0257	0,0053	0,0053	0,0053
19	0,036	0,0257	0,0257	0,0053	0,0053	0,0053
20	0,1	0,0322	0,0322	0,0008	0,0008	0,0008
Weighted		0,02429	0,02354	0,0158	0,02059	0,01566
Order		2	3	47	19	49

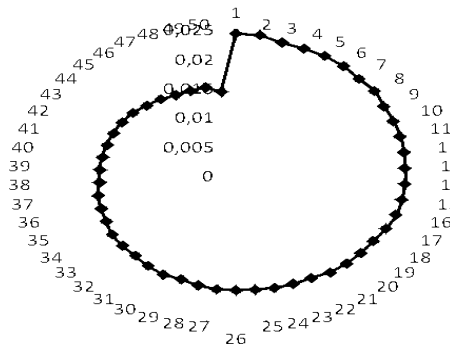


Fig. 1. The resulting order of gears in paired comparison

The advantage of paired comparison is an easy comparison of parameter pairs and the ability of establishing that the two parameters are equivalent or incomparable.

CONCLUSION

In today's competitive environment there is a continuous war between competing businesses. Every business is trying to be successful on the market with their products. [4] Businesses are constantly trying to improve their products through the use of modern technology, improving the quality of supplied raw materials necessary for their production or improving product functions. To conduct business more efficiently than the competition one would require to compare their products with competitors and find weaknesses that can to be removed [7].

This article discussed the paired comparison method, where the weights of gear characteristics were determined, followed by using the weighted sum to determine the order of gears. The advantage of this method is the easy comparison of parameter pairs, and the fact that this method can be combined with e.g. the scoring method.

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This article was created through the implementation of:

- the project "Centre for Management Research technical, environmental and human risks for sustainable development of production and products in engineering" (ITMS: 26220120060) on the grounds of promoting operational research and a development program financed by the European Regional Development Fund - Activity 3.1 Integrated Design manufacturing systems based on physical and virtual modeling;

- the project VEGA no. 1/0102/11 Experimental methods and modeling techniques in house manufacturing and non-manufacturing processes.

Tomasz Potkański¹⁴, Leszek Wanat¹⁵, Jan Chudobiecki¹⁶

LEADERSHIP IN TIME OF CRISIS OR CRISIS OF LEADERSHIP? IMPLICATIONS FOR REGIONAL DEVELOPMENT

Abstract: This article has been written in an attempt to diagnose a rather peculiar crisis that had manifested itself during the recent global financial crisis. It deals with the crisis of leadership or, in other words, the implications of leadership at the time of crisis, including regional leadership. It is being done in the context of major theoretical concepts of regional development. The authors identify key dimensions of the problem as well as directions for further studies oriented towards the elimination of outcomes and underlying causes of the growing economic crisis.

Key words: leadership, economic growth theories, mesoeconomics, regional development, economic crisis

¹⁴ Collegium Civitas in Warsaw, Deputy Executive Director of the Association of Polish Cities; tpotkanski@collegium.edu.pl

¹⁵ University of Life Sciences and University of Economics in Poznań, leszek.wanat@ue.poznan.pl

¹⁶ Poznań University of Life Sciences, Member of City Council of Poznań, chudobiecki@up.poznan.pl



INTRODUCTION

The search for methods enabling an optimal development of economy is one of the most important issues addressed by the economic studies. Given the growing disproportions between the entities participating in economic processes, it is not only the regional development concepts, but even more importantly the attempts to define the mechanisms, conditions and factors affecting the regional development that have become particularly important to the above mentioned search. It seems that spatial unevenness has become a key problem of today's economy. The elimination of regional development disproportions is the main objective of regional policies and consequently it becomes a challenge for the global economic policy. What is meant here, however, is not the limitation to the redistribution of money, but the stimulation of economic growth in less-developed regions, even at the expense of regions having the highest level of development. Unfortunately, actions taken in this area do not always bring the expected results. This can be demonstrated by the convergence and divergence tendencies of the regional product per capita [13]. These trends encourage researchers to continuously search for a new regional development paradigm [7], especially given that what we have been witnessing is not only a threat but a certain "stability" of the economic crisis which, though referred to as a global crisis, affects regions and local communities in different ways and to various extents.

The objective of this article is to try to diagnose, in the light of major theoretical concepts of regional development, the causes of quite a peculiar crisis that manifested itself during the recent global financial crisis. What is meant here is the crisis of leadership or, in other words, the implications of leadership at the time of crisis, including the crisis of regional leadership. In this context, the authors set directions for further studies oriented towards the elimination of the underlying causes of the growing economic crisis. Additional points of reference have included mesoeconomic¹⁷ tools enabling the analysis of phenomena at the level of industries and regions in which we can observe more and more fundamental phenomena affecting both the meta and macroeconomic reality that can also be noticed in the micro scale.

FROM NEOCLASSICAL ECONOMICS TO NEW ECONOMIC GEOGRAPHY AND LEARNING REGIONS

The sources of theories explaining the mechanisms of regional development can be found in traditional schools of economic thought. The wide selection of theoretical concepts of regional development can be easily divided into two main groups corresponding with the alternative models of economy, i.e. neoclassical economy concepts assuming, in line with the liberal doctrine, minimum government intervention in markets and treating free market as an optimum regulatory mechanism and *neo-keynesian economics* treating government intervention as an indispensable and most important regulatory mechanism contributing to the optimization of regional development.

TRADITIONAL APPROACH

There are many written works devoted to the theoretical concepts but in this article we would just like to note the most important ones (Table 1). It seems that the real role of economic leadership was traditionally seen from the perspective of economic growth models and theories. But after the weaknesses of the endogenous growth theory had been identified, there arose a need to formulate a new theory which, based on past experience, should neither reject nor marginalize the importance of leadership.

¹⁷ *Mesoeconomics – is a sub-discipline of economic sciences, which deal with the description and analysis of phenomena related to structural changes, especially changes in relations between branches and sectors of production, employment and regions. An example of classical mesoeconomic research would be a sectoral analysis (eg. of a regional or sectoral type of activity). In this context mesoeconomics covers also the area of functioning of territorial self-government as well as regional development.*

Table 1. Leadership as one of the factors in regional development - among the concepts of economic growth theory.

Examples of theoretical concepts of economic growth	The key authors	The factors in regional development
The accumulation of capital (the neoclassical growth model and the new growth theory);	R.M.Solow (1956); G.H.Borts, J.L.Stein (1964); H.W.Richardson (1973); P.Romer (1986)	Capital
Investments in small and medium-sized enterprises - SMEs (The Endogenous Development Model);	W.Molle, R.Cappellin (1988);	
Inward investment (the new concept of cumulative causation);	N.Kaldor (1970).	
Economic growth resulting from the demand influenced by export and import of goods (<i>economic base theory</i> and the concept of cumulative causation - CCC);	D.C.North (1955); G.Myrdal (1957); N.Kaldor (1970);	Trade
Export specialization (the new concept of cumulative causation);	N.Kaldor (1970);	
Free trade (The Endogenous Development Model);	L.A.Riviera-Batiz, D.Xie (1993);	
Human Capital (the new growth theory; as a factor of production);	E.Lucas (1988, 1990); R.Baro, X.Sala-i-Martin (1991);	Education
<i>Learning-by-doing</i> (the new growth theory);	E.Lucas (1988, 1990);	
Promotion of general education, professional, organizational and management skills - to create high-tech sectors (concept of regional endogenous development policy);	R.Camagni (1992);	
Technological innovation (the neoclassical growth model the neoclassical growth model as an exogenous factor);	G.H.Borts, J.L.Stein (1964); H.W.Richardson (1973);	Innovation
<i>Spillover effect of information</i> (the new concept of cumulative causation);	N.Kaldor (1970);	
Innovation as a key factor in economic growth (concept of regional endogenous development policy);	E.J.Malecki, P.Nijkamp (1988);	
Technological progress by stimulating research and development (R&D) activities (The Endogenous Growth Theory);	P.Romer (1990);	
The concept of Learning Regions (concept of regional endogenous development policy);	B.Asheim (1995);	
<i>Knowledge spill-over</i> (the new growth theory);	G.Tondl (2001);	
Promotion of local physical and social infrastructure (concept of regional endogenous development policy);	D.Biehl (1986);	Public investment
Private investment in public equity (The Endogenous Development Model, basic factors of production and economic growth);	D.A.Aschauer (1989)	
The strategy, that is based on the growth poles model;	F.Perroux (1955)	Scale Economies and Agglomeration
Polarization Theory;	A.O.Hirschman (1958)	
Territorial innovation models by GREMI;	P.Aydalot (1986)	
The New Industrial Spaces Theory concept	D.Keeble, E.Weaver (1986);	
Production networks (The Endogenous Development Model);	E.M.Bergman, G.Maier, F.Todtling (1991);	
Scale Economies (Paul Krugman's New Economic Geography);	P.Krugman (1991, 1995); P.Krugman, A.Venables (1995); M.Fujita, P.Krugman, A.J.Venables (1999);	
The Porter cluster concept;	M.E.Porter (1990); M.E.Porter (2000);	Leadership
New concepts (response to the weakness of the theory of endogenous growth);	List, Schumpeter, Drucker (1985),	
The need to formulate a new theory;	Peshkov (2008), Komai demands (1993, 2008, next), Komai, Grossman (2008), vivant sequentes	
A new perspective on regional endogenous development	R. Simson, R.R. Stough, M.Salazar (2009)	

Source: own study based on: [5] and [20].

Despite initial adaptation attempts, the neoclassical development model proved to be useless in explaining the phenomena emerging at the regional level. As H.W.Richardson [17] argued when formulating his regional growth theory, the concept underlying the neoclassical model, i.e. perfect competition, may prove to be untrue in the context of spatial dependencies. Explaining the differences between regions and countries, Richardson stated that:

- regions are more open than countries, both when it comes to flows of goods as well as their factors,

- regions do not have the economic policy instruments typical for states (e.g. trade policy, monetary policy, tax policy, competition policy, etc.).

In recent years regional economists are less engaged in creating new regional development theories, they rather focus on optimizing regional policies using the economic concepts that they know, and adapt them to new social and economic conditions. The main purpose of such activity is to create regional development strategies which, based on the theoretical foundations of economic development, are to ensure an optimal shape of regional development. This is how the new growth theory and new economic geography were created using both the neoclassical models as well as demand models underlying the concept of the endogenous regional development policy [see 1, 2, 14].

The history of the new growth theory dates back to the works of Paul Romer [18] and Robert E. Lucas [11]. They are based on the assumption that production volume is the function of capital and the current level of the technology. However, the level of technology is no longer treated as it used to be in neoclassical models, namely as an exogenous factor, but it results from large expenditure spent by enterprises and governments, which means that it is endogenous in nature. At the same time, the definition of capital was extended to cover both material capital and human capital whose concepts were introduced to economic literature by Theodore Schultz [8]. In all of these models, the increase in the accumulated capital, both material as well as human, resulting from engagement in the technological process, does not lead to lower profits. The costs are balanced by additional income earned thanks to, for instance, increased production, and even more importantly thanks to greater competitiveness. What is particularly important to development in this case is the human capital whose growth results in new ideas (innovation, entrepreneurship). New knowledge may be developed with the use of resources available at a given time, but it is even more valuable when the resources are not static but they develop providing new ideas. Future knowledge and skills are rather public goods and enable the improvement of *know-how*. Thanks to that, the accumulation of human capital may contribute to the growth of income.

One factor related to the accumulation of human capital that is important to income growth is the learning-by-doing effect covering [21]:

- *learning-by-doing* – a process which can be described as learning by producing (production of a new model of a product takes less time than the production of the previous model thanks to reliance on past experience);
- *knowledge spill-overs* – exchange of knowledge and skills (on the labour market, the knowledge acquired in one firm becomes a public good and spreads as part of staff turnover/relocation/secondment);
- *knowledge* – knowledge which is the outcome of learning by doing (it is diffused as part of staff movements, research and development activity and investments in education).

It would be hard to disagree with what P. Romer [18] argued that growth is more often prevented by the *know-how gap* than the investment (object) gap. So the poor quality of human capital is more likely to prevent growth than the lack of funds for investments.

APPROACH FROM THE PERSPECTIVE OF THE NEW GROWTH THEORY

New growth theory based on the endogenous growth model explains the phenomenon of the rapid growth of the Asian “Tigers” or the European regions such as southern Germany or northern Italy. However, the results of the analyses of regional income inequalities indicate that free trade may be perceived both as a factor leading to convergence, but also, in certain situations, to divergence [21]. It turns out that the differences in the level of economic development, education and the qualifications of workforce, etc. effectively hamper the convergence of regional income. According to the majority of authors, the movement of workforce and capital leads to divergence in the endogenous growth model. R.E. Lucas states that the mobility of human capital leads to its transfer to areas offering higher pays and to rich regions, which results in income divergence [11,

12]. As a result, rich regions become stronger thanks to the accumulation of greater human capital and poor regions get even poorer. The same applies to material capital that prefers wealthier regions where *high-tech* can be developed rather than the weaker ones.

The theory of **new economic geography** formulated and popularized in the early 90's of the 20th century explains the phenomena of regional development and income convergence and divergence process using the arguments about the tendency for the centralization and decentralization of activities in the geographic economic space. The new growth theory and the new economic geography have been widely applied to the new regional policy concept commonly referred to as the endogenous regional development policy [see 1, 14]. Its popularity stems from the fact that the previous theories failed to explain clearly the regional development process, which can be demonstrated by the growing social and economic inequality in various regions of individual countries or even continents. The theory holds that economic growth primarily results from regional, endogenous physical and social resources. That is why regional growth should be perceived as an endogenous phenomena shaped by each region "from the bottom". An important role in this process is played by small and medium-sized enterprises which, thanks to their flexibility, successfully develop the majority of modern industrial areas, including *technopolis* and high-tech parks. Another factor that contributes to an optimal regional development is an effective regional policy. This is where the neoclassical assumption that the market mechanism is crucial to bridging regional development gaps loses its importance.

So the creation of conditions suitable for endogenous development should be based on co-operation in the production networks implementing new solutions, economic *clusters*, *learning regions* and the creation of a social environment fostering entrepreneurship and innovation [3, 4, 6, 16]. And the creation of such conditions means a leadership challenge.

REGIONAL LEADERSHIP – FROM LOCAL GOVERNMENT TO LOCAL GOVERNANCE

In the light of the endogenous economic growth theories, there arises a need to formulate new theories or at least reformulate existing theories so that they address the regional development problems in a more effective way. It seems that a key matter here is to consider the role of leadership, including regional leadership [19].

Regional leadership¹⁸ can be described as one of the components of regional power. Even though it is not the same as power, the regional leadership is a prerequisite for a dynamic and balanced regional growth. Regardless of their position, regional leaders should not only develop ideas, but also motivate people to act upon the ideas making sure that they last and do not pass. What is important here is a certain degree of consensus and collaboration, impact exerted on a society who voluntarily succumbs to such an influence [7]. A regional leader is not the same as the administrator of a region perceived more like a technocrat responsible for coordination and management. A leader has a greater influence, including subordination, visionary or even charisma [15]. Regional leadership depends on the complexity of the local administrative structures. In Poland, it would not only cover the level of region (*województwa*), but also the local structures at the level of county (*powiatu*), and municipality (*gminy*) supported by entities representing the economic and social interests within this territory.

¹⁸ The concept of "regional leadership" referred to in this text, shall be understood to cover also leadership at the sub-regional level (county and municipality) as most of the features and described consequences pertain to all levels at the same time. Moreover, the modern concepts of territorial governance require - among others - close cooperation of leadership of all levels. In this text we assume that the leading concept is that of „regional leadership” as the region is a proper level of mesoeconomic analyses in the theories of economic growth. However, the concepts of "regional" and "local leadership" become compatible and can be used interchangeably – when we refer to leadership skills or style as a key factor for development.



So regional leadership is an idea which, on the one hand, is implemented by specific persons and public institutions but, on the other hand, directly depends on the social identity of the citizens of a given region as well as the local and global administrative solutions. Key factors affecting regional leadership in Poland include [8]:

- regional identity,
- widespread strengthening of political and administrative leadership in regions,
- local communities' engagement in the activities of local administrative authorities,
- frequent changes of regional leadership structures.

The regional identity is affected by historical and cultural factors as well as social determinants characteristic for individual communities (Śląsk, Wielkopolska, Kaszuby, Galicja). On the other hand, the strengthening of political and administrative leadership in regions is one of the European Union's priorities. The directions and pace for changing the position of local and regional governments are set out in the "White Paper on European Governance" issued on the 25th of July 2001. The Paper highlights the need for regional and local administrative authorities' engagement in the execution of the European Union's policy. The main forum where the interests of local and regional administrative authorities are represented in the European Union is the Committee of Regions, a collegial assembly of the EU.

The third component of regional leadership affecting regional growth is the regional and local authorities' weakness in maintaining proper relations with local and regional communities, which can be easily noticed in Poland. Local decision-makers are often criticized for the lack of transparency of their activities. International researchers have observed that even local authorities which are effective, are not free from such criticism. They shift the responsibility for their failures to those who criticise them, claiming that they are unwilling to participate in the decision-making process as demonstrated by, inter alia, low voter turnout [14].

Lack of participation and low confidence in local and regional authorities pose a threat to decentralization of state. Without the engagement of its citizens, the state remains the only legitimization of regional power. Paradoxically, this results in a situation where the regional government plays the role of the ambassador of the central government in its region. So a leadership challenge here is to support local administrative authorities in making the inhabitants of their respective regions participate in the resolution of common matters [6]. Bearing in mind that some citizens are only interested in being provided with high-quality services, the leaders should motivate and teach them how to participate. It is hard to expect support for local authorities from citizens who do not understand what participation means. Regional authorities need the support of their citizens to be able to manage their regions effectively. So it is hard to accept the fact that the deep local administration reforms witnessed in 1998, the changes introduced in 2002 and the accession to the European Union resulted in a situation where even well-educated citizens do not know the local administrative structure the awareness of which is a prerequisite for any form of engagement [5].

An important element of regional leadership that has been undergoing transformation is its structure. As opposed to the traditional structures based on individual leaders, there is now a tendency to wider a pool of key actors on the regional/local scene. Next to local administrative authorities, we have elected politicians performing management functions. Those who used to be informal participants have become formal ones. A capitalist/businessman is given the status of an investor, a local community organizes itself into a non-governmental organization, and the tasks of local administrative units are outsourced to private contractors. New phenomena such as globalization, Europeanization, global financial crisis and internal problems result in the emergence of new players (*semi-public, public/private and private actors and activities*). These changes require quick adaptation and coordination in the public sector and a new regional leadership style, the so-called *governance* not limited to the management of local administration but rather all participants [14] using the *New Public Management* philosophy. An instrument that speeds up regional and local growth are public-private partnerships, i.e. the engagement of private sector in public matters.

Except for the increased effectiveness of activities, they bring the following benefits: experience sharing between the private sector and the public sector and de-politicization of services offered to citizens[12].

CONCLUSIONS

Local governments in Europe have been undergoing a shift from their traditional role as providers of services to a more complex local management style whose key element is the leadership required for the development of a local community (*from local government to local governance*). What is needed here is a flexible decision-making model based on loose vertical links between various actors (public and private). Another requirement is the change of the role of local administrative authorities from one based on hierarchy and formal procedures and institutions to that of a promoter of an environment fostering partnership and achievement of common targets. A shift from “*power over*” to “*power to*”, which means an ability to mobilize resources to participate in the achievement of common targets.

One of the key factors of regional development from the perspective of regional leadership is the development of deliberative democracy (also called discursive democracy). This democracy is the future of the public sector, the opposite of the market model and traditional democratic theory. The objective is the legitimization of the activities of public institutions through the search for interesting ideas at the lowest levels of administration, shared decision-making, transfer of powers. The main idea behind such actions is the conviction that “street-level bureaucrats know things best.” Hence, the growing importance of various forms of consultations with citizens [6], encouragement of greater engagement in the periods between elections by democratically elected representatives or meetings with citizens. If citizens are to feel jointly responsible, they have to have an opportunity to decide about local matters. The main problem with the development of deliberative democracy is the surface nature of social consultations – sometimes their form and not the fact that they could be used as a public discourse norm matters more. The development of deliberative democracy does not mean a departure from the rule that the ultimate responsibility rests with politicians and heads of public institutions, which gets us back to the issue of leadership. The very nature of this issue requires further research.

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Ján Šesták, Peter Poór, Peter Takáč, Lucia Ondrejová¹⁹

PROPOSAL OF PC UNIT FOR FREQUENT TRANSFER AND MANIPULATION BY AIR TRANSPORT

Abstract: This work presents the realization of a PC unit for air transport focusing on design of particular parts and the design of the whole box. Particular variants of solution in this area are processed in form of 3D models, which is essential for the final composition of the PC unit as a harmonic unit with an eye-catching design. The proposal originated from the real need for computer transport by air. All aspects of this transport have been analyzed in detail and incorporated into this proposal.

¹⁹ Technická univerzita v Košiciach, Strojnícka fakulta, Katedra Priemyselného Inžinierstva a Manažmentu, ul. Némcovej 32, Košice, 042 00, Slovenská republika, jan.sestak@tuke.sk, peter.poor@tuke.sk, peter.takac.2@tuke.sk, lucia.ondrejova@tuke.sk

Key words: Air transport, design, PC unit.

INTRODUCTION

One of the major problems in construction of a personal computer is its handling during air transport, so that no damage or deterioration of the case occurs. We should not forget the weight and size restrictions of airlines. If we want the object to be fully protected against adverse impacts it will have to be carried on board an aircraft in the form of hand baggage, which must go through the scanner which has a fixed size and must not weigh more than is allowed to be taken on board. Currently there is no computer case on the market, which meets the above-mentioned two key criteria for airlines and also would not be expensive. That is why it is almost a necessity to develop a PC box, which will, among others, meet these conditions and will not be costly.

Issues to be resolved and are associated with design of computer cabinets that will be suitable for transportation and handling are several:

- keep weight restrictions,
- dimensional restrictions,
- rigidity and durability, structure,
- price and design.

In air travel, there is quite often damage to baggage compartment. This is mainly due to impacts in putting in and removing the object transmitted in and out from the aircraft. Fig.1. graphically represents the damage to a computer undergoing air transport. Main cause of damage of transported objects is the unreliable human factor. That is why it would be best for this type of baggage to carry it on board of a plane, or secure it properly in resistant packaging. Since the human factor is not so easy to influence and impact-resistant packaging is especially difficult and expensive, it is necessary to solve the problem to suit the following conditions:

- impact Resistance,
- weight (up to 5kg),
- practicality (560 x 400 x 200 mm),
- hardware criteria,
- functionality,
- exterior design,
- dust and moisture.

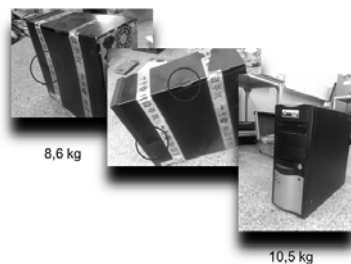


Fig. 1. Real state [own elaboration]

1. PC HARDWARE WEIGHT REDUCTION

It is possible to take only one piece of baggage into the plane cabin, maximum size 560 x 400 x 200mm and weight 5kg. In weighing various parts, total weight of necessary hardware is rounded up to 4kg. This mass is composed of previously used components and can be reduced by exchanging it with a newer ATX source and smaller and lighter source, which is sufficient for PC performance. Hard drive is also one of the toughest components, therefore it is necessary to exchange or remove it and use only an external drive.

2. SOLUTION VARIANTS AND CHOICE OF MATERIAL

Common feature of all proposed options is simplicity and ease of construction. They are elaborated in form of 3D models.

A-Variant

Principal feature of this variant is a simple travel case. It consists of simple L- and U-shaped profiles, which are threaded into aluminum plate of a thickness of 1mm. It has a simple design and is simple for maintenance. Access to the interior of the box is ensured by hinges. This variant has good stiffness due to the use of the above mentioned profiles. Material used is aluminum. They form the supporting skeleton of structures.

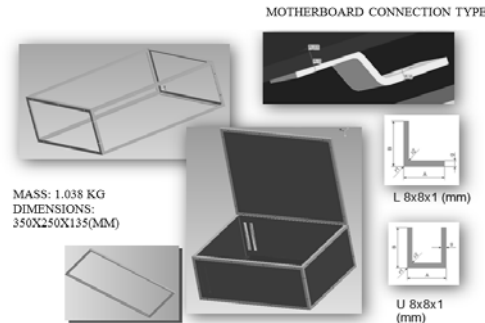


Fig. 2. A-Variant – 3D model [own elaboration – ProE Wildfire 4]

B-Variant

It has a modern look and a simple design. Like the A-variant, it has easy access to the interior. It consists only of two main parts, which are connected with two hinges. We must also think about the cooling, which is represented by the ventilation grille on the side of one of the box parts. The material used in this variant is hardened plastic. Parts are produced from plastic residues in the canned form. The estimated mass of this variant is 1.150kg, dimensions 330x250x140 mm.

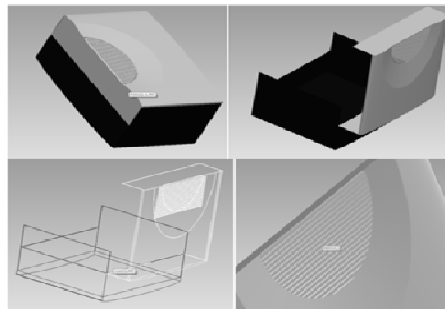


Fig. 3. B-Variant – 3D model [own elaboration – ProE Wildfire 4]

C-Variant

The C-variant is a simple and eye-catching PC unit concept. It meets the weight and size restrictions of airlines. It is a self-supporting construction, which saves space and weight. It consists of two dovetailing clippings of sheet of a thickness of 1mm. Therefore, the construction materials used in aluminum, providing maximum cooling, which also have a good lightweight and has excellent properties in terms of heat dissipation. Gross weight of this structure is 0.961kg which is favorable for the solution. The only disadvantage is less stiffness, which in this case is not so important, as the size and weight of the C-variant are appropriate for the PC unit to be taken on board. Dimensions are 400x270x140 mm.



Fig. 4. C-Variant – 3D model [own elaboration – ProE Wildfire 4]

3. OPTIMAL VARIANT SELECTION

To select the final version we will use the method of paired comparison. It is a progressive comparison of selected factors of solution, to make it easier to determine which of these requirements is more important.

Solution criteria:

- 1) weight,
- 2) practicality (size),
- 3) functionality,
- 4) impact resistance,
- 5) design,
- 6) dust resistance,
- 7) production costs,
- 8) technological intensity.

Tab. 1. Method of paired comparisons

CRITERION	1.	2.	3.	4.	5.	6.	7.	8.	Σ
1.	-----	0	1	0	2	0	1	1	-----
2.	2	-----	1	0	1	0	0	1	-----
3.	1	1	-----	0	1	0	1	1	-----
4.	2	2	2	-----	1	0	1	1	-----
5.	0	1	1	1	-----	2	1	0	-----
6.	2	2	2	2	0	-----	2	2	-----
7.	1	2	1	1	1	0	-----	0	-----
8.	1	1	1	1	2	0	2	-----	-----
b_i	9	9	9	5	8	2	8	6	56
w_i	0,16	0,16	0,16	0,08	0,14	0,035	0,14	0,107	1

Priority coefficient can be expressed in the relation:

$$w_i = \frac{b_i}{\sum b_i}$$

2 - important feature

1 - equally important feature

0 - less important feature

b_i - frequency characteristics of i-th factor

w_i - i-th priority coefficient factor



Tab. 2. Degrees of weight valuation

SIGN	QUANTITATIVE VALUE	QUALITATIVE VALUE
A	3	GREAT
B	2	GOOD
C	1	INSUFFICIENT

Tab. 3. Weight valuation of selected variants criteria

CRITERION	A-VARIANT	B-VARIANT	C-VARIANT
1.	B	A	A
2.	A	A	A
3.	A	B	A
4.	A	C	B
5.	C	B	A
6.	B	B	B
7.	C	B	A
8.	A	B	A

In tab. 3 the evaluated criteria of the solved problem are transmitted to various options. They are assessed on the basis of weight valuation grades.

Tab. 4. Variant choice using the partial indicator

CRITERION	PARTIAL INDICATOR Q_i		
	A-VARIANT	B-VARIANT	C-VARIANT
1.	0,32	0,48	0,48
2.	0,48	0,48	0,48
3.	0,48	0,32	0,48
4.	0,24	0,08	0,16
5.	0,14	0,28	0,42
6.	0,07	0,07	0,07
7.	0,14	0,28	0,42
8.	0,321	0,214	0,321
Σ	2,191	2,204	2,831

Q_i partial indicator is calculated by multiplying the coefficient of priorities and quantitative values assigned to each criterion.

4. PRODUCTION TECHNOLOGY

Laser cutting (photon erosion) belongs to a group of non-conventional machining methods. Laser cutting is one of the ways of dividing, which usually do not use mechanical work for material removal. Usually are based on the use of any physical or physico-chemical principle for material removing without power operations on the workpiece.

The special properties allow the laser beam to focus (by suitable optical system) a very high energy density at the impact beam (105-1014 w.cm⁻²) and concentrate into a small spot. The result is a melting and evaporation of the material, thereby achieving the desired box-processing effects [10].

Advantages:

- high cutting speed,
- very narrow cutting gap,
- high precision cutting,
- very narrow heat-affected zone,
- smooth cutting edges, with no need for further treatment: no cutting, handling,

- no-touch cutting, i.e. wear and cutting tool abrasion, it is not necessary to exchange the instrument when changing the shape of cutting parts.

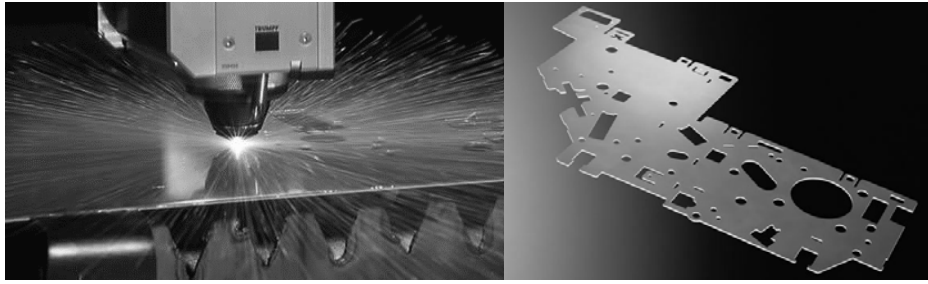


Fig. 5. Laser beam cutting [11]

Hydro-abrasive division is defined as a computer-controlled high-erosive process. The method uses a dividing hydro-abrasive stream, eventually only water at supersonic speeds to split the material to its disintegration. Because of the permeation, which possesses the kinetic energy of abrasive, washes away the products from the point of removing rust and provides cut point cooling. Precisely because of the cut point cooling in this technology is more favorable than current technologies of material division. As a result of heating the material followed by deformation, changes in the structure and visual appearance. The advantage of hydro-abrasive division is that materials divided by the cold are divided in all directions, with a simple shape division [10].

Advantages:

- separating material is micro-dimensional and occurs in a large number of sites,
- fast-moving stream does not generate sparks or dust,
- no thermal effect on the surface,
- no need to draw great strength on divided material and consequently there is no deformation of material during cutting,
- applicable in turning, milling, drilling, punching,
- ability on dividing soft and hard materials
- ability to divide multi-component composite materials,
- it is not necessary to consolidate the object,
- shape diversity,
- small loss in the cut,
- allowing for very detailed contours,
- opportunity to begin and end at any point of division.

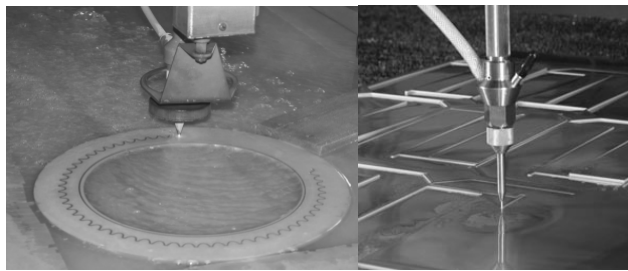


Fig. 6. Material division by water beam [12]



5. ECONOMIC EVALUATION AND COST ESTIMATE

The proposed solution is not expensive. Some operations such as bending, threading and the assembly itself can be done manually. The table shows the estimated financial costs of realization.

Tab. 5. Assumed costs table

Number	Part no.	Pe	Price (€)
1.	Aluminum alloy 1000x2000x1	1	25
2.	Water beam cutting		10 (2.49€/m)
3.	Bending		0
4.	HDD	1	75
5.	PSU	1	18
6.	Handle	1	20
7.	Transport		10
1. – 7.	Sum		158
8.	Reserve		12
1. – 8.	costs		170

CONCLUSION

Problems rise from the frequent transfer and manipulation of computer cases during air transportation, not from actual damage of the product. To resolve this problem dimensional and weight restrictions of airlines have been taken into account. Analysis of current state only confirmed the need to address the aforementioned problem in transport. At the beginning of our solution by measuring and weighing individual components we measured the weight and dimensions of the necessary hardware. This information was used as input data from which design, shapes and dimensions of the solution were formed. Individual variants are processed in the form of 3D models and compared using the method of value analysis. Optimal alternative material is aluminum, which has low weight and very good thermal properties. Final design of the PC unit is the easiest and simplest. Technologies of production of specified parts are various. The most preferred is hydro-abrasive division. The box design has been designed in compliance with technical and aesthetic requirements of the issue. The result is a clean lines design and an overall look that works harmoniously. Final goal of this work is to design and initiate production of a PC unit that meets the required criteria and is suitable for frequent carrying.

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This article was created through the implementation of:

- the project "Centre for Management Research technical, environmental and human risks for sustainable development of production and products in engineering" (ITMS: 26220120060) on the grounds of promoting operational research and a development program financed by the European Regional Development Fund - Activity 3.1 Integrated Design manufacturing systems based on physical and virtual modeling;

- the project VEGA no. 1/0102/11 Experimental methods and modeling techniques in house manufacturing and non-manufacturing processes.

Maria Strykowska²⁰

COMPETENCE AS A FACTOR OF REDUCTION OF EMPLOYEES' ANXIETY

Abstract: A significant part amongst various factors causing fear in modern people is related to professional work. First, a person fears that they will not be employed, then that they will not meet the requirements, and eventually that they will be dismissed. In contemporary organizations, often called knowledge organizations, competence plays a special role in alleviation of the sense of fear.

Key words: fear, anxiety, professional work, competence, knowledge organizations

The contemporary world, changing at a very fast pace and abundant in numerous situations unknown to people, may evoke many various fears in them. This issue is addressed by J. Koziński [8] in the article entitled Civilization of fear and culture of hope. Koziński writes that fear and its varieties (such as anxiety, concern, and apprehension) have accompanied people since forever. Originally the sources of fear were hazards caused by natural and ecological phenomena, different disasters and epidemics, i.e. all that what surrounded people, was independent of them and practically beyond their control. Koziński contrasted this fear, called natural, with a state defined as civilizational fear caused by so-called artificial part of our world designed and created by people. Part of this state is inseparable from professional work and working environment, and the role of competence in its reduction is the subject matter of deliberation presented in this article.

However, before I present the significance of competence, first I will describe the phenomenon of anxiety.

Anxiety is one of the most important and most often encountered emotions that have a bearing on human life and his actions. Treated as a natural element of life, anxiety accompanies us continuously and, irrespective of our will, may appear in our consciousness at any moment. Anxiety is a nagging and all-pervasive state, experienced as vague internal tension, excitement or concern. Anxiety is connected with anticipated occurrence of threat and associated with stretching on and lingering uncertainty.

There are many terminological ambiguities as regards the usage of terms "anxiety" and "fear" [9]. Often these terms are used interchangeably, and additionally in colloquial language "anxiety" is sometimes identified with uneasiness and worry. In the literature the most popular distinction between fear and anxiety is the criterion of an object or subject causing it. Fear is a term that describes emotional reaction to a specific observed danger, i.e. to a defined, recognizable threat. Almost all reactions of fear are strong and sudden by nature, and as they endure the level of excitation of an individual rises rapidly. They are accompanied by an increase in blood pressure, breath frequency, and heart rate, contraction of muscles of arms and face, goose bumps, sweating etc. These symptoms wane or even subside completely when danger disappears [ibidem, p.10-11]. On the other hand, anxiety is a reaction to indeterminate threat. In practice it happens that one of the above-mentioned feelings evolves into the other, and it is hard to separate one from the other.

²⁰ Instytut Psychologii, Uniwersytet im. Adama Mickiewicza, ul. Szamarzewskiego 89, 60-568 Poznań, Maria.Strykowska@amu.edu.pl



However, the distinction between them is helpful, for it is easier to get rid of fear than of anxiety, and changing anxiety into fear becomes the first step on the way to get rid of anxiety, for it makes it possible to learn the reason for this unpleasant emotional state and manage it effectively. The above described somatic component is only one of four aspects of emotions accompanying fear as well as anxiety. Seligman, Walker and Rosenham [10, p. 182, 183] additionally distinguish the cognitive aspect concerning recognition of a threat, the emotional component encompassing the feeling of panic/terror, and the behavioral component that includes two types of behavior: unintentional reactions of concern that often are a result of classical conditioning, and causative reactions that are attempts made in order to manage the emerged situation.

There are also other similarities between fear and anxiety. These similarities encompass: anticipated danger, nervous apprehensions, co-occurrence of somatic sensations, concern, excitement increase, negative emotional state, and orientation towards the future [9]. On the other hand, emotional reactions specific to anxiety are characterized by the following facts:

- that most people feel helpless in the face of them and feel that they are irrational,
- that individuals experience them as something unpleasant and lingering, which they cannot get rid of,
- that they are connected with or triggered by physiological reactions of individual organism,
- that they have specific, unpleasant overtone that almost everyone knows from their own experience [12, p. 251-252].

ANXIETY AS A FEATURE AND A STATE

In psychology there is an important distinction between anxiety understood as a feature and anxiety considered a state [12]. The anxiety feature means some general predisposition towards anxiety reactions in difficult, unknown or threatening situations. This predisposition manifests itself in a principally permanent individual difference between individuals and concerns their typical way of seeing the world and reacting to it. According to Spielberger, this disposition is responsible for person's susceptibility to see not dangerous situations as dangerous and react to them with excessive state of anxiety. Cognitive processes, and concretely noticing and interpretation of situations, play an important role in formation of the feature of anxiety [4, p. 20]. In the second meaning anxiety is treated as a passing emotional state, whose escalation and types of concerns, to a large extent, depend on circumstances in which a given person is. This state is inspired not only in real, current danger, but also in anticipated or even imagined. The state of anxiety consists of two elements: conscious feeling of anxiety, and physiological and behavioral symptoms. People have greater possibility of controlling anxiety as a state just by anticipation of possible difficulties and preparation for them. Such a role may be played by development of competence in order to meet the requirements of jobs in contemporary organizations, so-called knowledge organizations, which owe their name to higher and higher job intellectualization.

CONSEQUENCES OF EXPERIENCING ANXIETY AND WAYS TO MANAGE IT

Due to the role of anxiety in human behavior, it has been the object of much research. Some of these studies focus on conditions of this state, among which we find subject-dependent factors, genetic and constitutional factors, and temperamental and behavioral factors, and these include: behaviors, patterns of somatic, autonomic and immune reactions, and first of all – personality and situational conditions [11]. The last group of factors also encompasses working environment.

Other, equally numerous studies are devoted to positive and negative consequences of anxiety; while the positive effect of anxiety is incommensurately small compared with its destructive, devastating results. The adaptive value of anxiety should be considered positive. This value manifests itself in the fact that it helps prepare for possible danger, and in insignificant or limited doses it has a positive effect on learning and efficiency. While low escalation of anxiety may be favorable, strong or lingering anxiety is undoubtedly harmful, kills the joy of life in a person, lowers their self-esteem, causes that a person withdraws, and avoids accepting challenges as well as

showing initiative and accepting responsibility. Such anxiety also lowers the threshold of tolerance to uncertainty, thus impeding possibilities of development as well. Since the feeling of anxiety is to a less of greater degree an unpleasant state, people try managing it using, among other things, four major defensive techniques, i.e. rationalization, denial and supersession, taking pharmacological medications reducing anxiety stress, and avoiding all situations, thoughts and feelings that may trigger off anxiety reactions (7, p. 22). The use of the above-mentioned defensive mechanisms decreases the feeling of anxiety, but it does not change the actual situation in which a person is.

However, people feeling anxiety do not confine themselves to defensive reactions or withdrawal. They also show activity oriented to accepting challenges they face, which at work, especially in contemporary organizations, is a rational and desired strategy based on continuous development of competence.

COMPETENCE

In the subject literature and in everyday life the terms of competence and qualifications are often used interchangeably.

The traditional conception treats qualifications as a term from the area of education that means the level of education, and the International Labour Organization defines them as learned or acquired abilities to do a specified job or task in an appropriate manner. On the other hand, competence come to light when a specific job is done. They are a dynamic structure that changes under the influence of both external and internal factors. Competence are updated during professional activity and other activities. R. F. Boyatzis [2] defined competence as potential existing in human, thanks to which a person may fulfill requirements of a given job within the existing parameters of the organization's environment. Competence understood in this way consist of features of a given person, including: motivation, personal traits, skills, self-evaluation connected with functioning in a group, and knowledge absorbed and used by that person. The quoted author also introduced a division into threshold competence and differentiating competence. Threshold competence constitute the basic level of competence required in a given job (a person with a competency level lower than this reference level should not be given the job in question). Differentiating competence are competence that allow distinguishing people with better results from people with worse results and compare them with each other [1].

Miller, Rankin and Neathey [1] divided competence according to a different key. They distinguished two types of competence:

- behavioral, in other words "soft" skills, i.e. a way in which people should act to perform well tasks constituting their job; assessment of these skills requires observation of given person's actions; this kind of competence is considered as potential that can be developed or modified if needed;
- functional, so-called „hard" skills; they describe the knowledge required to perform well a specific job or fulfill well a specific duty; this type of competence refers strictly to effective standards of performance or expected results of work in a given professional environment.

Another division of competence may be into social competence and professional competence. Social competence condition functioning of employees in relations with other people, which is especially important in social professions (most important in professions connected with bringing help) and on managerial positions, where this kind of competence constitutes a crucial factor of building employees' involvement. Professional competence may be identified with functional (hard) competence.

Apart from the types of competence described hereinbefore, there is another conception worth mentioning, i.e. corporate competence. This competence results directly from the vision of organization and the goals it wants to achieve. The vision and the goals often are very general, abstract and expressed in underspecified way. Corporate competence is to show the employees how they are required to behave in order to stay in line with the company's course. This kind of



competence is general, for it concerns all employees, therefore it cannot be treated only as a requirement solely for positions [5].

In accordance with the basic assumption of contemporary psychology, people can develop their competence and learn all life. This thesis is the basis for managing one's own career.

PROFESSIONAL CAREER

Contemporary employees are doomed to experience anxiety. Firstly it is connected with getting a job on the current, difficult labor market, and then with the apprehension as to whether they will be able to the job and also whether they will not lose the job. Contemporary organizations do not assure their employees the feeling of safety and stabilization, which is expressed by so-called dynamic career patterns, assuming that contemporary employees will change jobs many times and that this will often happen for reasons independent of them. To reduce the threat of unemployment and losing a job, people take actions to increase their market value (employability) through accumulation of so-called career capital, whose basis consists of broader and broader competence gained all life (3). Competent employees better handle in the job, are more effective, make less mistakes, their self-esteem is higher, they easier adapt to changing environment, and they are ahead of changes before they happen, instead of confining themselves to passive reacting to changes. These employees not only obtain better results of professional tasks they are responsible for, but also their social competence (innate or trained) enables them to function better in social terms. They establish contacts easier, they cooperate better in a team, and conflicts are more often changed into problems that can be solved, which contributes to creation of new, original solutions. It is also expressed in involvement in work and the level of achieved satisfaction. It should also be noticed that the sense of one's own professional adequacy consists not only in execution of set tasks, but also in one's attitude towards them. Employees who are not very competent treat every task, especially new, as a threat; an increase in their competence causes a shift in their attitude towards treating tasks as challenges. Development of competence also prevents professional obsolescence and increases the sense of being the causative factor in one's life and having control over it, which contributes to achievement of welfare and better health of employees.

An increase in competence is not a matter of an individual employee. Managers of companies to a greater and greater degree understand that taking care of development and training of personnel is a good investment, which will not only pay off, but also may bring additional profits. According to M. Armstrong [1] training also has a bearing on reduction of personnel fluctuation and maintenance of a specified standard of performance, as well as it creates a common vision of the organization in the minds of its employees, which is conducive to releasing in the employees all the things that agree with effectiveness.

The benefits of owned competence may be considered not only at a level of an individual or an organization, but also on a social level. G. Hofstede [6] stresses its importance in his concept of national culture. He states that less educated nations are less tolerant to uncertainty connected with new situations and more often appeal to irrational action strategies (e.g. shaman practices), for they do not treat new situations as a manifestation of natural development and progress, which they should cope with.

The presented deliberation may be summarized by the following statement: competence is the primary factor of reducing anxiety of employees and a basic determinant of success of an individual and an organization, placing emphasis on the fact that here anxiety means a condition. Anxiety expressed as a feature is a more permanent property, although the feeling of control over one's own fortune and succeeding may cause it also to change within some limits.

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Michal Tkáč²¹, Renáta Turisová²²

COMPARISON OF THE RELIABILITY OF TECHNICAL DEVICES USING THE FTA METHOD

Abstract: The paper deals with the practical application of quantitative methods for stochastic method FTA in the production process. Through practical examples of using the above method in the production of asphalt, we will show the inaccuracies occurring in selected equipment.

Key words: Fault tree analysis, decision theory, process control, system failure.

INTRODUCTION

For process management it is very often necessary to make decisions in situations when there is not enough reliable information. Time pressure creates stress on the decision maker, who must take a decision without the relevant empirically verified data. One way to ensure support for such a decision is to use either more or less sophisticated methods used in quality control.

So making decisions requires a rational nature and the same objectivity, or even independence from the decision maker's own feelings. One such applicable method, in practice not a relatively complicated one, is the method of Fault Tree Analysis (FTA). On concrete examples from practice we show it is possible to use it in decision-making process. Decision-making process in this case will affect the development of system management of facility aimed to making asphalt coating. The concept of such a management system in the form of computer control equipment for the production of asphalt mixtures wrapping is shown in Fig. 1.

One important aspect of efficiency and functionality of the implementation of these asphalt mixtures is the selection of appropriate equipment for dispensing asphalt. In previous projects the following basic approaches of dosage have been used:

- Solution A: estimate of dosage using IRC circuit that is coupled with the pump.
- Solution B: dosage through the flowmeter with flowing asphalt.

²¹ Department of Business Informatics and Mathematics, Faculty of Business Economics with seat in Kosice, University of Economics in Bratislava, Tajovského 13, 04130 Košice, michal.tkac@euke.sk

²² Department of industrial engineering and management, Faculty of Mechanical Engineering of Technical University of Kosice, Nemcovej 32, 04200 Košice, renata.turisova@tuke.sk

- Solution C: dosage using dosing devices based on the principle of a weighing machine.

The first of the three solutions (Solution A), although the most frequently used in practice because it is the cheapest, is characterized by a great uncertainty of dosage, which ultimately causes customer resentment, requiring greater accuracy of dosing. Developers have therefore decided in the next two subsequent projects to implement the other two mentioned solutions in the methods used by competing systems in the form of pilot projects. To offer that of the two solutions which best met their requirements was the subject of decision.

By using QFD analysis the sales department revealed that a critical feature of VOC in the above-mentioned solutions B and C is not the accurate weighing (which is the same for both types), but the reliability, or faultiness. Equally important is the overall management system as well as the wider management system, which the unit is part of. The management company providing management system requirement should subscribe to one of the mentioned solutions B and C for all subsequent projects.

The task of developers was to create a comparison of reliability of two technical equipments which are identical except for device for dispensing asphalt. To solve this problem the FTA method was used.

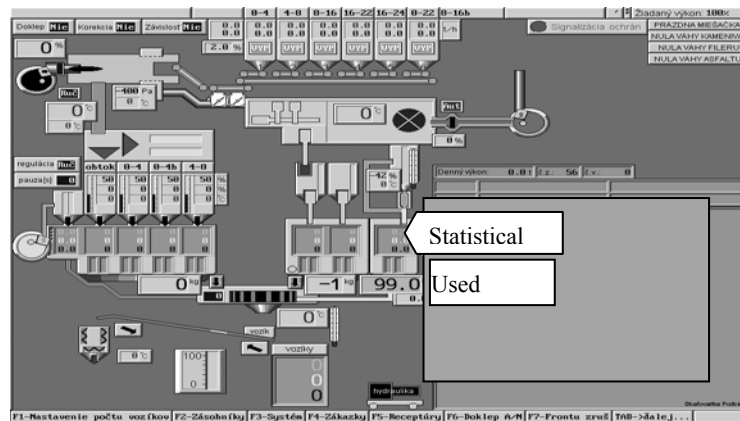


Fig. 1. Scheme of asphalt production

FAULT TREE ANALYSIS

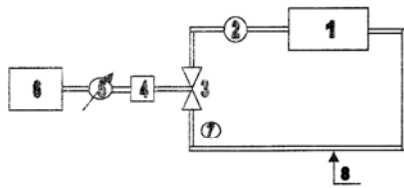
Fault tree analysis (FTA) is a method, which is based on a graphical solution structure of the problem and helps to understand the relationships and analyze following errors. To solve the problem it (based on an analysis of causal relationships between failures and the elements of system failure) usually uses two approaches:

- Inductive approach - Inductive analysis begins with a set of conditions of failure of the elements and moves forward to identifying the possible consequences, which means the approach of "what happens if?"
- Deductive approach - FTA is an example of a deductive approach, "what can cause a studied condition?" and is used to identify causal relationships leading to a specific type of system failure.

FTA is a method which can express a specific type of system failure in relation to the failure modes of individual elements and activities' operators. Type of system failure (root event) is located at the top which is called a root, whereas the downward extending branches show the possible causes. This process is interrupted should we encounter events causing failure of elements that cannot be divided. These events are called basic events. FTA is exemplified by information on the likelihood of such events [6].

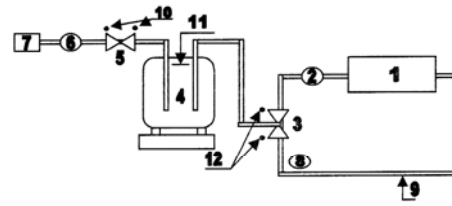
The terminology used in this article is based on terminology commonly used in [6] or [4,5].

The entry for each FTA analysis is the determination of the likelihood of errors mentioned in the analysis of elementary indivisible elements of the system. Their exact determination unambiguously determines the overall accuracy of a FTA. Schemes of asphalt mixtures dosing subsystems are described in Fig. 1 and Fig. 2.



Caption: 1 asphalt heating, 2 pump, 3 valve, 4 filter, 5 flowmeter, 6 mixer, 7 servodrive, 8 pipeline

Fig. 2. Solution B – equipment no. 1



Caption: 1 asphalt heating, 2 and 6 pump, 3 valve, 4 weighting machine, 5 valve, 7 mixer, 8 servodrive, 9 pipeline, 10 a 12 strain gauge, 11 emergency sensors

Fig. 3. Solution C – equipment no. 2

THE PROBABILITY OF ELEMENTARY ERRORS OF THE OF A SYSTEM

Probability estimation was carried out by expert assessment of three developers, while expert no. 1 and no. 3 were from the company; expert no. 2 was an external expert of the issue, who works for a research institute. Terms of expert assessments were privileged. All three evaluators (experts) had access to complete data and the opportunity to do empirical experiments on pilot equipment, which means: solution B and C. The results of this evaluation are given in values of ppm (parts per million). The results of the expert estimates are in Table 1.

Table 1. Probability Estimate of failure occurrence values

Parameter	For equipment no. 1			Parameter	For equipment no. 2		
	Estimate of failure occurrence (ppm)				Estimate of failure occurrence (ppm)		
	Estimate 1	Estimate 2	Estimate 3		Estimate 1	Estimate 2	Estimate 3
Pipeline	0,002	0,001	0,002	Connection to terminal	0,63	0,63	insignificant
Asphalt heating	3,81	1,90	5,71	Asphalt heating	3,81	1,90	5,71
Pump	1,90	insignificant	0,63	Pump	1,90	insignificant	0,63
Valve	insignificant	1,27	0,63	Hydraulic motor	1,90	1,27	1,90
Servodrive	1,90	1,27	1,90	Strain gauge	0,63	0,95	0,63
Filter	57,08	38,05	47,56	Weighting machine	0,63	0,95	0,63
Flowmeter	1,90	3,81	3,81	Emergency sensor	0,63	1,91	0,63
Mixer	1,90	insignificant	7,61	Mixer	0,63	insignificant	0,95
Contactar	38,05	41,86	38,05	Asphalt heating	3,81	1,90	5,71
Fuse	9,51	13,32	9,51	Pump	1,90	insignificant	0,63
Phase of grid	7,61	5,71	11,42	Valve	insignificant	1,27	0,63
End position sensor	0,63	1,27	1,27	Contactar	38,05	41,86	38,05
Electric motor	1,90	1,90	1,27	Fuses	9,51	13,32	9,51
Thermal protection	1,90	1,90	1,90	Electric motor	1,90	1,90	1,27
				Phase of grid	7,61	5,71	11,42
				Thermal Protection	1,90	1,90	1,90
				Pipeline	0,002	0,001	0,002

Fig. 4 and Fig. 5 presents failure trees based on schemes (Fig. 2 and Fig. 3) for equipment no. 1 and 2.

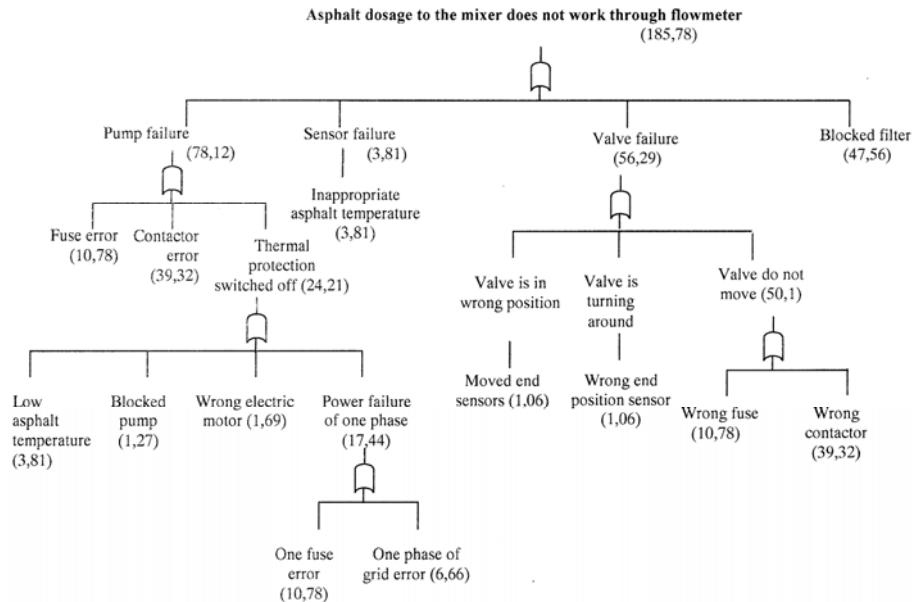


Fig. 4. Failure tree for equipment no. 1

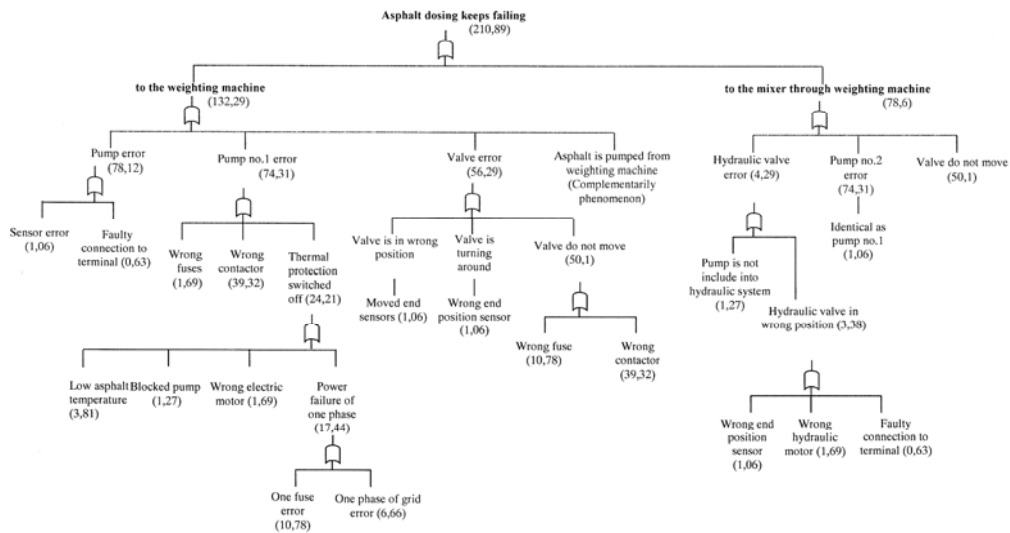


Fig. 5. Failure tree for equipment no. 2

RESULT FROM FTA

Root error for equipment no. 1 – flowmeter is 185,78 ppm and for equipment no. 2 - dose failure is 210,89 ppm. The slight increase of errors of the dispenser system based on the principle of a weighing machine is obvious in view of the increased number of elements of this system. Overall, both equipments have the same faultiness and given the mentioned equal accuracy of decision-making. It has also been recommended to manage another aspect, which based on analysis of QFD and VOC was important from a customer perspective due to costs associated with the operation of these equipments. Based on this factor, the flowmeter proves better, which was subsequently recommended as the final decision.

CONCLUSION

Ability to meet customer requirements, comply with customer opinion (VOC) and, moreover, knowing how to translate this opinion into technical requirements (QFD) in a manner that takes into account the existing competitive solutions, is clearly a competitive advantage. Using concrete examples from practice, we demonstrated how to use a FTA for the development of decision-making process of regarding a asphalt mixing control unit. The mentioned method, although based on subjective evaluation of experts, objectifies the decision-making process and gives it a rational character. Another advantage of this procedure is the possibility to review arguments, as each phase is properly described and clearly identifies critical factors.

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This contribution is the result of the project implementation: Center for research of control of technical, environmental and human risks for permanent development of production and products in mechanical engineering (ITMS: 26220120060), supported by the Research & Development Operational Programme, funded by the ERDF and Project KEGA No. 158-042EU-4/2010: Making and implementation of blended e-learning into the educational process of block teaching 3.3.16 Economics and Management of company.

Peter Trebuňa, Miriam Pekarčíková²³

SIMULATION METHODS OF RISK ANALYSIS

Abstract: The first step in the process of reducing risk is naturally their analysis. Risk analysis is largely seen as a process of defining threats, likelihood of occurring of these factors, and impact if they appear, thus determining the risks and their severity. The paper shows how it operates.

Key words: risk analysis, Monte Carlo method, simulation.

THE PRINCIPLE OF SAMPLING AND SIMULATION

An important factor in evaluating sampling techniques, is the number of repetitions needed to create the exact input distribution through sampling. Accurate results for the output distribution depend on the completeness of sampled input distribution [1,2].

The most common computer programs used are the Monte Carlo sampling and the Latin Hypercube. They differ in the number of repetitions needed for the sampled value to approach the

²³ *Strojnícka fakulta, Technická univerzita v Košiciach, Katedra priemyselného inžinierstva a manažmentu, Némcovej 32, 04001 Košice, peter.trebuna@tuke.sk, miriam.pekarcikova@tuke.sk tel.: 055 /6023235*

input probability distribution [2]. Monte Carlo sampling often requires large numbers of samples to approximate the input distribution, especially if the input distribution is very oblique, or contains results of low probability [2].

The principle of the Monte Carlo method is based on using the program to identify potential risks and the likelihood of their occurrence. @RISK is actually a quantitative method that determines the probability distribution of threats and risks. Each probability distribution program @RISK replaces fixed value with specified distribution functions. These functions, each of which represents a range of probability distribution, are using an enhanced set of functions of MS Excel spreadsheet.

Commencing analysis with @RISK involves three simple steps:

1. SETTING A MODEL

It starts by replacing uncertain values in the table with @RISK probability distribution functions, such as normal, uniform, or more than 35 others. These @RISK functions present a series of possible values, which could have a cell instead of just one case. It is necessary to choose the distribution of the video gallery, or to define the distribution using historical data for the input. Even distribution can be combined with @RISK composite functions. Download specific distribution function with other users using the @RISK Library, or change @RISK functions for those which do not have @RISK [3].

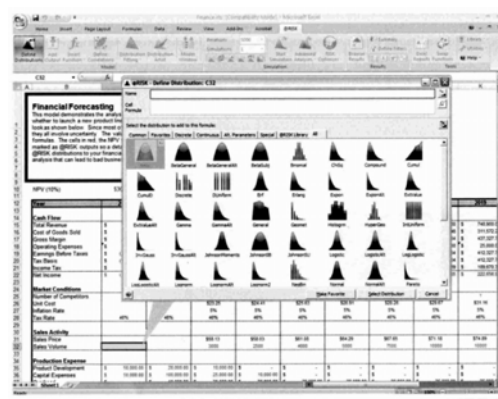


Fig. 1. @RISK distribution range [2]

Another choice is the output - "lower limit" cells whose values we are interested in. This could be the potential gains, return on investment, insurance claims payments etc. [3].

2. RUNNING SIMULATION

A button "watch and simulate" @RISK recalculates spreadsheet models. Whenever @RISK samples random value of @RISK functions that we have entered into the cells in our model, the software recalculates the resulting values. The process can be explained by other simulation run in demo mode, with charts and updated reports as a simulation runs [3].

3. UNDERSTANDING RISKS

The result of simulation is to look at the entire range of possible outcomes, including the likelihood that the phenomenon occurs. It shows the results with histograms, cumulative curves and others. We identify the critical factors with Tornado graphs and sensitivity analysis. It is possible to insert the results into Excel, Word or PowerPoint, or store them in the @RISK Library for other users of @RISK. Results and graphs can be stored directly in a form of an Excel sheet [3].

The figure below shows the course of the simulation for 1000 possible probabilities of uncertain input values of the sales price of the output. This computing environment in MS Excel consists of applications that run in the top toolbar.

This figure shows a table with input values divided triangular, with an added output and the distribution function set the value generated. Bottom left is the accompanying box, which informs us of the percent of sampling error as well as the number of samples.

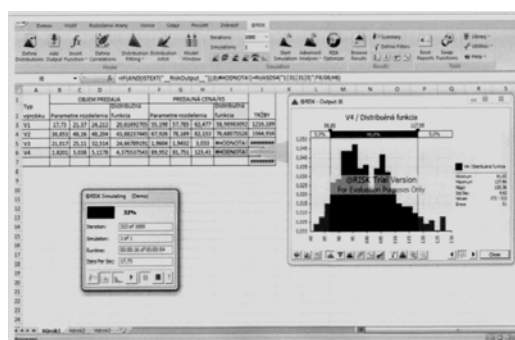


Fig.2. Example 2 during the simulation in @RISK

The resulting histogram to get the simulation generated values. I will evaluate according to the following picture, which shows the distribution of input values in the triangle. The assessment will consist of variable values, to which I assign values of the likelihood for the incumbent, alleged the histogram.

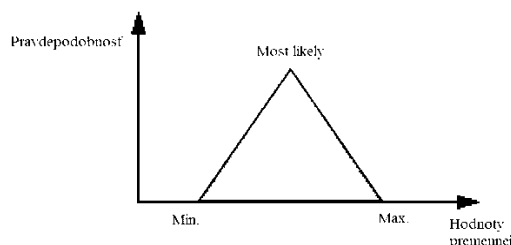


Fig. 3. Triangular probability distribution

To assess the histogram in order to produce a simulation in @RISK requires descriptive characteristics to determine the type of sampling distribution.

DESCRIPTIVE CHARACTERISTICS

Descriptive characteristics of a number calculated by the formula of the statistical file (in our case the value generated by the simulation). The aim is to characterize the descriptive characteristics of the file (values) [2].

Descriptive characteristics are divided into three groups [2]:

- Measures of position,
- Measures of variability,
- Measures of shape.

The analysis determine the likelihood of risk, and therefore I will describe it further in the following section, which consists of:

I. Skewness

Obliquity measures the direction and degree of asymmetry in the distribution of the variable and is calculated by:



$$b_1 = \frac{\frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^3}{s^3}$$

Positive (right-sided slant) means that the diameter is greater than the median, thus most of the values is less than average. Negative value (left-sided slant) means that the median is larger than average and therefore most of the values is greater than the average. Skewness equal to 0 indicates a symmetrical distribution, ie average and median are equal. Next figure shows the triangular distribution of the proliferation of differing skewness only. On the horizontal axis (x) histogram values are variable and the vertical axis (y) relative frequencies (percentages) of the variable values at appropriate intervals on the x axis.

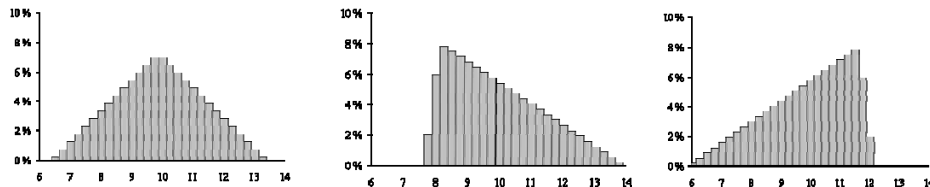


Fig. 4. Symmetric distribution, distribution with positive and negative skewness

II. Sharpness (Kurtosis)

Sharpness measures density tail distribution of the variable, thus describes the occurrence of extremely high and extremely low values. Sharpness is calculated according to the formula:

$$b_2 = \frac{\frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^4}{s^4}$$

Sharpness distribution is compared with the sharpness of the normal distribution, where it is equal to third Unimodal distribution, which has greater sharpness, and thicker tails (the occurrence of extreme values is more common) compared to a normal distribution. Such distribution will have higher peak. Unimodal distribution, whose sharpness is less than 3, has lower tails, hence the occurrence of extreme values is less frequent than in the normal distribution. Such distribution is flatter. Fig. 5 show the four symmetrical distribution of the same diameter (0) and equal variances (5/3), which differ only in kurtosis.

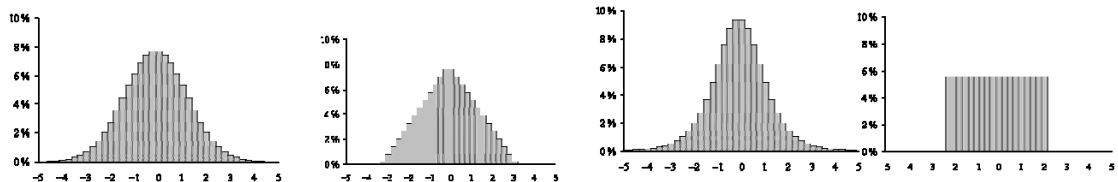


Fig. 5. Normal Student Triangular and uniform distribution

CUMULATIVE PROBABILITY DISTRIBUTION

Each probability distribution may be presented in a cumulative form. Cumulative curve of the y-axis default values from 0 to 1, with values for the y-axis represents the cumulative probability corresponding to the value on the x axis the cumulative curve. Cumulative value of 0.5 corresponding to a point 50% cumulative probability [2].

50% of values in the distribution falls below the median and 50% above the median. Cumulative value of 0 is the minimum value (0% value is below this point) and the cumulative value of 1 is the maximum value (100% value is below this point) [2].

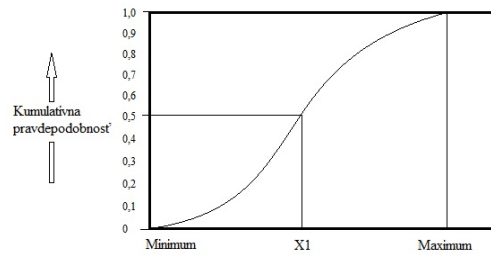


Fig. 6. Cumulative probability distribution [2]

CONCLUSION

Assessment of the success of the company lies in evaluating its results, which represent the expected values of variables and risks. Risk management strategy does not call for maximizing one criterion, but for an agreement among several criteria. The choice of these criteria affects the risk and entity (entrepreneur), which are decided between the different variants solving decision problem and then considering the adoption of solutions.

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This article was created through the implementation of:

- the project "Centre for Management Research technical, environmental and human risks for sustainable development of production and products in engineering" (ITMS: 26220120060) on the grounds of promoting operational research and a development program financed by the European Regional Development Fund - Activity 3.1 Integrated Design manufacturing systems based on physical and virtual modeling;

- the project VEGA no. 1/0102/11 Experimental methods and modeling techniques in house manufacturing and non-manufacturing processes.

Renáta Turisová, Jaroslava Kádárová²⁴

IMPROVING THE PERFORMANCE OF THE MANUFACTURING PROCESS BY USING THE SIPOC METHOD

Abstract: This contribution is about improving efficiency of the production processes using the SIPOC method in process maps. Practical use of this method in improving process performance is shown by presenting a specific example of the manufacturing process of photovoltaic panels.

Key words: process, process map, SIPOC analysis.

INTRODUCTION

Increasing the efficiency of all business (mainly manufacturing) processes is now a necessity for keeping the enterprise on the market. The use of process approach, which is based on understanding and measuring parameters of the analysis process, is the basis of any performance

²⁴ Department of Mechanical Engineering and Management, Faculty of Mechanical Engineering of Technical University of Kosice, Nemcovej 32, 04200 Košice, renata.turisova@tuke.sk, jaroslava.vidova@tuke.sk

improvement process. Based on suitably constructed maps containing all relevant information about the process, which are also described by the basic characteristics and the process identifier, both dynamic and static variables, it is possible to determine the performance of the process.

Consequently, it is possible to identify actions that will ultimately cause an increase in performance. Basic steps of this continuous improvement process are shown in Figure 1.

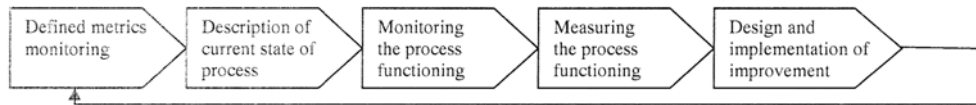
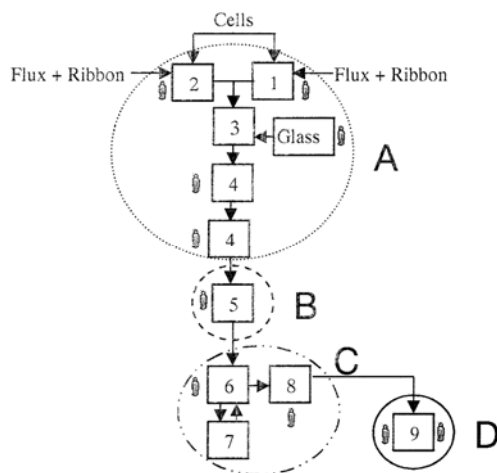


Figure 1. Continuous improvement process

Source: Processed by [3]

For analyzing processes, it is necessary to know the basic input features in a static form. They create the first iteration for the parameters that change dynamically its value over time. Consider the continuance of production process of photovoltaic (PV) panels, which is shown in the figure below (Figure 2).

As an example of such a static approach, under which there are proposed measures to ensure improvements for the process of installing solar panels.



Caption:

A. String production process, their storage on glass, handmade connecting and control.

1, 2 – Soldering of cells to the strings by 10 pieces.

Inputs: cells, ribbon, flux.

3 – Robot takes strings and put them on glass.

Inputs: glass, EVA cling film.

4 – Hand involvement in a series of PV panel, pre-laminated process and control.

Inputs: ribbons, EVA cling film, TEDLAR cling film.

B. Lamination process.

5 – Lamination.

C. Completion process.

6 – Cleaning the panel and bonding strip.

7 – Framing.

8 – Junction box assembly.

D. Process of measuring, testing, inspection and packaging.

9 – Measuring, testing, inspection and packaging of panel.

Figure 2. Production process of PV panels

USAGE OF SIPOC ANALYSIS

SIPOC analysis is suitable for a static description of the process analysis. This static model of the process makes it possible to characterize the static form of all basic parameters of the analysis process. SIPOC analysis consists of the following five main steps: the supplier, inputs, processes, outputs and customers. This analysis shows the interdependence of suppliers with inputs, outputs and also the linkage between outputs and customers (Figure 3). This analysis helps to understand the scope of the process in the context of customer expectations.

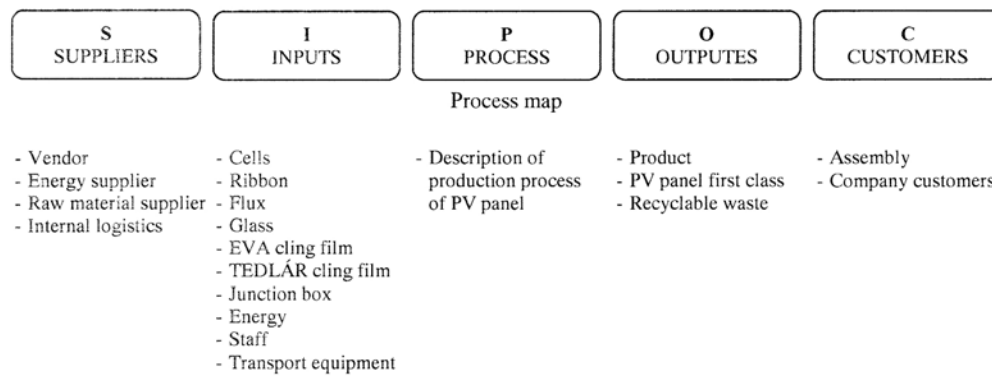


Figure 3. SIPOC analysis – process map

PROPOSAL FOR IMPROVEMENT OF THE MANUFACTURING PROCESSES OF PV PANELS

We focused on optimizing the process of PV panels. The process of PV panels manufacturing is used for installing solar panels, which generate electricity from solar energy. We chose the production of panels consisting of 60 parts and a maximum voltage of 30V. Although the manufacturing process has already been smooth, we decided to improve and optimize it and change the EVA type cling film from Standard cure to Ultra fast cure, in which the time of lamination process is reduced with no compromise in quality.

The procedure for calculating the time of production of PV panels is as follows.

A. String production process, their storage on glass, handmade connecting and control.

1,2 – Soldering of cells to the strings:

$$6,5s \times 1cells = 6,5 \times 60ks = 390s ,$$

$$\frac{390s}{2 machines} = 195s = 3,25 min ,$$

$$3,25 min \times 3 panels = 9,75 min .$$

We calculate the number of 9,75 min. In practice it means 10 minutes, if downtime occurred in the performance 4,09Wp.

3 - Robot takes strings and puts them on glass.

$$8s \times 18strings = 144s = 2,4 min .$$

We get 2,4 min., but really in practice it means 3 minutes (if downtime occurred in the performance 4,09Wp).

4 - Duration of manual operations in the batch of PV panels, pre-lamination process and control.

$$90s \times 3 panels = 270s = 4,5 min$$

We get 4,5 min., but in fact in practice it means 5 minutes (if downtime occurred in the performance 4,09Wp).

B. Lamination process.

5 – Lamination.

Temperature during lamination of 3 pieces of panel at the same time is 150°C in 10 minutes.

The EVA cling film Ultra fast cure is used when the temperature during lamination is 150°C and time is 7 – 10 minutes.

C. Completion process.

6 – Cleaning the panel and bonding strip.

$$60s \times 3 panels = 180s = 3 min$$

We count 3 min.; (if downtime occurred in the performance 4,09Wp).

7 – Framing.



$$50s \times 3 \text{ panels} = 150s = 2,5 \text{ min}$$

We get 2,5 min., but in fact in practice it means 3 minutes (if downtime occurred in the performance 4,09Wp).

8 – Junction box assembly.

$$73s \times 3 \text{ panels} = 219s = 3,65 \text{ min}$$

We get 3,65 min., but in fact in practice it is 4 minutes (if downtime occurred in the performance 4,09Wp).

D. Process of measuring, testing, inspection and packaging.

9 – Measuring, testing, inspection and packaging of panel.

$$190s \times 3 \text{ panels} = 570s = 9,5 \text{ min}$$

We get 9,5 min., but in fact in practice it is 10 minutes (if downtime occurred in the performance 4,09Wp).

Lamination time is reduced, which saves half of the lamination time. We also optimize all parts of the production process, reducing the time and thus production of PV panels will become smoother, faster, with lower downtime, and of course the company will reduce costs for labor and energy.

Difference between the previous and the newly proposed state of the manufacturing process of the PV panels is shown in the chart (Figure 4). In the previous state of production the time was 72 minutes and in the proposed state the production time is 48 minutes.

Next graph (Figure 5) shows the difference between the previous and proposed state of the process of PV panels production. Graph shows the lamination temperature, the overall manufacturing process time and number of pieces produced per hour.

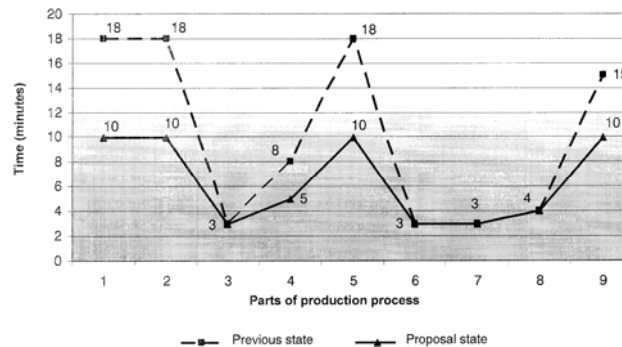


Figure 4. Graph of difference of time between previous and proposed process

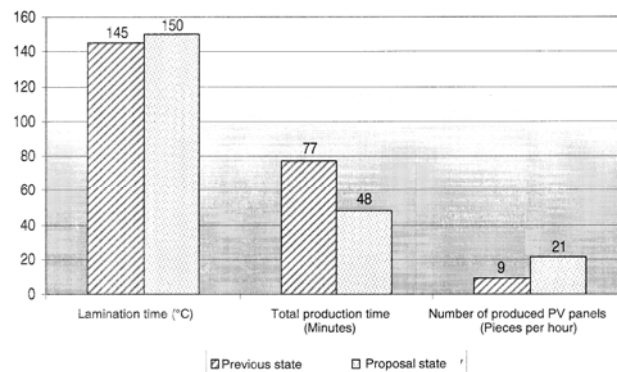


Figure 5. Graph of difference of T, t, pieces/hour between previous and proposed state

The difference between the previous and proposed state: the difference in lamination temperature is 5° C, the difference in the overall production time is 24 minutes, and the difference of pieces produced per hour is 12.

CONCLUSION

Using static SIPOC analysis in process maps shows the weaknesses of existing solutions and options for redress. The advantage of this approach in improvement is the simplicity, but mostly clarity of methods used in the management of the process.

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This article was created through the implementation of:

- the project "Centre for Management Research technical, environmental and human risks for sustainable development of production and products in engineering" (ITMS: 26220120060) on the grounds of promoting operational research and a development program financed by the European Regional Development Fund - Activity 3.1 Integrated Design manufacturing systems based on physical and virtual modeling;

- the project VEGA no. 1/0102/11 Experimental methods and modeling techniques in house manufacturing and non-manufacturing processes.

Leszek Wanat²⁵, Tomasz Potkański²⁶

BARRIERS FOR EFFECTIVE REGIONAL LEADERSHIP IN TIME OF CRISIS

Abstract: This article links to an earlier one published in Intercathedra Volume no. 27-4/2011 which dealt with a rather peculiar crisis of leadership that manifested itself during the recent global financial crisis, by presenting it the context of major theoretical concepts of regional development. In that context the authors had analysed the role of regional leadership in overcoming economic growth barriers. In this article the point of departure is accepting the crucial role of leadership –

²⁵ University of Life Sciences and University of Economics in Poznan, leszek.wanat@ue.poznan.pl

²⁶ Collegium Civitas in Warsaw, Deputy Executive Director of the Association of Polish Cities; tpotkanski@collegium.edu.pl



both in terms of regions (or sub-regions) as well as sectors/branches of economy - in stimulating economic growth and overcoming outcomes of the crisis. It is at the same time a new challenge for those research which are open for using a set of mesoeconomic tools, being at the same time open for experience of other disciplines, including psychology of management and social psychology.

Key words: leadership, regional development, economic crisis, mesoeconomic approach.

INTRODUCTION

Analysis of literature disclose various aspects of influence of regional leadership on the social, economic and technological development in the regional context. The subject literature is usually of theoretical character, only in some cases supported by case studies. Therefore it is difficult to identify in this literature a precise data or quantifiable indicators that would be structured into a coherent analytical way. Perhaps the easiest part concerns relationships between aspects of regional leadership²⁷ in the area of Local Government administration (eg. through the System of Local Self-Government Analysis) [15]. Newly engaged participants of these processes – representatives of public-private networks, as well as non-profit organizations are hardly captured by these simple indicators and are a difficult subject for research.

It would, however, be worth to identify at least key barriers for effective leadership, which are the crucial ones in the situation of crisis. Quite often they become symptoms of crisis, while in other situation they contribute to its causes.

The following table summarizes key factors which in different ways influence the regional leadership. They are then described in brief – becoming itself a list of issues for further academic investigation.

Table 1. Factors identified as key barriers to the development of regional leadership as well as direction and potential of the suggested changes.

REGIONAL LEADERSHIP	
FACTORS	BARRIERS
Regional identity	Competition within public sector
Widespread strengthening of political and administrative leadership in regions	Combining of executive and political powers
Local communities' engagement in the activities of local administrative authorities	Overusing the public participation as well as marginalizing the voice of minorities
Frequent changes of regional leadership structures	Style of leadership.
DETERMINANTS OF CHANGES	
Development of deliberative democracy	Conciliatory management style and competitive cooperation

Source: own study based on [5].

COMPETITION WITHIN PUBLIC SECTOR

International trends suggest that widening a scope of regional leadership by adding representatives of economic and social interest-groups result in creating, the so called *iron triangles of stakeholders*. They have a tendency to disperse activities within sectors (so called sectoralisation of public policies) and forming an opposition vis a vis horizontal coordination between sectors. Within each sector new vertical hierarchies are being formed, often very determined to fight for a high status of own sector [14].

²⁷ The concept of "regional leadership" referred in a previous article on this subject Volume no. 27-4/2011 and this one as well, shall be understood to cover also leadership at the sub-regional level (county and municipality) as most of the features and described consequences pertain to all levels at the same time. Moreover, the modern concepts of territorial governance require - among others - close cooperation of leadership of all levels. In this text we assume that the leading concept is that of „regional leadership“ as the region is a proper level of mesoeconomic analyses in the theories of economic growth. However, the concepts of "regional" and "local leadership" become compatible and can be used interchangeably – when we refer to leadership skills or style as a key factor for development.

COMBINING OF EXECUTIVE AND POLITICAL POWERS

One of the aspects of regional leadership, which complicates political dimension of development processes at the regional and local level, is combining political powers with administrative ones in the hands of the regional/local political leader. This is an inherent feature of the Polish and several other European countries' administrative systems, unlike for example in Scandinavia, where managerial administrative functions (CEOs) are strictly separated from political leadership functions. This feature has a number of consequences, both negative and positive. A negative consequence is that system of controls over activities of administrative managers is limited if CEO function is performed by a political leader at the same time. This is even more probable in the case of local level leaders in Poland who, since 2002, are directly elected (mayors of municipality / city level) by citizens, and whose power vis a vis the Municipality / City Council has consequently been significantly strengthened since that time. Given this fact, there is always a danger that their acts will remain to some degree and in practical sense - outside immediate of public control. This might incidentally happen to be true - since the mechanisms of social control are indeed weak while impeachment procedures are very cumbersome and lengthy [7]. A similar mechanism works for the truly regional level leaders, who are politically related to national political parties, which also makes their impeachment more difficult in practical sense.

On the other hand – a positive side of combining administrative and political powers is clearly visible in terms of increased effectiveness of decision-making and daily activities – which is a very case of most of Polish local and regional governments. Moreover, there is always a clear political responsibility for all acts of regional/local governments, at least once per four years. There are also other sub-dimensions of the problem discussed; combining of political and administrative tasks require from leaders double professional qualifications and experience. From this point of view there is another possible sub-problem: due to time pressure, or given the fact that some of the leaders might only have one of these types of skills developed better - therefore the other function might be underperformed.

OVERUSING THE PUBLIC PARTICIPATION AS WELL AS MARGINALIZING THE VOICE OF MINORITIES

Finally one of the most difficult problems identified in the context of regional development are cases of overusing public participation mechanisms by strong interest groups (eg. businesses, NGOs, or other individuals or groups that are well organized [eg. in protesting], etc.) which aim at their narrow interest – at the expense of interests of a wider public. On the other hand there happens sometimes a marginalization of the voice and therefore rights of different types of minority groups [10].

STYLE OF LEADERSHIP

One of the key barriers that are often faced by the regional or local elites in the context of creating and stimulating modern development paths for that given area – is the so-called “boss-like” style of executing leadership functions. Under this approach the leader, or leadership team is concentrated more on exact implementation of the accepted strategy/plan, at the expense of communication and cooperation with other participants of the process (stakeholders). As a result such a narrow and rigid approach makes implementation of public policies at the local/regional more difficult and not innovative [11].

A new potential for regional/local development is created by accepting and performing a **conciliatory management style**. Based on the research done by Swianiewicz, Klimska and Mielczarek [10], this is the most common approach, and such - that is most expected from local leaders. Its main strengths come from the fact that it is flexible and that it supports building coalitions and networks which involve a number of people into the process of strategy management and implementation. Such a style represents the highest potential for effective performance of leadership functions. Within this style a leader can flexibly react to the possibly changing structures



of local / regional leadership, emergence of new partners or stakeholders and the need to coordinate activities of different units or individuals. At the same time one should also remember about threats posed by conciliatory management style – i.e. problems with working out a coherent procedures for decision-making, and about tendency for quick growth of number of sectoral public policies created by local/regional government [12].

This approach - in a situation of good economic situation of a region and with traditionally strong engagement of citizens and businesses for the benefit of a region (which can be observed in Wielkopolska region, for example) – results for example in quick increase of number of non-for-profit organizations [5]. It enables the region's authorities to cooperate with other partners. Of the key role these days is engaging non-public resources in resolving problems of the public sphere. It is clearly established these days that effectiveness of regional and local authorities depends on ability to cooperate with other institutions [6]. One should also mention about a relatively new challenge which for an effective regional leadership – which is a **competitive cooperation** (a merger of *cooperate* and *compete* – resulting in *coopetition*). In the Polish language it starts to be phrased as *koopetycja* or *kooperencja*. This notion has first been introduced to the business sphere by R. Noord, the CEO of the Novell IT firm, while in the marketing science and strategic management, it was first promoted by Brandenburger i Nalebuff [16]. Despite of efforts at defining this term as “cooperation among business competitors in expectation of gaining mutual benefits”[8]; understanding of this concept is far from clear. A growing importance of *coopetition* – which takes place in the conditions of turbulent changes in the world's economy and of a theoretical evolution [16] - is a direction for this type of research in the Polish conditions.

A scientific reflection on the issues of convergence and divergence of specific countries, regions or sub-regions has been growing over the recent years [1]. This notion is used by economists most often for comparison of indicators related to human capital [11]. A typical research hypothesis under this approach has focused on differences of social capital between center and periphery. It leaves however unanswered an important questions of “whether and in what aspects” differences in character and access to social capital can be leveled, and where can we expect that this gap might be growing? It implies further research questions concerning leadership. New concepts, change in paradigms, and most recent research strongly suggest a need for considering a key role of leadership in economic concepts of development and growth.

CONCLUSIONS

Moving towards conclusions we shall mention apparent differences between concepts of human and social capital. For the latter the key components are; trust, social networks, social norms and obligations. We are still missing systematic empirical analyses in this sphere, especially in Poland [1]. A pioneering attempt at analyzing social capital in the context of quality of life were analyses led by J. Czapiński in the framework of „Social Diagnose 2009”. In the international context (see *European Social Survey 2006/7*), as well as through own research the author describes relationship between indicators of social development (the level of interpersonal trust and acceptance of democracy) with – among others – a sociological wellbeing measured by happiness and material level of life [2]. The authors of the research properly conclude that human capital is more important development factor than the social capital in poorer countries, where Poland still belongs. After reaching a certain level of material wealth in the country – a decisive factor becomes social capital. This explains why so far Poland has been developing relatively well in economic terms, despite very low level of social capital [5].

Where is then a key to effective leadership at the time of crisis? It comes clearly from the research of American psychologists: S. Rosenberg, C. Nelson, P.S. Vivekanathan [9], and in Poland from the work of B. Wojciszke [13] – that people assess other in two dimensions: effectiveness and morality (ethics). The authors show that approximately 70 percent of our assessments boils down to these two categories. Stephen Covey [3], the author of a number of books on leadership, a business

practitioner and academic lecturer, has conducted research among 54 thousands of American employees. He asked about key traits of a leader. He concluded that on the first place was personal integrity (rightness), then communication skills, follow by focus on people, visionary thinking and finally decision-making skills. A similar research has been implemented in Poland [13]. Employees who are subordinates to upper levels in the hierarchy were asked what are the key traits to be possessed by a good boss. Honesty has been placed on the first position, followed by intellect and professional competences. From both research comes clearly that an efficient leader shall focus first of all on own morality. Especially in difficult times personal honesty has a decisive importance for rebuilding of trust. Without trust in moral acts of business and political leaders, the world may not come out of crisis within a foreseeable future. Ban Ki Mun, a secretary general of UN also sees a solution to crisis in change of the model and quality of leadership [4]: *“we need a new understanding of business ethics and governance (...), which will be more open to empathy and less uncritical to the magic of the market.”*

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